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Frank Rabold Walker

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PRACTICAL
COST KEEPING
for CONTRACTORS

FRANK R. WALKER

Practical Cost Keeping FOR Contractors

A Book Giving a System of Accurate Cost
Keeping and the Methods Used for
Adapting It to All Classes of
Construction Work.

BY
FRANK R. WALKER

AUTHOR OF

"THE BUILDING ESTIMATOR'S REFERENCE BOOK."

*Second Edition, Revised
Illustrated.*

FRANK R. WALKER
168 North Michigan Avenue
CHICAGO
1918

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ROBERT O. LAW COMPANY
EDITION BOOK MANUFACTURERS
C H I C A G O, U. S. A.

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P R E F A C E .

In Present day competition among contractors of all classes of construction work, it is vitally important that the contractor, to be successful, should keep costs on the different branches of work performed by him. Costs stated in dollars and cents are not truly costs, for the reason that a cost in money in one locality may be absolutely worthless in another where wages are different.

Costs in order to be of value to the contractor and estimator in preparing future estimates should be stated in the quantity of each class of work a man will perform per hour or per day.

It is the purpose of this book to impart to contractors, timekeepers, superintendents, and foremen, the essentials of accurate cost keeping, and give the methods to be employed by which the maximum results may be obtained with a minimum amount of labor. For this reason, all the different kinds of forms and blanks that may be required on any job or in the contractor's office are illustrated and described.

In each instance the origin and all steps necessary to gather and compile the data from check-

ing the time on the job, subdividing the different classes of labor, and arriving at a basis for satisfactory units, are fully explained, so that the costs may be thoroughly reliable and dependable.

The author has kept time on a great many jobs and has had much experience in collecting and compiling cost data on different classes of construction work. The various illustrations and methods as described in this book are the perfected forms of several systems which were originated and worked out in actual work, making them results of actual practice and not the results of theory.

This book should be of especial interest to the bookkeeper or timekeeper who is just starting his career in the building or construction business; for the reason that if he has no knowledge of cost keeping, it will be necessary for him to have a certain amount of actual experience before he will be impressed with the importance of accurate cost keeping and the methods to be used in compiling same. A careful study of this book will give him a thorough understanding of the proper methods to pursue.

Illustrations and descriptions are also given on various forms in general use among contract-

ors, such as Estimate Sheets, Estimate Summary Sheets, Daily Construction and Material Reports, Labor Cost Records, Material Cost Records, and other forms which have been found satisfactory for use by contractors.

That this book will prove of much benefit to contractors and the construction business in general, is the wish of the author.

FRANK R. WALKER.

Chicago, June 1, 1916.

CHAPTER I

ESSENTIALS OF COST KEEPING

There have been a great many cost systems devised for the use of building contractors and others engaged in the construction business. Some of them have been very good, while others proved absolutely worthless; but in almost every case they have involved a vast amount of labor, either on the job or in the office; and the average building contractor has not been able to bear this expense.

Every contractor, no matter whether he employs only one man, should keep costs on his work; as it is only by checking the quantities of the different classes of work a mechanic will perform per day and the average for the job that a safe basis may be arrived at for preparing future estimates. There is always a certain amount of lost motion or lost labor in any piece of work, consequently it is not safe to watch a man for one day and base your assumptions on that performance. For example; a stone setter may set 200 cubic feet of stone in one day at a

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cost of only 10 or 12 cents per cubic foot, but perhaps before he could start setting any stone it was necessary to spend another 10 or 12 cents per foot to set derricks, sort, and place stone, etc., therefore, in all instances averages should be taken and any unusual conditions carefully noted.

Some contractors make no attempt to keep costs on the different classes of work, but figure the same price on every job; and after the work has been completed discover a loss, but are not able to tell just where the loss occurred. The result is that they continue figuring one class of work too high and another too low until they are awarded the contract for a large amount of difficult and expensive work, estimated considerably below what it is worth, and they not only lose everything they have, but are placed in debt for the balance of their life. If you wish to be a successful contractor, it is absolutely essential that you know what your work costs you in units of measure.

Any Cost System to be valuable must be simple and accurate; furnishing the desired information with the least amount of "red tape," so as to be readily understood by the time-keeper or foremen on the job; or, if necessary, by the

book-keeper in the office, when kept by him. No matter what system is used, unless the distribution of labor is accurate, the costs are absolutely worthless.

The author has been connected with many contractors in different parts of the country; and has made a study of cost-keeping on construction work, the systems employed by the various contractors, and the amount of labor involved in obtaining and tabulating the data. The system described in the following pages has been found to be absolutely reliable, very simple to keep; and gives the contractor more valuable and definite information than any other system in use by contractors.

COST SCHEDULE

In order to keep costs intelligently, it is necessary that a specific system or schedule be given wherein the different branches of work entering into the construction of any building be listed; so that when a certain item is encountered on the job, the foreman or time-keeper will be familiar with it and the methods by which the costs should be tabulated, in order to procure reliable data for use in the contractor's office.

The system may be as elaborate in detail as the contractor desires, or as simple as he sees

fit to make it; but in order to get the very best results, too many classes of work should not be kept together. The cost as obtained may be reduced to the cost per unit of measure in dollars and cents, or they may be further reduced to the lowest terms in hours, and the quantities stated in so many hours per unit of measure. This is by far the most satisfactory method to use.

The method of cost keeping as shown on the following pages was developed on the above basis and in it the reader will find that the same includes all the essential points of accurate cost keeping. The reader will also find that instead of dividing the costs on a specific branch of work into all its subdivisions as given in the cost schedule, the costs may be kept under the General heading; for example, instead of dividing the Masonry costs into nine subdivisions as given in the cost schedule, "FP-1," the symbol "FP-1" may be used to include all classes of masonry work as listed under Masonry in the cost schedule. This is not an altogether satisfactory method to use, particularly if it is desired to reduce the costs to units; but if it is to be used as a check against the estimate, to ascertain whether losses or gains have been made on a branch of work, it will prove very satisfactory.

GENERAL CONDITIONS

“A-P-1”

- (a) Superintendent.
- (b) Time-keepers.
- (c) Material Clerks.
- (d) Civil or Constructing Engineers.
- (e) Day and night watchmen.
- (f) Miscellaneous overhead expense.

“AP-2”

- (a) Labor required building hoisting towers for concrete construction, brick masonry, and general construction materials.
- (b) Labor required moving hoists.
Always give the number of hoists erected, description and height of same.

“AP-3”

- (a) Labor required building temporary offices, tool and cement sheds, temporary covering over engines, etc. Labor required removing same.
- (b) Labor required handling and placing hoisting engines, concrete mixers, air compressors, etc.
- (c) Labor required building and removing temporary protection over sidewalks, etc.

UNLOADING MATERIALS FROM CARS

“AP-5”

- (a) Labor required unloading crushed stone or gravel from the cars.
- (b) Labor required unloading sand used for concrete from the cars.
- (c) Labor required unloading sand used in brickwork from the cars.
- (d) Labor required unloading cinders, slag, etc., from the cars.

“AP-6”

- (a) Labor required unloading cement from cars and stacking in sheds.

“AP-7”

- (a) Labor required unloading common, hollow, and paving brick from the cars. (Where not necessary to put in piles).
- (b) Labor required unloading and stacking all kinds of press, face, or enamel brick.

“AP-8”

- (a) Labor required unloading and stacking hollow clay tile up to 4 inches in thickness. Measurement in square feet.
- (b) Labor required unloading and stacking hollow tile up to 6 inches in thickness.
- (c) Labor required unloading and stacking

- hollow tile up to 8 inches in thickness.
- (d) Labor required unloading and stacking hollow tile up to 10 inches in thickness.
 - (e) Labor required unloading and stacking hollow tile up to 12 inches in thickness.
 - (f) Labor required unloading and stacking hollow tile up to 15 inches in thickness.
 - (g) Labor required unloading and stacking all classes of hollow tile "back-up" blocks.

"AP-9"

- (a) Labor required unloading and putting into piles all kinds of lumber up to 3x12 inches.
- (b) Labor required unloading and putting into piles all kinds of lumber over 3x12 inches.

**WRECKING, SHORING AND
EXCAVATING**

"BP-1"

- (a) Men and teams required wrecking old buildings and removing rubbish.
- (b) Labor required shoring and underpinning for new foundations, in connection with basement walls, old buildings, etc.

“BP-2”

- (a) Men and teams required in general basement excavation, to excavate earth and remove from the premises.
- (b) Men and teams required excavating for trenches, piers, footings, etc., and removing surplus earth from premises.
- (c) Labor required grading and back-filling.

“BP-3”

- (a) Men and teams required excavating for caissons; including excavating, hoisting, placing lagging, placing iron rings, loading wagons, and removing excavated earth from premises.
- (b) Labor required placing concrete in caissons.

“BP-4”

- (a) Labor required with pile driver; driving either wood or concrete piles, including time of gang with pile driver, engineers, etc.
- (b) Labor required cutting off wood piles.

“BP-5”

- (a) Labor required placing either wood or steel sheet piling.

- (b) Labor required pumping water from excavation and piers.

**FOUNDATIONS OF CONCRETE, STONE,
RUBBLE, OR BRICK**

“CP-1”

- (a) Labor required building and erecting wood forms for concrete footings and foundation walls.
- (b) Labor required removing wood or metal forms and cleaning same.

“CP-2”

- (a) Labor required mixing and depositing concrete, including building runways, removing same, etc.
- (b) Labor required heating materials and water for concrete in freezing weather.
- (c) Labor required protecting concrete with temporary inclosures, straw, manure, paper, etc., during freezing weather.

“CP-3”

- (a) Labor required unloading reinforcing steel from cars and sorting same.
- (b) Labor required bending and placing reinforcement steel for concrete footings and foundations.

“CP-4”

- (a) Labor required on stone foundations, handling and placing.
- (b) Labor required on rubble walls and foundations, handling and placing materials.
- (c) Labor required on brick foundations and walls, handling and laying brick.

WATER AND DAMP PROOFING

“DP-1”

- (a) Labor required applying plaster coat of damp or water proofing. Area should be given in square feet.
- (b) Labor required applying water proof paints. Always state number of coats applied and area covered in square feet.

**CEMENT AND COMPOSITION FLOORS,
WALKS AND PAVEMENTS**

“EP-1”

- (a) Labor required placing wood screeds.
- (b) Labor required placing rough concrete.
- (c) Labor required mixing finish, and applying same, including cement finishers' time finishing floor.

“EP-2”

- (a) Labor required on stone or cinder con-

crete floor fill between wood floor sleepers.

- (b) Labor required placing concrete floor fill under tile and marble floors.
- (c) Labor required placing concrete or slag concrete floor fill, saddles, etc. Labor trowelling or floating surface of same.

“EP-3”

- (a) Labor required excavating for concrete curb and gutter. Costs should be given by the lineal foot of curb and gutter or by the cubic yard of excavation.
- (b) Labor required placing wood or metal forms for concrete and cement curb and gutter. Labor removing same.
- (c) Labor required placing rough concrete for concrete curb and gutter.
- (d) Labor required mixing and applying finish top on concrete curb and gutter.

“EP-4”

- (a) Labor required excavating for sewers. Costs should be given either by the lineal foot of sewer or by the cubic yard of excavation.
- (b) Labor required excavating and grading for all classes of pavements. State

whether excavating is being done with pick and shovels, scrapers, etc. Costs should be given either by the square or cubic yard of excavation.

- (c) Labor and teams required removing all classes of excavated earth from the premises. Costs should be given by the cubic yard or by the load.
- (d) Labor required rolling streets and subgrade with heavy roller before placing concrete, macadam, or other base.
- (e) Labor required hauling, placing, spreading and rolling macadam, slag, cinders, or other fill for streets and roads. Costs should be given either by the square or cubic yard.
- (f) Labor required mixing and placing concrete base for either concrete, asphalt, brick or wood block pavements. Costs should be given either by the square or cubic yard.
- (g) Labor required screening, spreading, rolling and screeding sand cushion under brick or wood block pavements. Costs should be given by the square yard of cushion placed, stating the thickness of same.

- (h) Labor required placing asphalt or composition filler and finish over concrete base. Labor required rolling same. Costs should be given by the number of square yards of pavement completed.
- (i) Labor required mixing and placing cement finish top on concrete pavements. Costs should be given either in square feet or square yards.
- (j) Labor required handling and placing paving brick, brick or wood paving blocks. Costs should be given by the square yard of pavement completed.
- (k) Labor required cutting and filling in brick around manholes, at street intersections, ends of streets, etc., which is commonly known as "butting in." Labor cost removing and replacing imperfect brick after the pavement has been inspected by the superintendent or engineer.
- (l) Labor required rolling brick, wood block, or asphalt pavements with roller.
- (m) Labor cost mixing and placing cement grout filler between paving brick or blocks. Costs should be given by the square yard of pavement grouted.

- (n) Labor required heating, handling and placing tar or composition filler between joints in pavements. Costs should be given by the square yard of pavement filled.
- (o) Labor required cleaning up and removing all rubbish from the premises after the job is completed. Take the total cost of the work and divide by the number of square yards of pavement in the job to arrive at the average cost per square yard of pavement.

“EP-5”

- (a) Labor required applying cement finish floors on top of old concrete floors.
- (b) Labor required on cement base. Give height of base and number of lineal feet.

For composition or mastic floors or base, use the same symbols as given for cement work, except add the letter “C” after numeral, as “EP-5C.”

**BRICK, STONE, GRANITE, TERRA
COTTA AND GENERAL MASONRY**

“FP-1”

BRICK MASONRY

- (a) Labor required making mortar, build-

- ing scaffold, handling, hoisting and laying common or hollow brick.
- (b) Labor required making mortar, building scaffold, handling, hoisting and laying paving brick or blocks in lime or cement mortar or sand cushion.
 - (c) Labor required making mortar, building scaffold, handling, hoisting and laying fire brick.
 - (d) Labor required making mortar, building scaffold, handling, hoisting and laying exterior and interior face brick. (Always state kind of bond, style of joints, etc.)
 - (e) Labor required making mortar, building scaffold, handling, hoisting and laying interior and special face brick.
 - (f) Labor required making mortar, building scaffold, handling, hoisting and laying enamel or glazed face brick, either interior or exterior work. (Always state size of brick and style of joint.)
 - (g) Labor required handling, hoisting and laying face brick, fire brick, etc., for mantels, fire places, hearths, etc.
 - (h) Labor required handling, hoisting, and setting terra cotta tile or cement flue

lining. Give number of lineal feet and size of tile lining.

- (i) Labor required handling, hoisting, and setting salt glazed coping. Give thickness of wall.

“FP-2”

- (a) Labor required unloading cut stone from cars, hauling to building, and unloading at building site.
- (b) Labor required cutting stone, lewising, carving, etc.
- (c) Labor required handling and setting cut stone.
- (d) Labor on miscellaneous stone work.

“FP-3”

- (a) Labor required unloading granite from cars, hauling to building, and unloading at building site.
- (b) Labor required cutting granite, lewising, carving, etc.
- (c) Labor required handling and setting granite.
- (d) Miscellaneous labor costs on granite.

“FP-4”

- (a) Labor required unloading architectural terra cotta from cars, hauling to building, and unloading at building site.

- (b) Labor required handling and setting terra cotta.

“FP-5”

Labor required cleaning and pointing brick work, cut stone, granite or terra cotta. Give number of brick in thousands and square feet of surface cleaned.

REINFORCED CONCRETE CONSTRUCTION

“GP-1”

- (a) Labor required framing and erecting all classes of plain slab forms.
- (b) Labor required framing and erecting all classes of beam and lintel forms.
- (c) Labor required framing and erecting depressions in flat slab work at column heads.
- (d) Labor required framing and erecting wood column forms for reinforced concrete or fire proofing. (Always state whether columns are square or octagonal.)
- (e) Labor required handling and erecting square, round, or octagonal metal column forms. (State kind of head used.)

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- (f) Labor required removing all classes of metal column moulds.
- (g) Labor required removing wood forms for all kinds of reinforced concrete construction, such as plain slabs, beam and lintel, and column forms.
- (h) Miscellaneous labor costs, cleaning old lumber, etc.

“GP-2”

- (a) Labor required handling cement, sand, and gravel to concrete mixer; labor on concrete mixer, spouts, hoppers, etc.; and the labor required wheeling concrete from hoppers and placing; also labor used in assisting dumping cars, carts or barrows; and the grading and spading of concrete. Labor required placing and removing runways.
- (b) Labor required heating sand, gravel, and water for concrete placed during freezing weather.
- (c) Labor required covering concrete with straw, paper, or other temporary protection during freezing weather. Labor attending salamanders, or temporary heat.

“GP-3”

- (a) Labor required unloading reinforcing steel from cars, hauling to building, and unloading at building site.
- (b) Labor required bending reinforcing steel for slabs, beams, or columns.
- (c) Labor required handling and placing reinforcing steel.

“GP-4”

- (a) Labor required handling and placing clay tile, gypsum blocks, or metal domes for floors, depending upon the system of floors in use.
- (b) Labor required placing expanded metal lath, etc., where same comes on top of wood forms.
- (c) Labor required placing hangers for metal lath or plaster board ceilings.
- (d) Labor required placing metal lath or plaster board ceilings directly under concrete floors, on hangers placed in the concrete.

HOLLOW TILE FIRE PROOFING

“GP-5”

- (a) Labor required handling, hoisting, and placing tile arches for floors up to 8 inches of thickness.

- (b) Labor required handling, hoisting, and placing tile arches for floors from 10 to 12 inches in thickness.
- (c) Labor required handling, hoisting, and placing tile arches for floors 13 and 14 inches thick.
- (d) Labor required handling, hoisting, and placing tile arches for floors 15 and 16 inches thick.
- (e) Labor required handling, hoisting, and placing tile for beam, spandrel and girder covering.
- (f) Labor placing and removing temporary wood forms or centering.

“GP-6”

- (a) Labor required handling, hoisting, and placing clay tile for partitions up to 4 inches in thickness.
- (b) Labor required handling, hoisting, and placing Gypsum tile for partitions up to 4 inches in thickness.
- (c) Labor required handling, hoisting, and placing clay tile for partitions up to 6 inches in thickness.
- (d) Labor required handling, hoisting, and placing Gypsum tile for partitions up

- to 6 inches in thickness.
- (e) Labor required handling, hoisting, and placing clay tile for partitions up to 8 inches in thickness.
 - (f) Labor required handling, hoisting, and placing Gypsum tile for partitions up to 8 inches in thickness.
 - (g) Labor required handling, hoisting, and placing clay tile for partitions up to 10 inches in thickness.
 - (h) Labor required handling, hoisting, and placing clay tile for partitions up to 12 inches in thickness.
 - (i) Labor required handling, hoisting, and placing book tile.
 - (j) Labor required handling, hoisting, and placing furring tile up to 3 inches in thickness.
 - (k) Labor required handling, hoisting, and placing clay tile for column covering.
 - (l) Labor required handling, hoisting, and placing clay "back-up" blocks for backing up face brick work or solid tile walls.
 - (m) Labor required handling, hoisting, and placing clay tile for furring up floors in toilets, pipe spaces, etc.

- (n) Labor required handling, hoisting, and placing roof tile, such as Federal Cement tile, Gypsum roof tile, etc.

ROUGH CARPENTRY

“HP-1”

- (a) Framing wood columns or posts, rounding corners, boring through center, and handling and placing.
- (b) Framing wood girders or beams, rounding or chamfering corners, and labor required in handling and placing.
- (c) Labor required framing and placing wood joists, rafters, etc., in mill constructed buildings. (State whether necessary to frame for joist hangers, stirrups, etc.)
- (d) Labor required framing and placing wood saddles, hips, valleys, etc., on top of flat wood roof, such as factories, etc.
- (e) Labor required framing and placing wood sills, joists, ceiling rafters, etc., in frame buildings.
- (f) Framing and placing wood studs for exterior and interior walls, such as frame buildings, partitions, etc. ; framed

in light lumber, such as 2x4, 2x6 and 2x8 inch material.

- (g) Labor required framing and placing straight, double pitch, or gable roofs on residences, barns, out houses, etc.
- (h) Framing and placing hip roofs, with hips, valleys, etc., as used on fancy residences, churches, etc.

“HP-2”

- (a) Labor required handling and placing wood sub-floors, wood sheathing on side walls, roofs, etc. (Laid straight.)
- (b) Same as above except laid diagonally.
- (c) Labor required handling and placing wood sub-floors in mill constructed buildings, such as 2x6, 3x6 inch lumber, etc.
- (d) Labor required handling and placing laminated wood floors in mill constructed buildings, such as 2x4, 2x6, 2x8, 2x10 and 2x12 inch lumber laid on edge and spiked together.

“HP-3”

- (a) Labor required handling and placing wood furring strips on brick or tile walls, etc. (Always state whether it

was necessary to plug walls and whether it was necessary to produce absolutely straight walls, as the cost of this work will vary from 100 to 200 per cent, depending upon the class of work performed.)

- (b) Labor required furring wood ceilings under wood joists. Same conditions as stated above.
- (c) Labor required placing wood grounds on brick or tile walls or partitions. (State whether it was necessary to plug walls, and whether it was necessary to produce absolutely straight work.)
- (d) Labor required placing wood grounds on wood stud partitions or wood furring strips. (State whether or not it was necessary to wedge or build out grounds to produce absolutely straight surface for plaster.)
- (e) Labor required handling and placing wood furring strips over wood sub-floor. (State whether or not it was necessary to wedge up strips to produce an absolutely level surface for finish wood floors.)

- (f) Labor required handling and placing wood floor sleepers or screeds over rough concrete floor, to be filled in with cinder or other concrete. (State class of work required.)
- (g) Labor required making and placing wood bucks for door openings.

“HP-4”

- (a) Labor required laying hardwood or other finish wood floors. If more than one kind of flooring on job, separate cost should be kept on each kind.
- (b) Labor required scraping, traversing, and sanding hardwood or other finish wood floors. (Give full information necessary as to number of operations required to make a finished job.)
- (c) Labor required laying parquetry floors. (Give complete description of floor.)
- (d) Labor required scraping, traversing, and sanding parquetry floors. (Give complete information as to number of operations necessary to make finished job.)

“HP-5”

- (a) Labor required dipping wood shingles in stain or creosote oils.

- (b) Labor required handling and laying wood shingles. (State whether laid with one or two nails to a shingle, distance to weather, etc.) Costs should be given per 1,000 shingles.

“HP-6”

- (a) Labor required framing for rough stairs; such as rear porches, open strings to basement, etc.
- (b) Labor required placing shelves and shelf cleats in pantries, closets, etc.

**MILL WORK AND INTERIOR FINISH,
STAIRS, ETC.**

“IP-1”

- (a) Labor required unloading mill work from cars, hauling to job, and placing inside of building.
- (b) Labor required assembling wood door and window frames, when sent to job K. D.
- (c) Labor required handling and placing wood door and window frames.
- (d) Labor required fitting wood sash. (State whether double hung or casement.)

- (e) Labor required hanging wood sash. (State whether double hung or casement.)
- (f) Labor required fitting and hanging wood doors.
- (g) Labor required trimming door openings. (Always state the number of sides of trim in place.)
- (h) Labor required trimming window openings, including the placing of jamb linings, stops, etc. (Always give the number of openings completed.)
- (i) Labor required handling and placing cases, book cases, wardrobes, etc.
- (j) Labor required setting wood mantels, shelves, brackets, etc.
- (k) Labor required handling and placing wood base. (State whether two or three member base.)
- (l) Labor required placing wood chair rail, wainscot cap, etc.
- (m) Labor required placing wood plate rail, wood cornice, etc. (State number of members.)
- (n) Labor required placing wood picture mould.

“IP-2”

- (a) Labor required handling and placing wood stair strings, treads, risers, etc. (State whether open or box strings.)
- (b) Labor required handling and placing wood hand rail, balusters, newels, etc. (Give number of newels set, lineal feet of hand rail, and number of balusters set.)

“IP-3”

- (a) Labor required placing jamb linings, stops, and casings for wood borrowed lights. (Give number of openings and average size of same.)

NOTE.

If interior finish is ART METAL instead of wood, use the same symbols as given above, with the exception of the heading on the Labor Distribution Sheet, instead of placing the symbols “IP-1” change to “IP-1 Metal,” etc., throughout.

**WOOD AND METAL LATHING AND
PLAIN AND ORNAMENTAL
PLASTERING, ETC.**

“JP-1”

- (a). Labor required unloading wood or

metal lath, channels, etc., from cars, hauling to building; and unloading at building. This includes all materials used in connection with lathing and furring.

- (b) Labor required handling and placing wood lath. State whether lath are 1 or 1½ inches wide. Quantities should be given per 1,000 lath or per 100 square yards.
- (c) Labor required handling and placing Sackett or other plaster board nailed to wood studs. Quantities should be given per 1,000 square feet or in square yards.
- (d) Labor required handling and placing metal lath on wood studs. Measurement should be given in square yards.
- (e) Labor required dipping or painting metal channels, angles or metal lath.
- (f) Labor required placing hangers, handling, bending, and placing channel iron and lath for suspended metal ceilings.
- (g) Labor required placing anchors, channel iron studs, and metal lath for solid metal and plaster partition. This in-

cludes such work as Hy-Rib, Rib-Trus, Corr-Mesh, etc.

- (h) Labor required bending, placing anchors, channels and metal lath for ornamental beams, cornices, brackets, etc.
- (i) Labor required placing wood furring, for ornamental plaster, cornices, beams, brackets, etc.
- (j) Labor required placing metal corner beads on wood studs or angles where beads are nailed directly to studs or wood. State whether necessary to plumb corner beads, etc. This will also apply to metal picture mould.
- (k) Labor required placing metal corner beads on brick or tile walls or partitions. (State whether necessary to plumb same. This will also apply to concealed metal picture mould.)

“JP-2”

- (a) Labor required unloading plastering materials from cars, hauling to job, and unloading at building site.
- (b) Labor required mixing materials, building scaffold, assisting plasterers, and plasterers' time applying scratch coat on wood or metal lath and brick or tile

walls and ceilings. On work of this kind measurement should be given in square yards and thickness of grounds mentioned.

- (c) Labor required mixing materials, building scaffold, assisting plasterers, and plasterers' time applying brown coat on wood or metal lath, brick or tile walls and ceilings.
- (d) Labor required mixing materials, building scaffold, assisting plasterers, and plasterers' time applying "skim" or white coat on interior work.
- (e) Labor required mixing materials, building scaffold, assisting plasterers, and plasterers' time applying sand finish coat on interior work.
- (f) Labor required mixing materials, building scaffold, assisting plasterers, and plasterers' time applying finish coat of Keene's cement, Adamant, or other cement finish plasters on interior work.
- (g) Labor required mixing materials, building scaffold, assisting plasterers, and plasterers' time applying finish coat of Keene's cement, Adamant, or

other cement finish plasters; blocked off to represent tile in squares 2x6 inches, 3x6 inches, etc.

- (h) Labor required applying finish coat of Caen cement plaster, either plain or blocked off to represent ashlar.
- (i) Labor required in connection with cement base from 6 to 8 inches high.
- (j) Labor required running ceiling coves or bull nose corners.

“JP-3”

- (a) Labor required mixing materials, building scaffold, assisting plasterers, and plasterers' time applying scratch coat on exterior walls of metal lath, wood lath, brick or tile walls. This applies to all classes of cement work such as Portland cement, Stone-kote, etc.
- (b) Labor required mixing materials, building scaffold, assisting plasterers, and plasterers' time applying brown coat on exterior walls of wood lath, brick or tile walls. This applies to all kinds of exterior plaster.
- (c) Labor time required mixing materials, building scaffold, assisting plasterers,

and plasterers' time applying float finish coat on exterior walls of Portland cement, Stone-kote, Kellastone or similar materials.

- (d) Labor required mixing materials, building scaffold, assisting plasterers, and plasterers' time applying rough cast finish coat on exterior walls of Portland cement, Stone-kote, Kellastone, or similar materials.
- (e) Labor required running exterior cornices in Keene's cement or Portland cement.

“JP-4”

- (a) Labor required making moulds and running ornamental cornices. If under one foot in girth measurement should be given by the lineal foot; if over one foot in girth, measure by the superficial foot.
- (b) Labor required sticking ornaments to plain plaster cornices, beams etc. Measurement should be taken by the lineal foot, and each row of enrichment should be so measured.
- (c) Labor required making models, etc., for ornamental plaster bases, caps, wall

and ceiling panels, cornice and beam enrichments. All work under one foot in girth should be measured by the lineal foot; over one foot in girth, measure by the superficial foot.

- (d) Labor required casting and making all classes of ornamental plaster work as given above. Measurements should be taken the same as given under (c).
- (e) Labor required sticking wall and ceiling panels in place after they had been cast in shop.
- (f) Labor required setting ornamental plaster bases, caps, figures, etc., in place, after they had been cast in shop.
- (g) Labor running wall rails and panel moulds under one foot in girth.
- (h) Labor required sticking wall rails and panel moulds in place after they have been cast in the shop. Measurements of the above items should be taken by the lineal foot.

**SHEET METAL WORK, CORNICES, SKY-
LIGHTS, METAL CEILINGS, FIRE
PROOF DOORS, AND WINDOWS**

“KP-1”

- (a) Labor required unloading material

- from cars, hauling to building and unloading.
- (b) Labor required handling and setting metal window frames.
 - (c) Labor required handling glass and glazing metal sash.
 - (d) Labor required handling and setting frames for metal doors.
 - (e) Labor required hanging and fitting metal doors, including the necessary hardware. (State whether sliding, swinging or folding doors.)
 - (f) Labor required handling and erecting metal skylights. State whether single, double pitch or hip. If side lights are included give number of same and whether stationary or pivoted.
 - (g) Labor required handling and erecting sash operating devices.
 - (h) Labor required handling and erecting vent ducts and ventilators. Give size and number.
 - (i) Labor required handling and placing metal eaves trough and gutter. Give number of lineal feet placed.
 - (j) Labor required handling and placing metal down spout.

“KP-2”

- (a) Labor required handling and placing metal ceilings. Measurement to be given in superficial feet.
- (b) Labor required handling and placing steel siding. Measurement to be given in superficial feet.
- (c) Labor required handling and placing sheet metal or copper cornices. If less than one foot in girth, give measurement in lineal feet; if over one foot in girth, give measurement in superficial feet.
- (d) Labor required handling and placing tin, lead, galvanized iron or copper roofing. State size of sheets, and whether finished with flat or standing seams. Measurement to be given in superficial feet.
- (e) Labor required handling and placing imitation tile roofing. Made to represent Spanish tile, Mission tile, etc. Measurement to be given in superficial feet.

**ROOFING, COMPOSITION, FELT, TILE,
ASBESTOS, SLATE, ETC.****LP-1''**

- (a) Labor required unloading material from cars, hauling to job, and unloading at building.
- (b) Labor required mopping roof, applying paper, and mopping same. Measurement should be given in square feet and always give the number of layers of paper and number of moppings required.
- (c) Labor required mopping felt and applying gravel on composition roofs. Give the quantity of gravel used for the entire job in order that the correct number of pounds may be calculated per square of roof.
Labor on **READY ROOFING** takes the same cost symbols as given above. Note the kind of roofing applied and the different operations required applying same.
- (d) Labor required handling and applying asphalt shingles. Measurement to be given in square feet; and the size

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of shingles and amount of nailing per shingle should always be noted.

- (e) Labor required handling and placing Asbestos shingles. Measurement should be the same as given under (d).
- (f) Labor cost of punching slate on job.
- (g) Labor required handling and applying roofing slate. Always give size of slate and measurement in square feet.
- (h) Labor required hoisting, handling, and placing Spanish or Mission roofing tile. Measurement in square feet.
- (i) Labor required hoisting, handling, and placing promenade or similar roofing tile. State whether laid in asphalt mastic or cement. Give size of tile and measurement in square feet.

“LP-2”

- (a) Labor required handling and placing felts or deadening quilts on floors.
- (b) Labor required handling and placing Beaver board or similar wall board on walls and ceilings.

INTERIOR MARBLE, SLATE AND
SCAGLIOLA WORK

“MP-1”

- (a) Labor required unloading materials from cars, hauling to job, and unloading at building.
- (b) Labor required handling and placing marble base. State height of same, and whether furnished with rough or smooth bottoms.
- (c) Labor required handling and placing marble wainscot cap. Give height of same, and measurement in lineal feet.
- (d) Labor handling and setting marble wainscot, toilet backs, etc. Give height of wainscot, and measurement in superficial feet.
- (e) Labor handling and placing wainscot on the rake. Measurement same as given above.
- (f) Labor required handling and placing marble stair treads.
- (g) Labor required handling and placing marble stair risers. On both treads and risers give length, width and thickness, and the number set in place.
- (h) Labor handling and setting marble

thresholds. Give number and length of same.

- (i) Labor required handling and setting marble plinths. Give number of plinths set.
- (j) Labor required handling and setting marble toilet partitions and stall partitions. Measurement should be given in superficial feet.
- (k) Labor required handling and setting marble stall fronts and rail. Measurement should be given in lineal feet.
- (l) Labor handling and setting marble counter tops and fronts. Measurement should be given in superficial feet.

“MP-2”

- (a) Labor handling and setting marble urinal floor slabs and similar work. Measurement should be given in superficial feet, and the number of pieces set.
- (b) Labor handling and setting marble floor tile, including cement fill underneath. Give size of tile and measurement in superficial feet.
- (c) Labor smoothing and polishing marble

floors. State whether hand or machine work, and area in superficial feet.

NOTE. For setting all classes of structural slate work, use same symbols as given under marble, except add "S" as "MP-2aS."

"MP-3"

- (a) Labor making models for scagliola columns, bases, caps, wall panels, etc. Measurement should be given in superficial feet, and number of pieces.
- (b) Labor making scagliola columns, bases, caps, wall panels, wainscot, etc. Measurement same as given under (a).
- (c) Labor polishing scagliola work. Measurement should be given in superficial feet.
- (d) Labor handling and setting scagliola after it had been delivered to job. Measurement should be given in superficial feet for columns, bases, caps, etc., and in lineal feet for base, door trim, panel rails, etc.

**TILE AND MOSAIC WORK, TERRAZZO,
ETC.**

"NP-1"

- (a) Labor unloading cars, hauling tile to

building, and unloading materials at the building site.

- (b) Labor mixing and placing cement floor fill (usually $2\frac{1}{2}$ to 3 inches thick) under tile and marble floors, etc. Measurement should be given in superficial feet.
- (c) Labor handling materials and laying tile floors where all classes of tile mounted on paper are used; such as, bath rooms, lavatories, vestibules, corridors, etc. This includes tile from $\frac{3}{4}$ to 1 inch in diameter, in rounds, hexagons, and squares. Measurement should be given in superficial feet; and in small spaces give the number of rooms completed.
- (d) Labor assisting tile setters, and time required laying tile floors for all classes of unmounted floor tile up to 3 inches in diameter. Measurement should be given as noted under (c).

“NP-2”

- (a) Labor assisting and laying quarry and other tile floors from 4x4 inches to 12x12 inches. State class of floor be-

- ing laid, size of tile, and area in superficial feet.
- (b) Labor required smoothing or polishing the various kinds of floor tile. Measurement should be given in superficial feet.
 - (c) Labor assisting and setting tile base (either cove or straight) in enameled, quarry, or plain cement tile. This includes all classes of base from 1x1 inch cove to base 8 inches high. Give height of base and measurement in lineal feet.
 - (d) Labor assisting and setting tile wainseot cap. Give height of cap and measurement in lineal feet.
 - (e) Labor assisting and setting enameled or other wall tile up to 6x6 inches. State size of tile used and measurement in superficial feet. In small rooms give number of superficial feet of wall tile in each room.

“NP-3”

- (a) Labor laying composition tile floors; such as cork, Arrow-lock, etc., where the tile are placed on top of cement finish floors. Measurement should be given in superficial feet.

- (b) Labor installing the various kinds of composition floors, such as Kellastone, Asbestone, Marbleloid, etc. Measurement should be given in superficial feet and state whether laid plain or blocked off to represent tile.
- (c) Labor installing composition base. Give height of base and measurement in lineal feet.

“NP-4”

- (a) Labor running terrazzo cove base. Give height of base and measurement in lineal feet.
- (b) Labor smoothing or polishing terrazzo base. Same rules for measurement as given above.
- (c) Labor installing monolithic terrazzo floors. Measurement should be given in superficial feet, and give extra time, if any, required on border.
- (d) Labor smoothing or polishing terrazzo floors. Measurement should be given in superficial feet, and state whether machine or hand smoothed or polished.

“NP-5”

- (a) Labor handling tile and setting mantel fronts. Measurement should be given

in superficial feet, and the number of fronts installed.

- (b) Labor installing tile hearths and back hearths for fire-places. Measurements should be given in superficial feet and the number of hearths installed.

GLASS AND GLAZING

“OP-1”

- (a) Labor unloading glass from cars, hauling to building, and unloading glass in building.
- (b) Labor handling and setting plain window glass in putty. Give number of lights set per hour or day and average size of glass.
- (c) Same as above, except glazed with wood stops.
- (d) Labor handling and setting plate glass in putty. Give number of lights set per hour or day and average size of glass.
- (e) Same as (d), except glazed with wood stops.
- (f) Labor handling and setting French plate mirrors. Give number of mirrors set and average size of same.
- (g) Labor glazing elevator doors, etc., with

metal stops. This includes all classes of glass, window, plate and mirrors. Give number of lights glazed and average size of same.

- (h) Labor glazing steel sash. Give average size of lights and number glazed per hour or day.
- (i) Labor glazing art or leaded glass in putty. Give average size of lights and number of lights glazed.
- (j) Same as above except glazed with wood stops.

PAINTING, VARNISHING AND DECORATING

“PP-1”

- (a) Labor unloading material from cars, hauling to building, and unloading at building site.
- (b) Labor applying primer coat on wood; such as, window frames, sash, doors, exterior wood work, weather boarded walls, etc.
- (c) Labor applying each additional coat after first coat on all classes of work as given above. Measurement should

be given per square containing 100 square feet.

- (d) Labor applying first coat on brick, rough plaster, cement and stone walls.
- (e) Labor applying each additional coat after first coat on all classes of work as given under (d). Measurement should be given per square containing 100 square feet.
- (f) Labor applying stain, filler, varnish, shellac, wax, etc., to interior wood work and interior finish. Separate time should be kept on each coat where possible. Measurement should be given per square containing 100 square feet.
- (g) Labor rubbing down all classes of interior wood work for rubbed finish. Measurements as noted above.
- (h) Labor applying stain, filler, shellac, varnish, or wax to hardwood floors. Separate time should be kept on each coat where possible, so as to note the difference in time required to apply the different materials. Measurement should be given per square containing 100 square feet.

“PP-2”

- (a) Labor applying wall size (either glue or hard oil) to plastered walls and ceilings.
- (b) Labor applying calcimine to plastered walls or ceilings. Measurement should be given per square containing 100 square feet.
- (c) Labor applying cold water paint, white wash, etc., to brick, wood or plaster walls and ceilings. This refers to work applied with brush, by hand, and measurement should be given per square containing 100 square feet.
- (d) Labor applying cold water paint by machine.
- (e) Labor applying paint to plastered walls and ceilings.
- (f) Labor stippling painted walls and ceilings.
- (g) Labor hanging paper on walls and ceilings. Measurement should be given by the number of single or double rolls applied.

**STRUCTURAL AND ORNAMENTAL
IRON AND STEEL WORK****“QP-1”**

- (a) Labor unloading structural steel from cars, hauling to job, and unloading at building.
- (b) Labor distributing structural steel from point of unloading at the job to derricks, ready for placing in the building.
- (c) Labor placing and raising derricks, hoisting engines, air compressors, removing same, etc.
- (d) Labor handling and placing structural steel. Structural steel is estimated by the number of tons of steel placed. State whether job is wall bearing or steel skeleton frame.
- (e) Labor placing steel lintels, cast iron columns, loose I beams, and other miscellaneous iron and steel. Give weight of materials placed.
- (f) Labor time required bolting connections. Give number of bolts placed.
- (g) Labor time required heating and driving rivets. Give number of rivets placed.
- (h) Labor placing and erecting steel stacks,

- etc. Give size of stack and weight of same.
- (i) Labor handling and placing miscellaneous iron sidewalk doors, area gratings, coal hole covers, coal hole doors, coal chutes, cast iron bumpers, etc.
 - (j) Labor assembling and erecting in place ornamental iron stairs, etc. Give detail of stair, story height, and a general description for reference.
 - (k) Labor assembling and erecting iron fire escapes, etc. Give number of stories, number of flights of stairs, number of platforms, width of stairway, etc.
 - (l) Labor handling and placing steel sash. Give number of sections placed and area in square feet.
 - (m) Labor assembling and placing ornamental iron, brass, or copper store fronts.
 - (n) Labor on miscellaneous ornamental iron work.

PLUMBING AND GAS FITTING

“RP-1”

- (a) Labor unloading materials from cars, hauling to building, and unloading at building site.

- (b) Labor roughing in for closets, bath tubs, urinals, lavatories, etc. Give average number of fixtures roughed in per hour or day.
- (c) Labor handling and setting fixtures, such as, bath tubs, lavatories, showers, toilets, urinals, slop sinks, etc.
- (d) Labor running gas pipe for ranges, fire places, lights, etc. Give number of lineal feet of pipe run and size of pipe.
- (e) Labor setting ranges, gas fixtures, etc.
- (f) Labor covering water pipes. Give number of lineal feet of pipe covered, kind of covering, and size of same.

**STEAM, HOT WATER, AND FURNACE
HEATING**

“SP-1”

- (a) Labor unloading material from cars, hauling to job, and unloading at the building.
- (b) Labor setting boiler. Give size of same and conditions of setting.
- (c) Labor bricking up boiler, breeching, etc.
- (d) Labor roughing in for radiators, etc. Give number of radiators roughed in per hour or day.

- (e) Labor setting radiators, valves, air cocks, etc., and labor required to make all necessary connections for same. Give number of radiators connected up per hour or day.
- (f) Labor setting temporary radiators, connecting and disconnecting same, etc. Give number of radiators set and connected per hour or day.
- (g) Painters' time painting or bronzing radiators. Measurement should be given in square feet of radiation painted.
- (h) Labor covering all kinds of pipes. Give size of covering, kind, and number of lineal feet installed.

ELECTRIC WIRING

“TP-1”

- (a) Labor unloading materials from cars, hauling to job, and unloading at building site.
- (b) Labor running conduit up to 1 inch in diameter, placing outlet boxes, receptacles, switches, etc. Give number of lineal feet placed together with size of same.

- (c) Labor running conduit up to 3 inches in diameter, placing outlet boxes, receptacles, switches, etc. Give number of lineal feet placed together with the size of same.
- (d) Labor installing switch boards, generators, dynamos, and all classes of electrical apparatus for power houses.
- (e) Labor installing and placing telephones. Keep separate time on running conduit and wires and placing telephone instruments.
- (f) Labor installing door bells, annunciators, etc. Give number installed.
- (g) Labor pulling wires, etc. Give number of lineal feet installed per hour or day.
- (h) Labor installing all classes of lighting fixtures. Give number of fixtures placed.
- (i) Labor handling and installing all classes of miscellaneous electrical work as required by the individual job.

**ALL CLASSES OF EXTRA WORK NOT
IN ORIGINAL CONTRACT**

“XP-1”

All classes of extra work on orders received from Architect or Owners, work

completed for sub-contractors, and any work that is not connected with the original contract, should bear an "X" symbol. The "Order for Change" sheet should bear any number; such as "XP-21," and the "Labor Distribution Card" on salmon color should bear the same number, so that the office can conveniently locate all expenditures that are chargeable to others and are not included in the original contract.

CHAPTER II

SHEETS USED IN THE TIME AND COST-KEEPING SYSTEM

All of the various kinds of sheets required in connection with this system are designed for use in the ordinary loose leaf binder; using sheets 4 by $6\frac{3}{4}$ inches which may be filed in the office on the ordinary loose leaf poster or in a card index; taking 5 by 7 inch cards. By using sheets of this size it is possible for the foreman or time-keeper to carry all necessary sheets with him on the job at all times for ready reference. This includes such sheets as the Weekly Expense Sheets, Foremen's Reports, Time and Pay-roll Sheets, Labor Distribution Sheets, and the Order for Change Blanks.

TIME AND PAY-ROLL SHEETS

In this system the Pay-roll sheet is also the time sheet and vice versa. The foreman or time-keeper enters the time on the sheet at the end of each working day; and when the pay-roll week ends, it is only necessary to enter the last day's time in the book, total the hours, and make

the necessary extensions; and the sheets are then ready for the office; or, if the pay rolls are not made up by the foreman or time-keeper on the job, the time for the last day is entered in the book and the sheets forwarded to the office for completion.

Where it is desirable or necessary to keep copies of the time or pay-roll sheets on the job, the sheets should be printed in purple copying ink; and the time-keeper or foreman should fill in the time and amounts either with copying ink or with a very hard indelible pencil. These sheets may then be placed in a regular letter press copy book, with the tissue sheets dampened according to instructions and placed in the letter press; and an exact duplicate of the original time and pay-roll sheet is produced. (This system may be used with all the various forms if so desired.) This takes but a very few minutes, and saves a large amount of time and labor copying all the names and time from the time book into the pay-roll book, eliminates the possibility of error, and reduces the cost of stationery nearly one-half; as it is not necessary to make a carbon copy of the original pay-roll sheets.

By using this system the copies as well as the original pay-roll sheets as turned into the home

METHOD USED IN KEEPING TIME 63

office, contain all the original checkings, marks, notations, etc., that were inserted by the foreman or time-keeper, such as late and absent marks, etc.

Another great advantage which this system enjoys over most any other time and pay-roll sheet is its great value in law suits, personal injury claims, etc. The original time sheets may be quickly produced showing the actual checkings of every man on the job; giving the time they started and quit work, and the number of men working each day. In law suits of delays, personal injuries, etc., these sheets are authentic, and cannot successfully be tampered with; and they furnish weighty evidence beyond dispute, whereas a copied pay roll cannot successfully be produced as evidence.

METHOD USED IN KEEPING TIME

Before the men start work in the morning they should report at the job office and give either their name or check number, or leave their brass check in the office. From this record the time-keeper enters on the time sheet a small dot at the left side of the small square, opposite the man's name, giving the day of the week; as it is from these dots he is able to tell what men have checked in for work in the morning and for whom

to look when the men are checked on the job during the day. If a man reports for work late, a small L is placed on the left side of the small square instead of the dot, and if the man leaves work before the close of the day, a small E is placed at the right edge of the small square, which designates the man left work early in the day. The men are checked while at work on the job, either three or four times a day, depending upon the time at the disposal of the time-keeper or foreman, and at intervals of about two hours.

As the time-keeper goes over the job he enters in the upper left hand corner of the small square, a symbol designating the class of work the man is performing at the time, for example, "C2" designates the man is working in the gang mixing and depositing concrete. Each time the men are checked on the job the symbols designating the class of work at which the men are engaged are entered as shown in the accompanying illustration (Figure 1), but if the man is working at the same thing all day, only the small symbol is repeated.

At the close of the day the men check out at the job office, giving either their names or check numbers, as they did in the morning; and from this record the time-keeper enters the complete

METHOD USED IN KEEPING TIME 65

Job No. <u>165</u>		FRANK R. WALKER COMPANY PAY-ROLL							Building <u>Central Hospital</u>		Week Ending <u>APR 13 1916</u>		Sheet No. <u>1275</u>	
Occu- sion	NAME	Check No.	F	S	S	M	T	W	T	Hours	Rate	Amount	Advance Pay-Roll	
"	Geo McGowan	101	8	4		8	8	7	8	43	40	1720		
"	Robt Gordon	102	8	4		8	8	7	8	43	"	1740		
"	W Johnson	103	8	4		8	8	8	8	44	"	1760		
"	W H Stokes	104	8	4		8	8	8	8	44	"	1760		
"	O Gordon	105	8	8		8	7	8	8	47	"	1880	500	
"	W Kelley	106	8	4		8	8	8	8	44	"	1760		
"	O Williams	107	7	4		8	8	8	8	43	"	1720		
"	Geo Garrison	108	8	4		8	8	8	8	44	"	1760		
"	J F Parker	109	8	2		8	6	8	8	40	"	1600		
"	W Burnel	110	8	4			4	6	8	30	"	1200	1200	
TOTAL												16900	1700	

Fig. 1. Time and Pay Roll Sheet.

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time for the day into the time and pay roll book. Always use a very hard pencil, preferably a "HHHH" for marking the small letters and symbols in the squares, as it is necessary the marks be very small and made with a sharp point, which is only satisfactorily obtained by using a pencil containing hard lead. For entering the time in the book, either copying ink or an indelible pencil (hard lead) should be used to produce a letter press copy.

The small symbols as given below are used to designate the various classes of work coming under the main classifications, and should be used in checking the time of the men on the job, as given in the preceding pages:

(a) (b) (c) (d) (e) (f) (g) (h) (i) (j) (k) (l) (m) (n)

∨ √ • - | × + ∨ ^ L J F 7 \

From the original check marks on the time sheets, the time-keeper goes through the sheets and totals the number of hours for each class of labor on the separate branches of work; and the total number of hours as totaled under the different classifications must check to the hour with the total number of hours as shown on the time sheets for that day. The Foreman's Re-

CHECK SYSTEMS USED AND IN USE 67

port is used in conjunction with the time-keeper's report, and by comparing the total number of hours on both sheets, the hours of each class of labor are entered on the Labor Distribution sheets as described in the following pages.

CHECK SYSTEMS USED AND IN USE

Every contractor uses some method of checking time, but nearly all of them use the brass check. Some companies have the men remove their checks from the board upon starting work in the morning and deposit them again at night upon leaving the job; but the most satisfactory method for all concerned is to have the men deposit their checks in the office or on the board upon reporting for work in the morning and taking their checks home with them at night. This is especially true in cases of sickness, accident or absence for any reason. If the man has been absent from work for several days or weeks, and has not been able to draw his pay, he still retains his check for identification purposes, and keeps it as long as there is money due him from the company. When the man is discharged, quits or leaves for any reason whatever, the check is "lifted" when he has received his pay. This system has been found much

more satisfactory than most any other now in use, as all checks hung on the board in the morning represent men working on the job.

In giving out brass checks to workmen it is well to keep the different trades separated as much as possible; for instance, laborers would have checks ranging in number from 1 to 150; carpenters from 151 to 200; masons 201 to 250, etc. In this way it is always possible to tell at a glance the occupation of any man employed on the job.

On the pay roll, all the men of one occupation should be placed on sheets together, as this will avoid much confusion and save considerable time in checking the men on the job, and furthermore, in making up the pay rolls at the end of the week all men of one rate are together.

FOREMAN'S REPORT

Each foreman on the job has a loose leaf book similar to the one carried by the time-keeper. In this book are carried the Foreman's Report sheets, as illustrated in Figure 2. At the close of each working day the foreman makes a report of the men who have been working under him and what they have been doing. For instance, if the carpenter foreman has 15 carpenters work-

FOREMAN'S REPORT

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Job		DESCRIPTION OF WORK		Quantity Work	Hours	Total Hours
Frank R. Walker Company Foreman's Report Central Hospital		Date MAY 15 1916		Job No. 165		
Occu- pation	No. of Men					
10	10	Laying setman face brick		3400	4	40
2	2	Sloping floor tile 2nd floor		3650	8	16
1	1	Setting floor lining		20	2	2
10	10	Common brick		9000	4	40
4	4	Laying face brick		3400	4	16
9	9	Common brick		9000	4	36
6	6	Laying tile & half masonry		3650	8	48
2	2	Masonry mortar			8	16
2	2	Laying 2nd floor			4	8
1	1	Working brick tile 4th			8	8
TOTAL						
Signed E. E. Wald Foreman						

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Fig. 2. Foreman's Report.

ing 8 hours each, he will have to account for 120 hours carpenter time, and this method may be repeated to cover every foreman and trade working on the job.

It is not necessary that the foreman reports the quantity of work performed each 8 hour day, as it has been found that many very good foremen are unable to do this class of work; so it may be left to the job office to complete; or the quantities may be checked once a week and, included on the Labor Distribution sheet when the pay rolls are totaled. It is absolutely essential that the foreman reports the number of hours employed on any piece of work, the total to agree with the number of men working during the day.

From the time sheets and the Foreman's Report the time-keeper is able to check the number of hours time for all classes of labor required to complete any certain piece of work; and from the result of the checkings entered in the time book and the Foreman's Report, the time is entered onto the Labor Distribution sheets. If there were 20 carpenters working 8 hours, 25 masons working 8 hours and 35 laborers working 8 hours, it would be necessary for the time-keeper to account for 160 hours carpenter time, 200

hours mason time and 280 hours laborers' time, and this time may be divided so as to cover twenty-five branches of work.

LABOR DISTRIBUTION SHEETS

The labor distribution sheets or cards are printed on either yellow paper or cardboard, depending upon the filing system in use—whether a loose leaf binder or a card index system. The yellow card is used to distinguish it from any other sheet in use ; so that a glance will show it to be a Labor Distribution sheet. Where there is extra work involved or charged against sub-contractors, a salmon colored card is used and from this color the home office distinguishes items that are to be charged as extras to the original contract or work completed for sub-contractors.

Every week one card is made out for each branch of work being performed and each day the time is entered from the original time and pay roll sheets and Foreman's Report to the Labor Distribution sheets. For instance, if there are 350 hours for laborers during any one day, 100 hours may be charged against masonry, 25 hours to cut stone work, 200 hours to reinforced concrete, etc., until the entire 350 hours are accounted for and this same system will work out

for every trade employed upon the building. At the end of the week when the Pay Roll sheets are totaled up, the Labor Distribution sheets are totaled in the same way, and the two should balance to the cent, unless an odd rate is in use when it will be necessary to add or deduct a few cents to make the cards balance with the pay roll.

If the time is entered on the Labor Distribution sheets on the job, the totals of both the Pay Rolls and the Distribution Sheets may be extended in the office; where the men on the job are too busy or perhaps not capable of doing this work. The totals from one week to the next, and the entire back of the card may be worked out in the office, providing the necessary information regarding the amount of work in place is furnished from the job.

To many contractors the information given on the front of the card will prove sufficient, and they will find the use of the back of the card unnecessary; but to the contractor who is doing work in all parts of the country and desires to reduce all classes of work to units of measure per man hour for use on future estimates, the information as given on the back of the card will prove valuable and complete. If desired, this information may be worked up from the cards

LABOR DISTRIBUTION SHEETS 73

at the completion of the job but it will be much easier and more satisfactory to keep the cards up to date as the job progresses.

At the completion of the job the last card issued on any branch of work may be filed; and this one card will contain a complete summary of the job from start to finish. The other cards may be destroyed or filed in the vaults if so desired.

The front of the distribution sheet gives the amount of work completed up to the past week, the work completed the present week, and the total quantity of work completed to date. The pay roll costs from the beginning of the job up to the present time are also given, together with the average labor cost per unit of measure up to the past week, present week, and the average cost to date. The quantity of work a mechanic averaged per 8 hour day from the start of the job up to the present time is also given.

The back of the card analyzes all costs and reduces them to their lowest possible terms in money, hours, and the time required to complete any certain unit of work.

The Unit Labor Costs as given at the top of the card show where it cost \$7.00 per thousand to lay common brick, of this amount \$4.50 was

for masons; \$1.40 was for laborers assisting masons; 60 cents was for men making mortar; and 50 cents was for laborers building scaffold; thereby making it possible to know just where and how the different costs were arrived at. It is not necessary to write in the squares, numbered 1, 2, 3, 4, 5, 6, 7 and 8, giving the occupations, unless desired; as the front of the card is numbered in the same manner, so by merely turning the card it is possible to see just what class of mechanics were employed in the construction of the work.

The Total Labor Hours columns give the total number of hours required by each class of mechanics to complete the job, first are given the number of hours up until the present week; then the number of hours required during the present week; and the lower columns show the total number of hours to the present time. This is very valuable where it is desired to reduce the costs on the entire job to man hours per unit of measure.

The Labor Hours Per Unit columns give the average number of hours of the different classes of labor to complete a certain amount of work, viz.: a thousand feet of lumber, a thousand brick, one hundred square feet of concrete forms, etc.

COST ANALYSIS RECORD								
UNIT LABOR COSTS							UNIT	
	1	2	3	4	5	6	7	
Previous							8	
This Week								
Total								
TOTAL LABOR HOURS								UNIT
	1	2	3	4	5	6	7	
Previous							8	
This Week								
Total								
LABOR HOURS PER UNIT								UNIT
	1	2	3	4	5	6	7	
Previous							8	
This Week								
Total								

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Fig. 4. Back of Labor Distribution Sheet.

This column is also very valuable to the contractor who does work in many parts of the country at varying wage scales; as he can tell at a glance just how many hours of each class of labor are required to complete any piece of work.

HOW TO KEEP COSTS

In order to keep costs so that they may be of value to the contractor in preparing future estimates, it is important that they be kept in identically the same manner in which new work is to be estimated; the units of measures should be kept the same, and the costs and hours should be compiled accordingly.

In order to make this plain to those who have never made an attempt to keep unit costs on their work; to give the time-keeper on the job exactly the information required in the office, and to give the bookkeeper or estimator the information necessary to reduce the costs to working units; the different branches of work will be dealt with and practical examples showing the cards in use under varying conditions will be given. This will give those who are not familiar with cost keeping the necessary information to compile valuable data on all classes of work.

CHAPTER III

GENERAL CONDITIONS

The branch of work covered by General Conditions gives the pay roll cost of the Superintendents, time-keepers, material clerks, civil or constructing engineers, day and night watchmen and other miscellaneous pay roll expense in connection with the job. All the above items are generally figured as overhead expense and are non-productive labor. The pay roll covering plant, temporary offices, tool and cement sheds, hoisting towers, placing derricks, etc., are all general expense, as it will cost just as much to build a tower to hoist 500 yards of concrete as one to hoist 5,000 yards, so when the plant costs are charged directly to the different branches of work using them the ratio of proportions are unfair. All plant and equipment charges should be charged to a special account in order that the costs as reduced to units of measure may be of value.

Figure 5 shows the distribution sheet as used under General Conditions, and showing the vari-

ous classes of men employed and charged to General Conditions. Under pay roll costs are given the total expenditures on the job to the present time.

Building <u>Central Hospital</u>		Frank R. Walker Company							Sheet No. <u>1</u>		
Class <u>"AP-1"</u>		LABOR DISTRIBUTION							Job No. <u>165</u>		
OCCUPATION		Week Ending <u>APR 6 - 1916</u>							Job No. <u>165</u>		
		F	S	S	M	T	W	T	HOURS	RATE	AMOUNT
1	Superintendent	8	H			8	8	8	44	50-	50.00
2	Timekeeper	8	H			8	8	8	44	25-	25.00
3	Civil Engineer	8	H			8	8	8	44	25-	35.00
4	Watchman	17	17	24	17	17	17	804	22-	16.00	
5	Mason Foreman	8	H			8	8	8	44	42-	42.00
6	Carp. "	8	H			8	8	8	44	40-	40.00
7	Labor "	8	H			8	8	8	44	20-	20.00
Total											228.00
	Quantity Work in Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day	Quantity Work in Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day			
	Previous	1528.00									
	This Week	228.00									
	Total	1756.00									

Fig. 5. Keeping Costs on General Expense.

Figure 6, which is the back of figure 5, analyzes the costs, and shows just what portion of \$1,756.00 was spent for superintendent, timekeeper, civil engineer, watchmen, mason, carpenter, and labor foreman, together with the total number of hours put in by the different professions and trades.

You will note that all foremen's time is carried under General Conditions. This is not customary, but at the same time it is the proper

charge. For instance, if the mason foreman's time is charged against masonry, and there are three or four weeks of bad weather with only ten or fifteen thousand brick laid, the cost of

COST ANALYSIS RECORD								
UNIT LABOR COSTS				UNIT				
	1	2	3	4	5	6	7	8
Previous	350.00	175.00	245.00	112.00	252.00	240.00	107.00	
This Week	50.00	75.00	35.00	16.00	42.00	40.00	20.00	Total
Total	400.00	200.00	280.00	128.00	294.00	280.00	174.00	1,756.00
TOTAL LABOR HOURS				UNIT				
	1	2	3	4	5	6	7	8
Previous	308	308	308	672	308	308	344	
This Week	44	44	44	96	44	44	44	
Total	352	352	352	768	352	352	388	
LABOR HOURS PER UNIT				UNIT				
	1	2	3	4	5	6	7	8
Previous								
This Week								
Total								

Fig. 6. Analyzing Costs on General Expense.

laying same will be enormous, and still the men may be doing a fair day's work every day. All foremen's time should be charged under general conditions and then the costs will give the actual time employed by mechanics and helpers to accomplish a certain piece of work. The same thing is applicable to every branch of building or construction work.

Figure 7 gives the cost of constructing a brick hoist 80 feet high for use with double

GENERAL CONDITIONS

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Building Central Hospital		Frank R. Walker Company						Sheet No. <u>2</u>		
LABOR DISTRIBUTION		LABOR DISTRIBUTION						Job No. <u>165</u>		
Class <u>"HP 2"</u>		Week Ending <u>APR 6 - 1916</u>						Total		
OCCUPATION	F	S	S	M	T	W	T	HOURS	RATE	AMOUNT
1 <u>(u) Carpenters</u>	16	4		32	16	16	—	84	70	5880
2 <u>Laborers</u>	8	4		24	8	16	—	60	40	2400
3 <u>Riggers</u>	—	—		—	8	8	—	16	75	1200
4										
5										
6										
7										
8										
Total									94.80	
	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day		
Previous	<u>Brick Work</u>	17.60								
This Week	<u>Roofing</u>	94.80								
Total	<u>Dbl Gage</u>	112.40								

Fig. 7. Keeping Cost on Plant Charges.

cages; giving the cost last week, the cost this week, and the total cost of same. Figure 8,

COST ANALYSIS RECORD								
UNIT LABOR COSTS				UNIT				
	1	2	3	4	5	6	7	8
Previous	9.60	8.00	—					
This Week	58.80	24.00	12.00					
Total	68.40	32.00	12.00					Total 112.40
TOTAL LABOR HOURS				UNIT				
	1	2	3	4	5	6	7	8
Previous	14	20	—					
This Week	84	60	16					
Total	98	80	16					
LABOR HOURS PER UNIT				UNIT				
	1	2	3	4	5	6	7	8
Previous								
This Week								
Total								

Fig. 8. Analyzing Costs on Plant and Equipment.

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which is the back of figure 7, gives the time for carpenters, laborers, and engineers in the construction of same, and the total number of hours required by each trade.

Building: <u>Central Hospital</u>		Frank R. Walker Company LABOR DISTRIBUTION		Sheet No. <u>3</u>						
Class: <u>HP-3</u>		Week Ending <u>APR 6 - 1916</u>		Job No. <u>165</u>						
OCCUPATION	F	S	S	M	T	W	T	HOURS	RATE	AMOUNT
1 (a) <u>Carpenters</u>	16	8		16	16	16	—	72	70	5040
2 <u>Laborers</u>	8	8		8	8	4		36	40	1440
3										
4										
5										
6										
7										
8 <u>1 Shanty 12' x 30' - 1 Office 17' x 20'</u>										
Total										<u>6480</u>
	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day		
Previous	<u>77</u>	<u>52.70</u>	<u>7.53</u>	<u>1100</u>	<u>74</u>					
This Week	<u>77</u>	<u>64.80</u>	<u>9.26</u>	<u>778'</u>						
Total	<u>147</u>	<u>117.50</u>	<u>8.39</u>	<u>939'</u>						

Fig. 9. Costs on Constructing Temporary Buildings.

Under figure 9 are given the costs of building the temporary shanty or office, the size of same, and the number of feet of lumber required. The total pay roll cost to date is given, together with the average cost per thousand feet of lumber, and the quantity of lumber a man will handle and frame per 8 hour day. On the back of this card, figure 10, are given the separate units, showing just what items are included in the total cost, the number of hours worked

by the various classes of labor from the start of the job to the present time, and the number of hours required for carpenters and laborers to handle and frame a thousand feet of lumber.

COST ANALYSIS RECORD								
UNIT LABOR COSTS				UNIT <i>Per 1000 ft. lumber</i>				
	1 Carp	2 Labor	3	4	5	6	7	8
Previous	5.20	2.33						
This Week	7.20	2.06						
Total	6.20	2.19	8.39					
TOTAL LABOR HOURS <i>to date</i>				UNIT <i>Per 1000 ft. lumber</i>				
	1 Carp	2 Labor	3	4	5	6	7	8
Previous	52	40 $\frac{3}{4}$						
This Week	72	36						
Total	124	76 $\frac{3}{4}$						
LABOR HOURS PER UNIT				UNIT <i>Per 1000 ft. lumber</i>				
	1 Carp	2 Labor	3	4	5	6	7	8
Previous	7 $\frac{1}{2}$ hrs	5 $\frac{1}{4}$ hrs						
This Week	10 $\frac{1}{4}$ "	5 $\frac{1}{4}$ "						
Total	8 $\frac{3}{4}$ "	5 $\frac{1}{4}$ "						

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(Over)

Fig. 10. Analyzed Costs on Temporary Structures.

UNLOADING MATERIAL FROM CARS

On jobs where the different materials are delivered on cars, it is well to keep separate costs of the unloading, as there are a great many jobs where the materials are delivered by truck, and a comparison of costs would not be possible unless the unloading were kept separately.

On the cost schedule as given on the preceding pages are included all items that enter into the construction of an ordinary building;

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so that reference to this schedule will give the reader an idea of the class of materials to be unloaded and the basis for keeping costs on same.

OCCUPATION		F	S	S	M	T	W	T	HOURS	RATE	AMOUNT	
1	(a) Laborers	32	16					48	96	40	38.40	
2	(b) Laborers				18	20	22		60	40	24.00	
3	(c) Laborers											
4												
5												
6												
7												
8												
Total		(a)						(b)		62.40		
	Quantity Work in Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day	Quantity Work in Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day				
Previous	157	40.00	25 1/2	12 1/2 Yds	80	73.60	29 1/2	10.40				
This Week	153	38.40	25	13 h	75	24.00	32	10 "				
Total	310	78.40	25	13 "	155	47.60	31	10 "				

Fig. 11. Costs on Unloading Sand and Gravel from Cars.

Under figure 11 are given the time required by laborers unloading sand and gravel from the cars; the quantity of each unloaded, together with the total pay roll cost to date and the average labor cost per cubic yard. The average number of cubic yards a man will unload per 8 hour day are also given. On the back of this card, figure 12, are given the separate labor costs and the total number of hours worked by each class of workmen, and the column at the

bottom of the card gives the average time for a laborer to unload a cubic yard of sand or gravel.

COST ANALYSIS RECORD (a) Cu. Yd. Gravel UNIT (b) " " Sand								
UNIT LABOR COSTS								
	1 (a)	2 (b)	3	4	5	6	7	8
Previous	75 ¹ / ₂	38 ¹ / ₂						
This Week	75	32						
Total	75	31						
TOTAL LABOR HOURS								
	1 (a)	2 (b)	3	4	5	6	7	8
Previous	100	59						
This Week	96	60						
Total	196	119						
LABOR HOURS PER UNIT								
	1 (a)	2 (b)	3	4	5	6	7	8
Previous	38 ⁷ / ₁₀ Min.	44 ¹ / ₂ Min.						
This Week	37 ¹ / ₂ "	48 "						
Total	38 "	46 "						

Fig. 12. Analyzed Costs on Unloading Sand and Gravel.

Figure 13 illustrates the method used in unloading both common and face brick. The number of thousands of each kind of brick unloaded to date, the pay roll cost of same, and the average cost of unloading one thousand brick. The number of thousand brick a laborer will unload per 8 hour day are also given. On the back of this card, figure 14, are given the separate unit costs which go to make up the total costs as given on the front of the card. The total number of hours required to complete the entire

job are given, and the number of hours required to unload both one thousand common and one thousand face brick are also given.

Building Central Hospital		Frank R. Walker Company							LABOR DISTRIBUTION		Sheet No. <u>5</u>
Class <u>"A.P. 7"</u>		Week Ending <u>APR 6 - 1916</u>							Job No. <u>165</u>		
OCCUPATION		F	S	S	M	T	W	T	HOURS	RATE	AMOUNT
1	(a) Laborers	32	8				16	16	72	40	2880
2											
3											
4											
5	(b) Laborers	32				32			64	40	2560
6											
7											
8											
Total		(a)							(b)		57760
	Quantity Work in Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day	Quantity Work in Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day			
Previous	200 77	97.00	.48 ¹ / ₂	66.00	50 77	44.00	.88	3.636			
This Week	60 77	28.80	.48	66.66	27 77	25.60	.95	3.375			
Total	260 77	125.80	.48	66.24	77 77	69.60	.90	3.444			

Fig. 13. Labor Costs on Unloading Brick from Cars.

COST ANALYSIS RECORD (a) 1,000 Com Brick								
UNIT LABOR COSTS				UNIT (b) 1,000 Face "				
	1 (a)	2 (b)	3	4	5	6	7	8
Previous	.48 ¹ / ₂	.88						
This Week	.48	.95						
Total	.48	.90						
TOTAL LABOR HOURS				UNIT				
	1 (a)	2 (b)	3	4	5	6	7	8
Previous	242 ¹ / ₂	110						
This Week	72	64						
Total	314 ¹ / ₂	174						
LABOR HOURS PER UNIT				UNIT (c) Per 1,000 Com Brick				
	1 Com	2 Face	3	4	5	6	7	8
Previous	1 ¹ / ₄ hr	2 ¹ / ₅ hr						
This Week	1 ¹ / ₅ "	2 ¹ / ₅ "						
Total	1 ¹ / ₄ "	2 ¹ / ₄ "						

Brick.

Fig. 14. Method of Analyzing Costs on Unloading

Building <u>Central Hospital</u>		Frank R. Walker Company		LABOR DISTRIBUTION							Sheet No. <u>6</u>	
Class <u>"AP-8"</u>		Week Ending <u>APR 6 - 1916</u>							Job No. <u>165</u>			
	OCCUPATION	F	S	S	M	T	W	T	HOURS	RATE	AMOUNT	
1	(a) Laborers	30	—	—	26	16	8	—	80	40	3200	
2												
3												
4	(c) Laborers	16	—	—	32	32	—	—	80	40	3200	
5												
6												
7												
8												
Total		(a)							(c) <u>6400</u>			
	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per Hour Day	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per Hour Day				
Previous	<u>2774'</u>	<u>80.00</u>	<u>2.96</u>	<u>1,080</u>	<u>12,800'</u>	<u>31.00</u>	<u>6.20</u>	<u>576</u>				
This Week	<u>1174'</u>	<u>32.00</u>	<u>2.91</u>	<u>1,100</u>	<u>4,500'</u>	<u>32.00</u>	<u>7.11</u>	<u>450</u>				
Total	<u>3800'</u>	<u>112.00</u>	<u>2.95</u>	<u>1,086</u>	<u>9,500'</u>	<u>63.00</u>	<u>6.63</u>	<u>481</u>				

Fig. 15. Distribution and Costs on Unloading Hollow Tile.

Under "AP-8," figure 15, are given the costs of unloading hollow building tile. The total

COST ANALYSIS RECORD								
UNIT LABOR COSTS			UNIT (a) Per 1,000 Tile 4" Thick					
	1 a	2 c	3	4	5	6	7	8
Previous	2.96	6.20						
This Week	2.91	7.11						
Total	2.95	6.63						
TOTAL LABOR HOURS			UNIT					
	1 a	2 c	3	4	5	6	7	8
Previous	200	77½						
This Week	80	80						
Total	280	157½						
LABOR HOURS PER UNIT			UNIT (b) Per 1,000 - 4" Tile					
	1 a	2 c	3	4	5	6	7	8
Previous	7½ Hrs	15¾ Hrs						
This Week	7¼ "	17¾ "						
Total	7½ "	16¾ "						

Fig. 16. Method of Analyzing Costs on Unloading Tile.

quantity of the different size tile are given and the pay roll cost of each to date. The unit costs are given per square foot of tile and the average number of each kind of tile a man will unload per 8 hour day. On the back of this card, figure 16, the separate unit labor costs are given, and the total number of hours worked by the laborers on the job. The bottom column gives the number of hours required to unload a thousand square feet of 4 and 12 inch tile.

CHAPTER IV

WRECKING, SHORING AND EXCAVATING

Under this heading will come the labor and teams required to wreck old buildings and remove the rubbish from the premises; also the cost of shoring and underpinning old buildings and foundations are included. It is difficult to reduce the cost on this work to units that will be of value to any future time, as there are no standards by which this work may be measured.

In estimating the cost of excavation, measurement is invariably taken by the cubic yard; therefore, the costs should be kept in the same manner if they are to be valuable for pricing other work under similar conditions.

If a steam shovel is being used for the general excavation, the number of days time required by the shovel, and the number of men required to handle same should be given so as to get the average daily output of the shovel. If the excavating is being done by laborers the average cost per cubic yard should be kept and the num-

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ber of yards a man will excavate per 8 hour day. In giving the number of teams required, always give the size of the wagon, the amount of loose earth carried at each load, the number of loads made per day by each team, and the distance of the haul.

Building <u>Central Hospital</u>		Frank R. Walker Company						Sheet No. <u>64</u>		
Class <u>"B.P.R."</u>		LABOR DISTRIBUTION						Job No. <u>165</u>		
		Week Ending <u>APR 6 - 1916</u>								
OCCUPATION	F	S	S	M	T	W	T	HOURS	RATE	AMOUNT
1 (a) <u>Laborers</u>	<u>160</u>	<u>80</u>		<u>152</u>	<u>24</u>	<u>24</u>	<u>16</u>	<u>456</u>	<u>.75</u>	<u>114.00</u>
2 <u>Teams</u>	<u>48</u>	<u>24</u>		<u>40</u>	<u>8</u>	<u>8</u>	<u>8</u>	<u>136</u>	<u>.75</u>	<u>102.00</u>
3										
4										
5										
6										
7										
8										
Total	<u>"A" Laborers</u>			<u>"B" Teams</u>						<u>216.00</u>
	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day		
Previous	<u>7150 Yds</u>	<u>\$60.00</u>	<u>.40</u>	<u>5442</u>	<u>7150 Yds</u>	<u>641.00</u>	<u>.90</u>	<u>79.11</u>		
This Week	<u>300 "</u>	<u>114.00</u>	<u>.38</u>	<u>54 "</u>	<u>300 "</u>	<u>102.00</u>	<u>.34</u>	<u>18 "</u>		
Total	<u>2450 "</u>	<u>974.00</u>	<u>.393</u>	<u>5 "</u>	<u>2450 "</u>	<u>747.00</u>	<u>.304</u>	<u>19 1/2 "</u>		

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Fig. 17. Keeping Costs on General Excavation.

Under figure 17 are given the costs of general excavation. The number of cubic yards and the total pay roll cost of same, together with the unit cost per cubic yard and the average number of cubic yards a laborer will excavate per 8 hour day. The second column gives the number of cubic yards of earth removed from the premises, the total pay roll costs for teams,

the average cost per cubic yard, and the number of yards removed by each team per 8 hour day. On the back of this card, figure 18, are

COST ANALYSIS RECORD (A) Excavating Cu. Yd.								
UNIT LABOR COSTS				UNIT				
	1 Exc.	2 Haul	3	4	5	6	7	8
Previous	40	30						
This Week	38	34						
Total	39 1/2	32 1/2						
TOTAL LABOR HOURS				UNIT				
	1 Exc.	2 Haul	3	4	5	6	7	8
Previous	3440	860						
This Week	456	136						
Total	3896	996						
LABOR HOURS PER UNIT				UNIT				
	1 Exc.	2 Haul	3	4	5	6	7	8
Previous	1 1/2 Hrs	1 Hrs						
This Week	1 1/2 "	1 1/8 "						
Total	1 3/8 "	1 "						

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Fig. 18. Analyzed Costs on General Excavation.

given the separate units for laborers and teams; the total number of hours worked by both the laborers and teams, the average time required to excavate and load one cubic yard of earth, and the time required by each team to haul and dump one load.

Excavating for caissons should be kept separate; the time required by laborers excavating the earth, placing the lagging and iron rings, and the time required by the man on the winch and the laborers loading the wagons. If the

costs are kept in this manner, it is possible to arrive at the different quantities of work each man performs per 8 hour shift. The cost of the excavation should be kept by the cubic yard, and the placing of the lagging by the thousand feet board measure; as the work is usually estimated in this manner.

Central Hospital		Frank R. Walker Company							Sheet No. 7		
Building		LABOR DISTRIBUTION							Job No. 165		
Class "AP. 3"		Week Ending APR 6 - 1916							Job No. 165		
OCCUPATION	F	S	S	M	T	W	T	HOURS	RATE	AMOUNT	
1 (a) Winch	8	8		8	8	8	8	48	.50	24.00	
2 Diggers	16	16		12	16	16	24	100	.60	60.00	
3 Lagging	8	8		4		8		28	.60	16.80	
4 Laborers	24	16		24	24	24	16	128	.40	51.20	
5 Engineer	8	8		8	8	8	8	48	.75	36.00	
6											
7											
8											
Total										188.00	
	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day			
Previous	Excavating 100	192.00	1.92	Diggers 8400	Lagging 1000	11.50	11.50	9.20			
This Week	96	188.00	1.96	720 "	1700 "	16.80	9.90	4.88			
Total	196	380.00	1.94	780 "	2700 "	28.30	10.48	4.62			

Fig. 19. Cost Keeping on Caisson Work.

Figure 19 illustrates the method used in keeping costs on this class of work. The time of the various classes of workmen are given with the quantities of earth excavated and the number of feet of lagging placed. The total pay roll costs for both are given, also the unit labor cost per cubic yard of earth, and per thousand

SHORING AND EXCAVATING 93

feet of lagging. On the back of this card, figure 20, the separate units which go to make up the total unit are given as noted on the front

COST ANALYSIS RECORD (A) Per Cu. Yd. Excavation								
UNIT LABOR COSTS				UNIT (3) " 1000' Lagging				
	1	2	3 Lagging	4	5	6	7	8
Previous	25	60	11.20 Hr	56	33			TOTAL 194
This Week	25	62 1/2	10 1/2 Hr	53 1/2	37 1/2			196
Total	50	122 1/2	21 1/2 Hr	109 1/2	70 1/2			194
TOTAL LABOR HOURS				UNIT				
	1	2	3	4	5	6	7	8
Previous	50	120	30	140	44			
This Week	48	100	28	128	48			
Total	98	200	58	268	92			
LABOR HOURS PER UNIT				UNIT Per Cu. Yd. Excavation " 1000' B.M. Lagging				
	1	2	3	4	5	6	7	8
Previous	1/4 Hr	1 Hr	18 Min	1 1/2 Hrs	1 1/2 Hr			
This Week	1/4 "	1 "	17 Min	1 1/4 "	1 1/4 "			
Total	1/2 "	1 "	17 1/2 Min	1 3/4 "	1 1/2 "			

Fig. 20. Method of Analyzing Costs on Caisson Work.

of the card. The second column gives the number of hours required by the man on the winch, laborers digging and placing lagging, laborers removing earth and loading wagons, and the time of the engineer to complete a certain quantity of work. On the bottom of the card are given the time required by each class of labor to excavate and remove one cubic yard of earth and the time required to place a thousand feet of lagging.

LABOR COST DRIVING WOOD OR CONCRETE PILES

To arrive at the labor cost of driving wood or concrete piles, it is necessary to know the number of piles driven each 8 hour shift by each gang, giving the number of men with each pile driver, and the total number of lineal feet of all the piles driven.

Central Hospital		Frank R. Walker Company										
Building		LABOR DISTRIBUTION							Sheet No. <u>8</u>			
Class <u>"BP-A"</u>		Week Ending <u>APR 6 - 1916</u>							Job No. <u>165</u>			
OCCUPATION		F	S	S	M	T	W	T	HOURS	RATE	AMOUNT	
1	(a) <u>Engineers</u>	20	20		20	—	—	20	80	75	6000	
2	<u>Laborers</u>	40	40		40	—	—	57 1/2	171 1/2	150	8560	
3												
4												
5	(b) <u>Laborers</u>	16		16	16	—	—	16	64	40	2560	
6												
7												
8												
Total		<u>Wood Piles 40's longer</u>										<u>17120</u>
		Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day			
Previous		127	127.00	1.00	32	127	61.00	.48	7			
This Week		158	146.60	.92	39	82	75.60	.91	10			
Total		285	273.60	.95 1/2	35	209	86.60	.41 1/2	8			

Fig. 21. Costs on Driving Wood Piles.

Under (a) figure 21, the time of the men with the pile driver is given, the total number of 40 foot piles driven to date, and the total pay roll cost of same. The unit labor costs are given at so much per pile and the average number of piles driven per 8 hour shift. Un-

der (b) on the same card, the time required by laborers to cut off the piles is given, the number of piles cut off, and the costs for cutting off each pile and the average number a man will cut off per 8 hour day is also given. On the back of the card, figure 22, the separate

COST ANALYSIS RECORD								
UNIT LABOR COSTS					Labor Cost Per 40' Pile UNIT			
	1	2	3	4	5	6	7	8
Previous	42	58			48			
This Week	38	54			31			
Total	46	56			41½			
TOTAL LABOR HOURS					UNIT			
	1	2	3	4	5	6	7	8
Previous	78	149			152½			
This Week	80	171½			64			
Total	150	320½			216½			
LABOR HOURS PER UNIT					UNIT			
	1	2	3	4	5	6	7	8
Previous	33 Mo	14 Hrs			15 Hrs			
This Week	30 "	15 "			34 "			
Total	31½ "	18 "			1 "			

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Fig. 22. Analyzed Costs on Pile Driving.

units which go to make up the total labor unit are given, and the number of hours worked by each class of workmen. The length of time required to drive and cut off each 40 foot pile is also given.

CHAPTER V

FOUNDATIONS OF CONCRETE, STONE, RUBBLE OR BRICK

In keeping the costs on foundation work, the method will vary according to the materials used. If the foundations are of concrete it will be necessary to keep the cost of the forms in square feet, based on the number of superficial feet of concrete wall for which wood forms are required, and the quantity of lumber necessary to complete one square foot of forms, so the basis for costs may be either a certain price per square foot of concrete forms or per thousand feet of lumber. The cost of unloading, piling, sorting, and placing reinforcing steel will be another item of cost, and should be kept by the number of tons of reinforcing steel unloaded and placed. The cost of mixing and placing the concrete should be kept by the cubic yard of concrete placed, and if it is necessary to heat the aggregate or protect the concrete from freezing, these items should be kept separately.

Building <u>Central Hospital</u>		Frank R. Walker Company							LABOR DISTRIBUTION			Sheet No. <u>9</u>
Class <u>"CPI"</u>		Week Ending <u>APR 6 - 1916</u>							Job No. <u>165</u>			
OCCUPATION	F	S	S	M	T	W	T	HOURS	RATE	AMOUNT		
1 (a) <u>Carpenters</u>	<u>32</u>	<u>16</u>		<u>48</u>	<u>48</u>	<u>56</u>	<u>64</u>	<u>264</u>	<u>70</u>	<u>18480</u>		
2 <u>Laborers</u>	<u>16</u>	<u>8</u>		<u>24</u>	<u>16</u>	<u>48</u>	<u>32</u>	<u>144</u>	<u>40</u>	<u>5760</u>		
3												
4												
5 (b) <u>Laborers</u>	<u>16</u>	<u>8</u>		<u>16</u>	<u>16</u>			<u>56</u>	<u>40</u>	<u>2240</u>		
6												
7												
8 <u>Foundation walls 1'5" wide 6'8" high</u>												
Total										<u>26480</u>		
Quantity Work in Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day	Quantity Work in Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day					
Previous <u>7000^{sq}</u>	<u>\$100</u>	<u>.04</u>	<u>182^{sq}</u>	<u>7000^{sq}</u>	<u>24.00</u>	<u>.01</u>	<u>320^{sq}</u>					
This Week <u>6300^{sq}</u>	<u>247.40</u>	<u>.0381</u>	<u>191^{sq}</u>	<u>2100^{sq}</u>	<u>22.40</u>	<u>.0072</u>	<u>554^{sq}</u>					
Total <u>8300^{sq}</u>	<u>347.40</u>	<u>.039</u>	<u>189^{sq}</u>	<u>5500^{sq}</u>	<u>46.40</u>	<u>.0084</u>	<u>1174^{sq}</u>					

Fig. 23. Cost Keeping on Forms for Concrete Foundations.

Under figure 23 is given the cost of placing and removing concrete forms for foundation walls. The total hours worked each week by the various classes of mechanics are given and the total quantity of work in place to date. The total pay roll costs are given together with the average labor unit per square foot of forms and the number of square feet of forms a carpenter will average per 8 hour day. The front of this card also gives the quantity of concrete forms removed together with the pay roll cost of same and the average cost per square foot of forms. Under this division the average number of square feet of forms a laborer will remove

per 8 hour day are also given. On the back of this card the separate costs per square foot of forms and per thousand feet of lumber

COST ANALYSIS RECORD (1) Per Sq. Ft. Forms								
UNIT LABOR COSTS				UNIT				
	1	2	3	4	5	6	7	8
Previous	12.00 M	1.00 M				.01		
This Week	8.75 M	2.25 M				.072		
Total	11.25 M	3.25 M				.082		
TOTAL LABOR HOURS				UNIT				
	1	2	3	4	5	6	7	8
Previous	87	52 1/2				6.7		
This Week	26 1/2	14 1/2				1.56		
Total	3.51	14.6 3/4				1.16		
LABOR HOURS PER UNIT				UNIT Per 100' Forms 1000' Lumber B.M.				
	1 Corp.	2 Labor	3	4	5 Labor	6	7	8
Previous	1.25 Hrs	2.75 Hrs			1.3 Hrs	M. B.M.		
This Week	1.75 Hrs	2.4 Hrs			1.2 Hrs	M. B.M.		
Total	1.7 Hrs	2.6 Hrs			1.25 Hrs	M. B.M.		

Fig. 24. Method of Analyzing Costs on Concrete Forms.

for carpenters and laborers are given, and the total number of hours worked by each class to complete the work to date. The lower column gives the average length of time in hours required by both carpenters and laborers to erect and remove one hundred square feet of forms and the same work reduced to hours per thousand feet of lumber.

Building		Frank R. Walker Company		LABOR DISTRIBUTION		Sheet No. <u>10</u>					
Class		Week Ending		APR 6 - 1916		Job No. <u>165</u>					
OCCUPATION		F	S	S	M	T	W	T	HOURS	RATE	AMOUNT
1	(a) Mason Foreman	8	4		8			8	28	75	21.00
2	Laborers	80	40		48			88	256	110	102.40
3	Engineers	8	4		4				24	75	18.00
4											
5											
6											
7											
8	Gasolene mix w. 10% cap.										141.40
Total											141.40
	Quantity Work in Place	Pay Roll Cost	Labor Average Unit Cost	Average Quantity Per 8 Hour Day	Quantity Work in Place	Pay Roll Cost	Labor Average Unit Cost	Average Quantity Per 8 Hour Day			
Previous	176.44	277.60	1.57	4.44							
This Week	143	141.40	.99	14.4							
Total	319	419.00	1.11	14.6							

Fig. 25. Keeping Costs on Mixing Concrete.

Under figure 25, the time required mixing and placing concrete is given; showing the various classes of labor employed and the total expenditure for the week. On the bottom of the card are given the quantities of concrete placed in cubic yards and the total pay roll cost of same, the average cost of labor in placing one cubic yard of concrete and the average number of cubic yards placed by a laborer in 8 hour day are also given. On the back of the card, figure 26, the separate labor units which enter into the total unit labor cost are given, and the number of hours worked by each class of labor to complete the work. The lower column

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gives the time required by the various classes of workmen to mix and place one cubic yard of concrete.

COST ANALYSIS RECORD								
UNIT LABOR COSTS				UNIT <i>Cubic Yard</i>				
	1 <i>Finer</i>	2 <i>Lab</i>	3 <i>Engr</i>	4	5	6	7	8
Previous	.18	.83	.20					<i>1.21</i>
This Week	<i>.14³</i>	<i>.71³</i>	<i>.12³</i>					<i>.99</i>
Total	<i>.16⁴</i>	<i>.77</i>	<i>.16⁴</i>					<i>1.70</i>
TOTAL LABOR HOURS				UNIT				
	1 <i>Finer</i>	2 <i>Lab</i>	3 <i>Engr</i>	4	5	6	7	8
Previous	<i>42</i>	<i>367</i>	<i>77</i>					
This Week	<i>28</i>	<i>256</i>	<i>24</i>					
Total	<i>70</i>	<i>623</i>	<i>71</i>					
LABOR HOURS PER UNIT				UNIT <i>Cubic Yard</i>				
	1 <i>Finer</i>	2 <i>Lab</i>	3 <i>Engr</i>	4	5	6	7	8
Previous	<i>1/4 Hr</i>	<i>2 Hrs</i>	<i>1/4 Hr</i>					
This Week	<i>1/5 "</i>	<i>1 1/2 "</i>	<i>1/6 "</i>					
Total	<i>1/5 "</i>	<i>2 "</i>	<i>1/4 "</i>					

Fig. 26. Analyzed Costs on Mixing Concrete.

If the foundations are placed during freezing weather and it is necessary to heat the sand, stone, and water required, and to protect the concrete after it has been placed, separate costs should be kept on these items as enumerated in the Cost Schedule.

If the foundations are of stone, the measurement should be taken either by the cubic yard, perch or the cubic foot. If brick are used, the costs should be kept at so much per thousand brick, as illustrated on the following pages under Brick Masonry.

WATER AND DAMP PROOFING

To keep costs on applying the various kinds of water and damp proofing, be sure to specify the class of material being used and whether same is a heavy paint or in plaster form. In either event, the costs should be kept by the square foot or by the square yard and the number of coats of the different materials being applied should be mentioned.

Central Hospital		Frank R. Walker Company						LABOR DISTRIBUTION				Sheet No. <u>11</u>				
Building <u>Central Hospital</u>		LABOR DISTRIBUTION						Week Ending <u>APR 6 - 1916</u>				Job No. <u>165</u>				
Class <u>DP-I</u>		F		S		M		T		W		T		HOURS	RATE	AMOUNT
1	(b) Laborers	16	8		16	16	-	-				56	40	2240		
2																
3																
4																
5																
6																
7																
8	Apply R.I.W. to basement walls.															
Total																2240
	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day								
Previous																
This Week	2400'	22.40	.009	343'												
Total	2400'	22.40	.009	343'												

Fig. 27. Method of Keeping Costs on Water and Damp Proofing.

The illustration, figure 27, shows the method employed in keeping costs on applying either water-proof paint or plaster. The quantities are given in square feet with the total pay roll

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cost to date. The labor units are reduced to the cost per square foot, and the average number of square feet a man will apply per 8

COST ANALYSIS RECORD								
UNIT LABOR COSTS				UNIT <i>Per Square 100'</i>				
	1	2	3	4	5	6	7	8
Previous	—							
This Week	.009							
Total	.009							
TOTAL LABOR HOURS				UNIT				
	1	2	3	4	5	6	7	8
Previous	—							
This Week	56							
Total	56							
LABOR HOURS PER UNIT				UNIT <i>Per Square 100'</i>				
	1	2	3	4	5	6	7	8
Previous	—							
This Week	<i>2 1/2 to 3 min.</i>							
Total	<i>2 1/2 to 3 min.</i>							

Fig. 28. Analyzed Labor Costs on Water and Damp Proofing.

hour day. On the back of the card, figure 28, the separate unit labor costs are given, and the total number of hours worked by laborers from the start of the job to the present time. The length of time required to apply one hundred square feet of waterproofing are also given.

CHAPTER VI

CEMENT AND COMPOSITION FLOORS AND BASE

In keeping costs on cement and composition floors, the costs are invariably kept by the square foot of floor installed. On cement floors the cost of placing the wood strips or screeds should be kept separately; also keep separately the time required placing the rough concrete. Always give the number of square feet and the thickness of the floor so they may be reduced to cubic feet or yards if desired. Separate costs should also be kept on mixing and placing the cement finish topping together with the time of cement finishers and helpers finishing same.

On cement or composition base, the carpenter's time placing the wood grounds should be kept separately, and the time of finishers, laborers and helpers mixing materials and placing cement base should be kept as a separate item. In work of this kind always give the number of lineal feet of base installed and the height of same.

The labor costs of installing all kinds of cinder or other concrete floor fill under marble

or tile floors, between wood sleepers, roof fill, and saddles, etc., should be kept by the number of square feet of surface covered and the thickness of same, so the costs may be reduced to cubic yards if desired.

The labor cost of placing wood or metal forms for combination curb and gutter, or either separately, should be kept by the number of lineal feet of curb and gutter installed, and separate time should be kept on removing the forms after the concrete has been placed. The cost of placing the rough concrete should be kept by the square foot, and the thickness of concrete should be given, so it may be reduced to cubic yards where desired. The cost of mixing and applying the finish topping to curb and gutter should be kept either by the number of lineal feet of curb and gutter installed and the dimensions of same, or by the number of square feet of surface finished. By using this method an estimating basis may be easily arrived at.

On rough concrete or cement pavements, separate costs should be kept of surveying and laying out the work to grades, etc., also the cost of placing stakes, screeds or other strips should be kept as a separate item. It is also necessary to keep separate time and costs on placing

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the rough concrete and give the length of the haul, if any, or other methods used to place the concrete. The finish topping, if any, should be kept by the number of square feet placed, as given under cement finish floors. Where the pavement is of brick, stone, or wood blocks, separate costs should be kept on placing the sand cushion and laying the brick or wood blocks which should be kept either by the thousand pieces, giving size of same, or by the square yard of surface covered.

Where finish concrete floors from 1½ to 2 inches thick are placed over old concrete, separate costs should be kept on placing strips or screeds; also separate costs should be kept on

Building Central Hospital		Frank R. Walker Company							Sheet No. <u>12</u>			
		LABOR DISTRIBUTION										
Class <u>"E.P.I."</u>		Week Ending <u>APR 6 - 1916</u>							Job No. <u>161</u>			
OCCUPATION												
		F	S	S	M	T	W	T	HOURS	RATE	AMOUNT	
1	(A) Finisher	8	4						12	60	720	
2	Helper	8	4						12	50	600	
3	(B) Finisher			4	4				8	60	480	
4	Helper			4	4				8	50	400	
5	Laborer			64	64				128	40	5120	
6	Engineer				8	8			16	75	1200	
7	(C) Finisher				12	16			28	60	1680	
8	Helper				12	16			28	50	1400	
Total		<u>"A" 13"</u>							<u>"C" 10"</u>			11600
	Quantity Work in Place	Pay Roll Cost	Labor Average Unit Cost	Average Quantity Per 8 Hour Day	Quantity Work in Place	Pay Roll Cost	Labor Average Unit Cost	Average Quantity Per 8 Hour Day				
Previous	2000	80.00	.04	132'	2000	40.00	.02	750'				
This Week	2050	85.20	.0415	128'	2050	30.80	.015	586'				
Total	4050	165.20	.0408	130'	4050	70.80	.0175	625'				

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Fig. 29. Cost Keeping on Cement Finish Floors.

mixing, handling, and placing the rough concrete, and the cost of mixing materials and applying the finish top.

Under Figure 29, is given the method of keeping costs on concrete or cement finish floors. Separate time is kept on placing screeds, mixing and placing concrete, and the cost of finishing same. On the bottom of the card are given the quantities of work in place in square feet, the total pay roll cost to date, the average quantity a laborer would install per 8-hour day, together with the unit cost of same. On the back of the card, which is figure 30, are given the different costs which go to make up the

COST ANALYSIS RECORD								
UNIT LABOR COSTS				UNIT 100 Sq. Ft. Floor				
	1 Fin	2 H/pr	3 Fin	4 H/pr	5 Labor	6 Engr	7 Fin	8 H/pr
Previous	.003	.0034	.002	.002	.03	.004	.015	.005
This Week	.0035	.0029	.0023	.0019	.025	.006	.008	.007
Total	.003	.00315	.0022	.002	.027	.005	.013	.006
TOTAL LABOR HOURS				UNIT				
	1	2	3	4	5	6	7	8
Previous	10	12	7	8	150	10	40	20
This Week	12	12	8	8	128	16	28	28
Total	22	24	15	16	278	26	68	48
LABOR HOURS PER UNIT				UNIT 100 Sq. Ft. Floor				
	1 Fin	2 H/pr	3 Fin	4 H/pr	5 Labor	6 Engr	7 Fin	8 H/pr
Previous	1/2 Hr	3/4 Min	2 Min	2 1/4 Min	1 1/2 Hrs	1/5 Hr	2 Hrs	1 Hr
This Week	3/5 Min	3/5 "	2 1/2 "	2 3/4 "	6 1/4 "	3/4 "	1 1/2 "	1 1/2 "
Total	3/3 Min	3/5 Min	2 1/2 Min	2 1/4 Min	7 "	3/6 Min	1 3/4 "	1 1/4 "

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Fig. 30. Method of Analyzing Costs on Cement Finish Floors.

total unit, the number of hours put in by the various classes of workmen employed, and the length of time required by each to complete 100 square feet of floor. Costs kept this way are invaluable for the reason that no matter what wage scale prevails, there is always a working basis for estimating.

Building <u>Central Hospital</u>		Frank R. Walker Company						Sheet No. <u>13</u>			
		LABOR DISTRIBUTION									
Class <u>FP. 5'</u>		Week Ending <u>APR 6 - 1916</u>						Job No. <u>165</u>			
OCCUPATION		F	S	S	M	T	W	T	HOURS	RATE	AMOUNT
1 (a)	Finishers	12	8		16	16	16	16	82	60	50.40
2	Helpers	12	8		16	16	16	16	84	58	47.00
3	Laborers	16	8		16	16	16	16	88	40	35.20
4	Engineers	11	7		4	4	4	4	22	75	16.50
5 (b)	Finishers	—	—		8	8	8	8	32	60	19.20
6	Helpers	—	—		8	8	8	8	32	50	16.00
7	Laborers	—	—		4	4	4	4	16	40	6.40
8											
Total		"a"							28		185.70
	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day			
Previous	4000'	160.80	.04	340'	312'	5200	.16%	60'			
This Week	2700'	144.10	.039	350'	276'	4160	.15%	69'			
Total	7700'	304.90	.0395	345'	588'	9360	.15%	65'			

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Fig. 31. Distribution and Costs on Cement Floors and Base.

Figure 31 gives the method for keeping costs on cement finish floors and base, the various classes of labor employed, the total quantity of work in place, the pay roll cost of same, and the unit cost per square foot of floor, and the cost per lineal foot of base. The quantities of

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COST ANALYSIS RECORD (a) Per 39. Foot. UNIT (b) Per Lineal Foot.								
UNIT LABOR COSTS								
	1 Fin	2 H/pr	3 Labor	4 Engr	5 Fin	6 H/pr	7 Labor	8
Previous	.0126	.0114	.0095	.0045	.08	.064	.023	
This Week	.0135	.0114	.0095	.0045	.07	.058	.023	
Total	.0135	.0114	.0095	.0045	.075	.061	.023	
TOTAL LABOR HOURS UNIT								
	1 Fin	2 H/pr	3 Labor	4 Engr	5 Fin	6 H/pr	7 Labor	8
Previous	91	91	95	24	41 1/2	40	18	
This Week	84	84	88	22	32	32	16	
Total	175	175	183	46	73 1/2	72	34	
(a) LABOR HOURS PER UNIT (b) UNIT (c) Per 100 Sq. Ft. (d) Per 100 Lin. Ft.								
	1 Fin	2 H/pr	3 Labor	4 Engr	5 Fin	6 H/pr	7 Labor	8
Previous	2 1/4 Hrs	2 1/4 Hrs	2 3/8 Hrs	36 Min.	12 1/2 Hrs	12 3/4 Hrs	6 Hrs	
This Week	2 1/4 Hrs	2 1/4 Hrs	2 3/8 Hrs	36 Min.	12 Hrs	12 Hrs	6 Hrs	
Total	2 1/4 Hrs	2 1/4 Hrs	2 3/8 Hrs	36 Min.	12 1/4 Hrs	12 1/4 Hrs	6 Hrs	

Fig. 32. Analyzed Costs on Cement Floors and Base.

completed work a finisher averaged per 8-hour day are also given. On the back of the card, which is figure 32, are the different unit costs which go to make up the total unit cost of the job; the total number of hours of the various classes of labor employed, and the time required by the various classes of workmen to complete 100 square feet of floor or 100 lineal feet of base.

CHAPTER VII

BRICK MASONRY

The labor costs of brick masonry may be kept in any of the following ways; the cost of mechanics, laborers and engineers in the construction of all classes of brick masonry, or each class may be kept separately, and units arrived at on each class of work.

When keeping costs on common or press brick of the various classes, the costs are usually kept by the number of thousands of brick laid, and if the brick are of uncommon size, the size of the brick should be given, likewise the kind of brick used—whether smooth or rough texture, glazed or enamel—and the size and kind of the mortar joints. In press brick work the style of the bond should also be given.

To arrive at absolutely dependable costs, the time of the masons laying the brick should be kept separately; likewise the time of the laborers handling and wheeling brick to the masons; also the time of the mortar makers and scaffold builders; so that the units on each portion of the work may be arrived at. Under figure 33

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Building <u>Central Hospital</u>		Frank R. Walker Company							LABOR DISTRIBUTION				Sheet No. <u>14</u>
Class <u>"FP-1"</u>		Week Ending <u>APR 6 - 1916</u>							Job No. <u>165</u>				
OCCUPATION		F	S	M	T	W	T	HOURS	RATE	AMOUNT			
1 (a)	Masons	80	40		88	96	40	80	424	75	318.00		
2	Laborers	72	36		80	80	36	72	376	40	150.40		
3 (a & d)	Mortar Makers	16	16		16	16	16	96	40	38.40			
4 (a & d)	Scaffold Builders	8	4		16	8	8	16	60	40	24.00		
5 (a & d)	Hoist Eng'rs	8	4		8	8	8	40	75	30.00			
6 (d)	Masons	40	20		56	64	72	40	292	75	219.00		
7	Laborers	24	12		28	36	36	22	158	40	63.20		
8	Items 3-4-5 Pro rata into total brick work											846.00	
Total		(a)							(d)		846.00		
	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day					
Previous	127 7/8	789.00	6.23	1700	36 7/8	482.00	13.39	625					
This Week	92 7/8	545.75	5.93	1736	21 7/8	300.25	14.30	575					
Total	219 7/8	1344.75	6.14	1715	57 7/8	782.25	13.72	600					

Fig. 33. Method of Keeping Costs on Brick Masonry.

are given the methods of keeping costs on brick work, showing all classes of workmen employed, the quantity of each class of brick laid, and the total pay-roll cost of same to date. The unit costs per thousand brick, and the number of brick of the various classes a mason will lay per 8-hour day are also given. On the back of the card, as illustrated by figure 34, the separate units which go to make up the total unit per thousand are given; the number of hours of the various classes of workmen employed, and the time required by each class of labor to lay one thousand of each kind of brick.

To keep costs on terra cotta or cement flue lining, the size of the lining should be given and the number of lineal feet set.

COST ANALYSIS RECORD (a) Per Sq. Common Brick								
UNIT LABOR COSTS					UNIT (b) Per Sq. Face Brick			
	1 Mason	2 Labor	3 Mortar and	4 Scaffold and	5 Engr and	6 Mason	7 Labor	8 and
Previous	3.50	1.80	.40	.25	.28	10.72	1.74	
This Week	3.45	1.63	.34	.21 $\frac{1}{2}$	.30	10.43	3.00	
Total	3.47 $\frac{1}{2}$	1.72	.37	.23 $\frac{1}{4}$	.29	10.57	2.37	
TOTAL LABOR HOURS					UNIT Total To Date			
	1 Mason	2 Labor	3 Mortar and	4 Scaffold and	5 Engr and	6 Mason	7 Labor	8
Previous	593	571	163	102	114	515	157	
This Week	424	376	96	60	44	292	158	
Total	1017	947	259	162	158	807	315	
LABOR HOURS PER UNIT					UNIT (c) Per 1000 Com Brick			
	1 Mason	2 Labor	3 Mortar and	4 Scaffold and	5 Engr and	6 Mason	7 Labor	8
Previous	4 $\frac{3}{4}$ Hrs	1 $\frac{1}{2}$ Hrs	1 Hrs	$\frac{5}{8}$ Hrs	40 Min.	1 $\frac{1}{3}$ Hrs	4 $\frac{1}{2}$ Hrs	
This Week	4 $\frac{3}{4}$ Hrs	4 Hrs	$\frac{3}{4}$ Hrs	$\frac{1}{2}$ Hrs	24 "	14 Hrs	7 $\frac{1}{2}$ Hrs	
Total	4 $\frac{3}{4}$ Hrs	4 $\frac{1}{4}$ Hrs	1 Hrs	$\frac{5}{8}$ Hrs	35 "	14 $\frac{1}{2}$ Hrs	5 $\frac{1}{2}$ Hrs	

Fig. 34. Analyzed Costs on Brick Masonry.

The costs on placing salt glazed wall coping should also be given in lineal feet and the size of the coping should be stated.

CUT STONE, GRANITE AND ARCHITECTURAL TERRA COTTA

The costs on cut stone, granite, and terra cotta work are usually kept by the cubic foot of material placed. All cornices, columns, etc., are measured square or by the size of the blocks required to produce the finished pieces.

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Separate costs should be kept on the unloading of materials from the cars, hauling to the building, and unloading and sorting at the building site. If it is necessary for stone cutters to do any cutting, lewising, or carving at the job, the cost of this work should also be kept separately and the measurements given in superficial feet where possible. Separate costs should be kept on handling and setting the stone in place in the building; the various classes of workmen employed; and the quantities of stone, granite, or terra cotta set in place should be kept in cubic feet.

Building <u>Central Hospital</u>		Frank R. Walker Company							LABOR DISTRIBUTION		Sheet No. <u>15</u>	
Class <u>"F.P.R"</u>		Week Ending <u>APR 6 - 1916</u>							Job No. <u>165</u>			
OCCUPATION		F	S	M	T	W	T	HOURS	RATE	AMOUNT		
1 (a)	Riggers	8	4	—	—	—	—	12	.75	9.00		
2	Laborers	32	16	—	—	—	—	48	.40	19.20		
3 (c)	Stone Setters	16	8	16	16	—	16	72	.75	54.00		
4	Riggers	—	—	8	8	—	8	24	.75	18.00		
5	Derrick man	24	24	24	24	—	24	120	.50	60.00		
6	Laborers	24	24	16	16	—	8	88	.40	35.20		
7												
8												
Total		(A)				(C)				195.40		
	Quantity Work in Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day	Quantity Work in Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day				
Previous	960'	47.00	.05	74'	812'	212.00	.26	72'				
This Week	550'	28.20	.0513	73'	680'	167.20	.246	76'				
Total	1500'	75.20	.05	74'	1492'	379.20	.254	74'				
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Fig. 35. Distribution and Costs on Unloading and Setting Cut Stone.

Figure 35 gives an example of the method used in keeping the cost of unloading, handling, and setting cut stone work. The various classes of workmen are given, the quantity of

COST ANALYSIS RECORD								
UNIT LABOR COSTS (C)				UNIT Cost Per Cu. Ft				
(a)	1 Riggers	2 Labor	3 Setters	4 Rigger	5 Derricks	6 Labor	7	8
Previous	.016	.024	.09	.025	.08	.065		
This Week	.0165	.027	.08	.025	.09	.057		
Total	.0162	.0255	.085	.025	.085	.058		
TOTAL LABOR HOURS				UNIT				
(a)	1 Riggers	2 Labor	3 Setters	4 Riggers	5 Derricks	6 Labor	7	8
Previous	20	81	97 1/2	27	120	127		
This Week	17	48	72	24	120	88		
Total	37	129	169 1/2	51	240	215		
LABOR HOURS PER UNIT				UNIT Hrs Per 100 Cu Ft				
(a)	1 Riggers	2 Labor	3 Setters	4 Riggers	5 Derricks	6 Labor	7	8
Previous	2 Hrs	8 1/2 Hrs	12 Hrs	3 1/2 Hrs	16 Hrs	16 1/4 Hrs		
This Week	2 1/4 Hrs	8 3/4 Hrs	10 1/2 Hrs	3 1/2 Hrs	17 1/2 Hrs	13 Hrs		
Total	2 1/2 Hrs	8 3/4 Hrs	11 1/4 Hrs	3 1/2 Hrs	16 3/4 Hrs	14 3/4 Hrs		

Fig. 36. Method of Analyzing Costs on Unloading and Setting Cut Stone.

work set in place in the building, the total payroll costs of same, and the average unit cost per cubic foot of stone for unloading and setting. The average quantity of stone a laborer would unload per 8-hour day and the quantity of stone a setter would place in the same time are also given.

Under figure 36, which is the back of figure 35, the separate unit costs are given, which make

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Frank R. Walker Company											
Building <u>Central Hospital</u>		LABOR DISTRIBUTION						Sheet No. <u>16</u>			
Class <u>"F.P. 3"</u>		Week Ending <u>APR 6 - 1916</u>						Job No. <u>165</u>			
OCCUPATION		F	S	S	M	T	W	T	HOURS	RATE	AMOUNT
1	(a) Team	8	—	—	8	8	—	—	24	75	1800
2	Laborers	32	—	—	32	32	—	—	96	40	3840
3	(c) Setters	8	11	—	8	8	8	8	51	50	2550
4	Derrickmen	24	24	—	24	24	24	24	144	15	2160
5	Laborers	16	8	—	16	—	8	16	64	40	2560
6											
7											
8											
Total:		<u>112</u>						<u>18700</u>			
	Quantity Work in Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day	Quantity Work in Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day
Previous	810	8700	10 1/2	45	360	125.00	34 1/2	70 1/2			
This Week	572	5640	11	49	407	130.60	32	74			
Total	1382	14340	10 7/8	44	767	255.60	33 1/2	72			

Fig. 37. Keeping Costs on Setting Granite.

up the total unit cost for the entire job; the total number of hours of the different classes of

COST ANALYSIS RECORD								
UNIT LABOR COSTS				UNIT <u>Cubic Foot</u>				
(a)	1	2	3	4	5	6	7	8
Previous	.085	.0725	.085	.19	.0625			
This Week	.035	.075	.08	.17	.062			
Total	.035	.07375	.0875	.185	.0627			
TOTAL LABOR HOURS				UNIT				
(a)	1	2	3	4	5	6	7	8
Previous	38	146 1/2	46	137	56			
This Week	24	96	44	144	64			
Total	62	242 1/2	90	281	120			
LABOR HOURS PER UNIT				UNIT <u>Per 100 Cubic Feet</u>				
(a)	1	2	3	4	5	6	7	8
Previous	4 3/8 Hrs	18 Hrs	12 1/2 Hrs	38 1/2 Hrs	15 1/2 Hrs			
This Week	4 3/8 Hrs	18 3/8 Hrs	10 1/2 Hrs	35 1/2 Hrs	15 3/8 Hrs			
Total	4 3/8 Hrs	18 3/8 Hrs	11 3/8 Hrs	36 3/8 Hrs	15 3/8 Hrs			

Fig. 38. Analyzed Costs on Granite Setting.

labor employed and the number of hours required to handle and set 100 cubic feet of stone work.

Figure 37, which is practically the same as figure 35, illustrates the use of the cost keeping system as applied to handling and setting granite work. Figure 38 is the back of figure 37, and shows that the same results are arrived at as given on figure 36.

CHAPTER VIII

REINFORCED CONCRETE CONSTRUCTION

To obtain accurate and valuable cost data on reinforced concrete work requires the use of a great many sub-divisions as there are many factors to be taken into consideration; and, owing to the great variations in costs of reinforced concrete the time and money spent in obtaining the best cost data possible is a good investment.

The labor cost of unloading lumber from cars should be kept separately as given on the previous pages.

The costs of framing and erecting plain slab forms should be one sub-division, and these costs should be kept by both the number of square feet of forms erected and the quantity of lumber required, then the cost may also be arrived at per thousand feet of lumber. Concrete forms are measured according to the concrete surface which actually comes in contact with the wood forms. It is well to take a typical floor slab and figure out the quantity of lumber required to construct a certain area; and

then by dividing the quantity of lumber in board feet by the number of square feet of forms erected, it will give the average quantity of lumber required to complete one square foot of forms; and the quantity of lumber required for the entire job may be safely estimated on this basis.

The costs on beam and lintel forms should be kept separately from the slab forms, as they are entirely different classes of work, and the former usually require from three to four times as much carpenter labor per hundred feet of forms as are required to erect the same quantity of plain slab forms.

On buildings of flat slab design, separate costs should be kept on framing for depressions at the column heads where possible, as this work usually requires about twice as much carpenter labor per square foot of forms as the plain slab work.

The labor on wood column and beam forms comes nearer to being the same class of work than any other two branches of form work; but it is desirable to keep these costs separately wherever possible. Where two inch lumber is used it requires on an average of two and one-half feet of lumber to each square foot of forms;

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and after the area in square feet has been obtained in this manner, the amount of lumber required is easily arrived at.

The labor required handling and erecting metal column forms is an entirely different proposition from wood forms as they are usually erected by sheet metal workers. To keep costs on work of this kind, give the diameter and height of the column, the style of head used, and the number of columns erected per 8-hour day.

As common laborers remove all classes of wood forms, the costs are usually kept by the number of square feet of forms removed, which includes all classes of form work, such as column,

Building Central Hospital		Frank R. Walker Company							Sheet No. <u>17</u>	
		LABOR DISTRIBUTION								
Class <u>"G.P.I."</u>		Week Ending <u>APR 6 - 1916</u>							Job No. <u>165</u>	
OCCUPATION	F	S	S	M	T	W	T	HOURS	RATE	AMOUNT
1 (a) Carpenters	40	16		80	96	104	72	408	70	28560
2 Laborers	18	10		38	40	56	32	194	40	7760
3 Average 3' Lumber Per Sq. Ft. Forms										
4										
5 (b) Carpenters	16	8		24	24	16	16	104	70	7280
6 Laborers	7	4		12	9	6	8	46	40	1840
7 Av. 2½' Lumber Per Sq. Ft. Forms										
8										
Total	(a)			(b)						45440
	Quantity Work in Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day	Quantity Work in Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day		
Previous	15500'	627.00	.04	160'	1800'	12760	.071	102'		
This Week	9200'	363.20	.0395	180'	1250'	9120	.073	96'		
Total	24700'	990.20	.04	167'	3050'	21880	.072	97'		

Fig. 39. Cost Keeping Applied to Forms for Reinforced Concrete.

beam, lintel, and plain slab forms. These costs should be kept by the number of square feet of forms removed and the number of thousand feet of lumber handled.

Under figure 39, are given the methods of cost keeping on plain slab and beam forms; giving the quantity of work in place in square feet, the total pay roll costs to date, the average unit cost per square foot of forms, and the number of feet of forms a carpenter would average per 8-hour day. On the back of the card,

COST ANALYSIS RECORD								
UNIT LABOR COSTS				Par Sq Ft Forms				
(a)	1	2	3	4	5	6	7	8
				UNIT Par Ft Lumber				
Previous	\$10.67 ⁰⁰	2.75 ⁰⁰			20.00 ⁰⁰	4.00 ⁰⁰		
This Week	\$10.35 ⁰⁰	2.81 ⁰⁰			19.78 ⁰⁰	3.99 ⁰⁰		
Total	\$21.02 ⁰⁰	5.56 ⁰⁰			39.78 ⁰⁰	7.99 ⁰⁰		
TOTAL LABOR HOURS				UNIT				
Previous	714	318			128 ^{1/2}	115 ^{1/2}		
This Week	408	194			104	46		
Total	1122	512			232 ^{1/2}	161 ^{1/2}		
LABOR HOURS PER UNIT				UNIT Par 100 Sq Ft Forms				
(a)	1	2	3	4	5	6	7	8
Previous	15.44 ⁰⁰	7.42 ⁰⁰			28.12 ⁰⁰	10.12 ⁰⁰		
This Week	15.70 ⁰⁰	7.43 ⁰⁰			28.12 ⁰⁰	10.12 ⁰⁰		
Total	31.14 ⁰⁰	14.85 ⁰⁰			56.24 ⁰⁰	20.24 ⁰⁰		

Fig. 40. Method of Analyzing Costs on Concrete Forms.

as shown by figure 40, the separate unit costs are given per square foot of forms and per

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thousand feet of lumber; also the total number of hours of the various classes of labor and the number of hours required by the different mechanics to complete 100 square feet of forms, and handle and erect a thousand feet of lumber.

Central Hospital		Frank R. Walker Company							Sheet No. 18		
Building		LABOR DISTRIBUTION							Job No. 165		
Class "G.P.I."		Week Ending APR 6 - 1916							Job No. 165		
OCCUPATION	F	S	S	M	T	W	T	HOURS	RATE	AMOUNT	
1 (a) Carpenters	32	16		56	56	64	—	224	70	156.80	
2 Laborers	8	4		10	12	16	—	50	40	20.00	
3											
4											
5 (b) Laborers	48	24		32	32	48	48	232	40	92.80	
6											
7											
8											
Total	(d)						(e)				
	Quantity Work in Piece	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day	Quantity Work in Piece	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day			
Previous	2400'	197.20	.082	76'	3312'	27.50	.0083	384'			
This Week	2200'	176.80	.08	78'	11160'	92.80	.0083	385'			
Total	4600'	374.00	.081	77'	14472'	120.30	.0083	385'			
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Fig. 41. Keeping Costs on Wood Column Forms.

Under figure 41 are given the methods employed in keeping cost on wood columns and the labor cost of removing wood forms of all classes. This is worked on the same method as given under figure 39. On the back of this card, figure 42, the separate unit costs are given; the total number of labor hours required to complete the work, and the number of hours of the various classes of labor required to complete or re-

COST ANALYSIS RECORD <i>For 50 Ft Forms</i>								
UNIT LABOR COSTS				UNIT <i>Per 100 Ft Lumber</i>				
	1	2	3	4	5	6	7	8
Previous	<i>60</i> \$ 28.90 0.73	\$ 4.00 0.10			<i>54</i> \$ 3.70 0.23			
This Week	\$ 28.50 0.73	\$ 3.64 0.09			\$ 3.00 0.23			
Total	\$ 28.15 0.74	\$ 3.82 0.05			\$ 3.10 0.23			
TOTAL LABOR HOURS				UNIT				
Previous	247	10			69			
This Week	224	50			232			
Total	471	110			301			
LABOR HOURS PER UNIT				UNIT <i>For 100 Ft Forms</i>				
Previous	41 Hrs 10 Hrs	10 Hrs 2 Hrs			7 Hrs 2 Hrs			
This Week	10 Hrs 20 Hrs	9.5 Hrs 14 Hrs			7 Hrs 2 Hrs			
Total	10 Hrs 10 Hrs	23 Hrs 2 Hrs			7 Hrs 2 Hrs			

Fig. 42. Analyzed Costs on Concrete Form Work.

move 100 square feet of forms for a thousand feet of lumber.

Building Central Hospital		Frank R. Walker Company				Sheet No. <u>19</u>					
Class "G.P.I."		LABOR DISTRIBUTION				Job No. <u>165</u>					
		Week Ending APR 6 - 1916									
OCCUPATION		F	S	S	M	T	W	T	HOURS	RATE	AMOUNT
1	(E) Sheet Metal Workers	16	8		16	16	-	-	56	50	28.00
4	(F) Sheet Metal Workers					16	-	-	16	50	8.00
Total <i>Co. Size 1'6" Dia. 12'0" Long. No cap.</i> (E) (F)											
	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day			
Previous	22	42.00	1.83	2	15	12.00	.80	5			
This Week	15	28.00	1.87	2	10	8.00	.80	5			
Total	38	70.00	1.85	2	25	20.00	.80	5			

Fig. 43. Cost Keeping on Placing and Removing Metal Column Moulds.

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Under figure 43 are given the methods of cost keeping for the erection and removal of metal column moulds; the size of the columns used; the number erected and removed; the total pay roll cost of same, and the unit cost per column. The number of columns a sheet metal worker will erect or remove per 8-hour day is also given. Figure 44, which is the back of figure

COST ANALYSIS RECORD								
UNIT LABOR COSTS				UNIT <i>Cost Per Column</i>				
(c) 1	2	3	4 (f)	5	6	7	8	
Previous	1.83			80				
This Week	1.87			80				
Total	1.85			80				
TOTAL LABOR HOURS				UNIT				
1	2	3	4	5	6	7	8	
Previous	84			24				
This Week	56			16				
Total	140			40				
LABOR HOURS PER UNIT				UNIT <i>Hours Per Column.</i>				
1	2	3	4	5	6	7	8	
Previous	3 1/2 Hrs			1 3/4 Hrs				
This Week	3 3/4 Hrs			1 3/4 Hrs				
Total	3 3/4 Hrs			1 3/4 Hrs				

Fig. 44. Method of Analyzing Costs on Placing and Removing Metal Column Moulds.

43, is similar in all respects to figure 42, and the same method should be used throughout.

MIXING AND PLACING CONCRETE

To obtain accurate costs of mixing and placing concrete, the following sub-divisions should

be made in order that the costs may be accurate and valuable for future estimates.

The labor cost of unloading all classes of material, such as sand, stone, gravel, and cement, should be kept separately as given under a previous heading.

The labor required handling cement from shed to mixer, loading wheelbarrows, wheeling sand and gravel from stock pile to mixer, the time of laborers attending to mixer, dumping same, the hoisting and placing of concrete to point of distribution, and the labor required tamping, spading, and grading concrete should all be charged under one sub-division. In giving the cost on mixing and placing concrete always state the distance of material stock piles from the mixer, the method of distribution from hopper, and whether or not wheelbarrows, concrete carts or gravity system is used.

If the concrete is placed during freezing weather, and it is necessary to heat the sand, gravel, and water, separate cost should be kept on this work; also the cost of covering the concrete with straw, boards, paper, etc., and the upkeep of salamanders or other temporary heat should be kept separately.

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Building <u>Central Hospital</u>		Frank R. Walker Company					LABOR DISTRIBUTION			Sheet No. <u>20</u>
Class <u>"G.P.R."</u>		Week Ending <u>APR 6 - 1916</u>					Job No. <u>165</u>			
OCCUPATION	F	S	M	T	W	T	HOURS	RATE	AMOUNT	
1 (a) Finisher	—	—	—	8	8	—	16	75	1200	
2 Laborers	—	—	32	160	147	—	339	40	13560	
3 Engineers	—	—	8	16	18	—	42	75	3150	
4										
5										
6										
7										
8										
Total									17910	
	Quantity Work in Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day	Quantity Work in Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day		
Previous	60.420	463.00	1.25	35.462						
This Week	162	17900	1.10	38						
Total	599	64200	1.20	37.6						

Fig. 45. Distribution and Costs on Mixing and Placing Concrete.

Figure 45 gives the method employed in keeping cost on mixing and placing concrete, which is the same manner as described above, as the total time of all different trades employed are given; the number of cubic yards of concrete in place, the total pay roll cost of same, and the average labor cost per cubic yard of concrete. The number of cubic yards of concrete a laborer will average per 8-hour day are also given. The back of the card, which is figure 46, gives the separate units which make up the total unit price per cubic yard; the total number of hours

COST ANALYSIS RECORD								
UNIT LABOR COSTS				UNIT <i>Cubic Yard</i>				
	1	2	3	4	5	6	7	8
Previous	.10	.95	.20					
This Week	.074	.84	.19					
Total	.087	.89	.195					
TOTAL LABOR HOURS				UNIT				
	1	2	3	4	5	6	7	8
Previous	49 1/2	881	99					
This Week	16	339	172					
Total	65 1/2	1220	141					
LABOR HOURS PER UNIT				UNIT <i>Cubic Yard</i>				
	1	2	3	4	5	6	7	8
Previous	1/4 Hrs	2 3/8 Hrs	1/4 Hrs					
This Week	1/10 Hrs	2 1/2 Hrs	1/4 Hrs					
Total	1/8 Hrs	2 1/4 Hrs	1/4 Hrs					

Fig. 46. Analyzed Costs on Mixing and Placing Concrete.

for the various trades employed and the number of hours required to mix and place one cubic yard of concrete.

REINFORCING STEEL

Separate time should be kept on unloading the reinforcing steel from the cars, sorting, and storing same for future use in the building. If the steel is to be bent on the job, the time should also be kept separately for this branch of the work, likewise separate costs on handling the steel from the stock piles to the building site,

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hoisting, placing, and tying same in place. Costs on reinforcing steel are always given by the number of tons of steel placed.

Frank R. Walker Company										
Building <u>Central Hospital</u>		LABOR DISTRIBUTION					Sheet No. <u>21</u>			
Class <u>"G.P. 3"</u>		Week Ending <u>APR 6 - 1916</u>					Job No. <u>165</u>			
OCCUPATION	F	S	S	M	T	W	T	HOURS	RATE	AMOUNT
1 (A) Laborers	32	16						48	40	1920
2										
3										
4 (C) Iron Workers				16	32	32	32	112	70	7840
5										
6										
7										
8										
Total	<u>"A"</u>					<u>"C"</u>				
	Quantity Work In Place Tons	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8-hour Day	Quantity Work In Place Tons	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8-hour Day		
Previous	34	36.00	1.06	3	44	69.50	15.44	1700		
This Week	21	19.20	.91	3 1/2	5 1/2	78.40	14.26	1840		
Total	55	55.20	1.00	3 1/4	10	147.90	14.79	1800		
Form 106	Copyright 1916 By Frank R. Walker					(Over)				

Fig. 47. Costs on Unloading and Placing Reinforcing Steel.

Under figure 47 is given an example of cost keeping on unloading and placing reinforcing steel. The front of the card gives the number of tons unloaded, the total pay roll cost to date, together with the average labor cost per ton, and the number of tons of steel a man would unload and pile per 8-hour day.

On the back of the card, figure 48, are given the unit costs for both unloading and placing, the total number of hours of each class of labor

CLAY AND TILE METAL DOMES 127

COST ANALYSIS RECORD								
UNIT LABOR COSTS				UNIT <i>Cost Per Ton</i>				
(a) 1	2	3	4 (c)	5	6	7	8	
Previous	1.06			16.44				
This Week	.91			14.26				
Total	1.00			16.79				
TOTAL LABOR HOURS				UNIT				
1	2	3	4	5	6	7	8	
Previous	9.0			99 1/2				
This Week	4.8			112				
Total	1.38			211 1/2				
LABOR HOURS PER UNIT				UNIT <i>Hours Per Ton.</i>				
1	2	3	4	5	6	7	8	
Previous	2 1/3 Hrs			22 1/4 Hrs				
This Week	2 1/4 Hrs			20 3/4 Hrs				
Total	2 1/2 Hrs			21 1/2 Hrs				

Fig. 48. Method of Analyzing Costs on Reinforcing Steel.

required, and the number of hours required for one man to unload and place one ton of reinforcing steel.

CLAY TILE AND METAL DOMES

There are many kinds of combination tile and concrete systems; some of them being used in connection with clay tile, some with gypsum blocks and concrete, and others with metal tile (commonly called domes) and concrete joists. On all of these systems it is advisable to keep the cost of unloading materials from cars and

at building separately from the time of handling and placing in the building.

In keeping the cost of placing clay or gypsum tile, the costs should be given either by the square foot of tile placed, or by the square foot of floor area. On many of the metal dome systems the costs are kept per lineal foot or per square foot of tile. Metal domes usually come 20 inches wide and 2 feet long; so there are $1\frac{2}{3}$ square feet of tile to each lineal foot. Always give the depth of tile or domes, as 6, 8, 10 or 12 inches.

Separate time should also be kept on placing wire hangers to support or hold the metal lath or plaster board ceiling underneath the floor system, and the cost should be kept separately where the metal lath is placed on top of the forms before the metal domes are placed, and the quantities should be given per square foot or per square yard. Under some systems of metal dome construction the metal domes are pulled out or removed after the concrete has set and are used over time after time. The cost of this work should be kept separately and costs given per square foot of tile removed—the same method as used in placing them.

If the ceilings of metal lath, Hy-rib, or plaster board are fastened directly under the concrete

CLAY AND TILE METAL DOMES 129

joists by means of 1/4-inch rods spaced 12 inches on centers, and the lath are wired to them, the cost of this work should be kept separately and the quantities should be given per square foot or per square yard of completed ceiling.

Frank R. Walker Company										
Central Hospital			LABOR DISTRIBUTION				Sheet No. 22			
Building		Class "GP-4"		Week Ending APR 6 - 1916				Job No. 165		
OCCUPATION	F	S	S	M	T	W	T	HOURS	RATE	AMOUNT
1 (a) Masons	8	4		16	16			44	.75	33.00
2 Laborers	32	16		32	32			112	.40	44.80
3 Engineers	4	2		8	8			22	.75	16.50
4										
5										
6										
7										
8										
Total	Tile 8" x 12" x 12"									94.30
Previous	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day		
This Week	2400'	36.00	.015	1000'						
Total	5400'	44.30	.0134	982'						
	7800'	130.30	.0173	990'						

Fig. 49. Distribution and Costs on Handling and Placing Clay Tile for Floors.

Figure 49 is an example of cost keeping on placing clay tile in floors of combination tile and concrete systems. On the front of the card is given the thickness of the tile, the number of square feet in place, together with the total pay roll cost of same, and the average cost of handling and placing a square foot of tile. The quantity of tile a mason would average per 8-hour day is also given. On the back of this

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COST ANALYSIS RECORD								
UNIT LABOR COSTS			UNIT <i>Per Square Foot.</i>					
	1	2	3	4	5	6	7	8
Previous	.006	.007	.002					
This Week	.0061	.0083	.003					
Total	.006	.0076	.0025					
TOTAL LABOR HOURS				UNIT				
	1	2	3	4	5	6	7	8
Previous	19½	42	6½					
This Week	44	112	22					
Total	63½	154	28½					
LABOR HOURS PER UNIT				UNIT <i>Per 100 Square Feet.</i>				
	1	2	3	4	5	6	7	8
Previous	¾ Hrs	1 7/8 Hrs	¼ Hrs					
This Week	5/8 Hrs	2 Hrs	1/5 Hrs					
Total	5/8 Hrs	2 Hrs	1/3 Hrs					

Fig. 50. Analyzed Costs on Handling and Placing Clay Tile.

card, figure 50, are given the separate units which go to make up the total unit, the total number of hours of the various trades employed, and the time required by each class of workmen to handle and place 100 square feet of tile.

CHAPTER IX

HOLLOW TILE FIRE PROOFING

Under hollow tile fire proofing will come all kinds of clay and gypsum tile partitions from 2 to 12 inches in thickness. In work of this kind it is always advisable to keep the time on the different kinds and thicknesses of tile separately, as it costs much more to lay clay tile than gypsum blocks; and a laborer is able to wheel more 4-inch tile in a barrow than 12-inch tile; therefore, it is advisable to divide the time on the different classes of tile as much as possible. The cost schedule as given on the previous pages gives the proper divisions of sizes. On work of this kind the costs are always kept per square foot of tile laid, making deductions in full for openings.

The labor costs on square or circular column, beam, and spandrel covering should be kept under a separate heading, and the measurement given per square foot of tile laid.

Where any of the many kinds of tile "back-up" blocks are used, the cost of laying this work should also be kept by the square foot or

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number of tile laid. In every instance the kind of tile, size of same, etc., should be noted to make the cost data valuable for future estimates.

If tile floor arches are being installed, the cost on this work should be kept in the same manner as tile partitions or exterior tile walls. This method is by the square foot of floor laid and the thickness of the tile. Separate time should also be kept on the labor for erecting and removing temporary wood centering for the tile arches. Measurement of this work should be given by the number of square feet of floor area covered.

Building <u>Central Hospital</u>		Frank R. Walker Company						LABOR DISTRIBUTION		Sheet No. <u>23</u>	
Class <u>"G.P.S."</u>		Week Ending <u>APR 6 - 1916</u>						Job No. <u>165</u>			
OCCUPATION	F	S	S	M	T	W	T	HOURS	RATE	AMOUNT	
1 (b) <u>Masons</u>	16	8		16	16	56	16	128	75	9600	
2 <u>Laborers</u>	32	16		32	32	108	32	252	40	10080	
3 <u>Engineers</u>	11	2		4	4	8	4	26	75	1950	
4											
5 (f) <u>Laborers</u>	16	8		32	16	16	16	104	40	4160	
6											
7											
8											
Total	(b)						(f)		25790		
	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day			
Previous	2500'	112.50	04 1/2	300	7000'	120.70	01 3/4	183'			
This Week	5000'	216.30	04	312	1800'	41.60	02 1/2	140'			
Total	7500'	328.80	04 1/4	305	8800'	162.30	01 4/5	170'			
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Fig. 51. Method of Keeping Costs on Placing and Removing Wood Centering and Placing Tile Arches.

Under figure 51 are given the costs of installing wood centers and placing tile arches up to

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8 inches in thickness. The quantities are given in square feet together with the total pay roll cost to date, the average cost per square foot of wood centering and per square foot of clay tile; also the average number of square feet a man would complete per 8-hour day. On the back of this card, figure 52, are given the sepa-

COST ANALYSIS RECORD								
UNIT LABOR COSTS					UNIT <i>Per Square Foot</i>			
(D)	1	2	3	4	(%)	6	7	8
Previous	.02	.02	.005		.0175			
This Week	.019	.02	.0049		.023			
Total	.0195	.02	.00495		.018			
TOTAL LABOR HOURS					UNIT			
	1	2	3	4	5	6	7	8
Previous	67	175	16		301 ³ / ₄			
This Week	128	252	26		104			
Total	195	377	42		405 ³ / ₄			
LABOR HOURS PER UNIT					UNIT <i>Per 100 Sq. Ft</i>			
	1	2	3	4	5	6	7	8
Previous	2 ³ / ₄ Hrs	5 Hrs	1/2 Hrs		4 1/8 Hrs			
This Week	2 1/2 Hrs	5 Hrs	1/2 Hrs		6 Hrs			
Total	2 3/8 Hrs	5 Hrs	1/2 Hrs		4 1/2 Hrs			

Fig. 52. Analyzed Costs on Wood Centering and Tile Arches.

rate units which go to make up the total unit cost of the job; also the number of hours put in by each class of labor employed on the work, and the number of hours required by the different classes of labor to place 100 square feet of wood centers and tile arches.

Central Hospital		Frank R. Walker Company							LABOR DISTRIBUTION			Sheet No. <u>24</u>
Building		Week Ending							APR 6 - 1916			Job No. <u>165</u>
Class <u>G.P.G.</u>												
OCCUPATION	F	S	S	M	T	W	T	HOURS	RATE	AMOUNT		
1 (a) Masons	40	20		40	32	48	48	228	.75	171.00		
2 Laborers	56	24		56	48	60	64	308	.40	123.20		
3 Engineers	4	2		6	6	8	8	34	.75	25.50		
4												
6 (a) Masons	32	16		16	16	—	—	80	.75	60.00		
8 Laborers	32	16		20	20	—	—	98	.40	35.20		
7 Engineers	4	2		2	2	—	—	10	.75	7.50		
8												
Total											472.40	
Quantity Work in Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day	Quantity Work in Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day					
Previous	3800'	215.60	.056	200'	—	—	—					
This Week	5900'	219.70	.054	206'	1500'	102.70	.0645	150'				
Total	9700'	535.30	.055	204'	1500'	102.70	.0645	150'				

Fig. 53. Distribution and Costs on Placing Tile Partitions.

Figure 53 furnishes an illustration of cost keeping on tile partitions of various thicknesses.

UNIT LABOR COSTS								COST ANALYSIS RECORD							
UNIT				UNIT Per Sq. Ft.				UNIT							
(a) 1	2	3	4	(b) 5	6	7	8								
Previous	.029	.021	.025												
This Week	.029	.021	.025		.04	.023	.025								
Total	.029	.021	.025		.04	.023	.025								
TOTAL LABOR HOURS				UNIT											
(a) 1	2	3	4	5 (b)	6	7	8								
Previous	1672	1995	25												
This Week	228	308	34		80	88	10								
Total	380	5075	59		80	88	10								
LABOR HOURS PER UNIT				UNIT Per 100 Sq. Ft.											
1	2	3	4	5	6	7	8								
Previous	4 Hrs	5 1/4 Hrs	7 1/2 Hrs	—	—	—	—								
This Week	4 Hrs	5 1/4 Hrs	7 1/2 Hrs	—	5 1/2 Hrs	5 1/2 Hrs	7 1/2 Hrs								
Total	4 Hrs	5 1/4 Hrs	7 1/2 Hrs	—	5 1/2 Hrs	5 1/2 Hrs	7 1/2 Hrs								

Fig. 54. Costs as Analyzed on Tile Partition Work.

The quantity of tile installed together with the total pay roll costs on same are given; also the average labor cost per square foot of tile placed and the number of square feet of tile a man will place per 8-hour day are shown. On the back of the card, figure 54, the separate unit costs of this work are given and the total number of hours required by each class of labor. In the lower columns are given the time required by the different classes of workmen to handle and lay 100 square feet of tile partition.

CHAPTER X

ROUGH CARPENTRY

Under rough carpentry will come all classes of carpentry work with the exception of interior finish, stairs, and mill work.

The cost of framing lumber of nearly all kinds are given per thousand feet of lumber.

The cost of framing wood posts or columns from 6x6 inches to 12x12 inches or larger, should be given per thousand feet of lumber, and the exact character of the work should be noted, such as rounding or chamfering corners, boring holes through centers of columns, framing for post caps and bases, and the labor cost of handling and erecting same.

The cost of framing large beams and girders should also be kept separately. In all cases state whether or not it was necessary to frame for post caps, bases, stirrups, etc., and whether or not the corners had to be chamfered, as all these items should be considered when estimat-

ing the cost of framing. Costs on this class of work should be given per thousand feet of lumber.

Building <u>Central Hospital</u>		Frank R. Walker Company							Sheet No. <u>25</u>	
Class <u>"HP-1"</u>		LABOR DISTRIBUTION							Job No. <u>1615</u>	
		Week Ending <u>APR 6 - 1916</u>								
OCCUPATION		F	S	M	T	W	T	HOURS	RATE	AMOUNT
1 (a)	Carpenters	16	—	32	48	32	—	128	70	8960
2	Laborers	18	—	40	56	40	—	154	40	6160
3										
4										
5 (b)	Carpenters	48	—	80	80	96	80	384	70	26880
6	Laborers	60	—	92	96	104	96	448	40	17920
7										
8										
Total		<u>16</u>							<u>59920</u>	
	Quantity Work in Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8-hour Day	Quantity Work in Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8-hour Day		
Previous	<u>80615</u>	<u>—</u>	<u>—</u>	<u>560'</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>		
This Week	<u>1274</u>	<u>151.20</u>	<u>12.60</u>	<u>750'</u>	<u>6074</u>	<u>448.00</u>	<u>7.47</u>	<u>1250'</u>		
Total	<u>1274</u>	<u>151.20</u>	<u>12.60</u>	<u>750'</u>	<u>6074</u>	<u>448.00</u>	<u>7.47</u>	<u>1250'</u>		
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Fig. 55. Distribution and Costs on Timber Framing.

Under figure 55 the methods of keeping costs on framing wood beams, girders, and columns, are given. The number of thousand feet of lumber are given, likewise the total pay roll costs, and the average cost per thousand feet of lumber. The quantity of lumber a carpenter will frame and erect per 8-hour day is also given. On the back of the card, figure 56, are given the separate units which go to make up the total average cost per thousand feet, the number of hours worked by each class of men employed on

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the job, and the number of hours required by each class of workmen to frame and erect a thousand feet of lumber.

COST ANALYSIS RECORD								
UNIT LABOR COSTS					UNIT	Per 1000 Ft. Lbr. B.M.		
(a)	1	2	3	4	(b)	6	7	8
Previous								
This Week	7.47	5.13			4.48	2.00		
Total	7.47	5.13			4.48	2.00		
TOTAL LABOR HOURS					UNIT			
	1	2	3	4	5	6	7	8
Previous	—	—	—	—	—	—	—	—
This Week	128	154	—	—	384	448	—	—
Total	128	154	—	—	384	448	—	—
LABOR HOURS PER UNIT					UNIT	Per 1000 Ft. Lbr. B.M.		
(a)	1	2	3	4	(b)	6	7	8
Previous								
This Week	10 3/8 Hrs	12 3/4 Hrs			6 5/8 Hrs	7 1/2 Hrs		
Total	10 3/8 Hrs	12 3/4 Hrs			6 5/8 Hrs	7 1/2 Hrs		
Form 108 <i>5000 per 8 hr day</i> Copyright 1916 By Frank R. Walker (Over)								

Fig. 56. Analyzed Costs on Handling and Placing Lumber.

The labor cost of framing and placing wood rafters, joists, etc., should be kept separately from heavy construction, and the costs of this work should be given per thousand feet of lumber placed.

Placing roof saddles, hips, valleys, and other light construction in wood constructed buildings, should be kept separately wherever possible, as there is usually a great amount of cutting necessary to frame a very small quantity of lumber.

On residences and other work where light studding of 2x4 or 2x6-inch lumber is used, the costs should be kept separately, as it requires almost as much time to frame a 2x4 as it does to frame a 2x8. Cost on this work should be kept by the thousand feet of lumber placed or erected.

Roof framing is another item which should be kept separately as this class of work is usually much more expensive than the ordinary framing, there being usually a great amount of cutting and fitting necessary for hips, valleys, rafters, jack rafters, etc. On costs of this kind always state the class of roof being framed, and the sizes of the lumber required. A general description is valuable for future reference.

Where wood sheathing is used on outside walls or for sub-floors always give the width of the lumber used, and whether laid straight or diagonally.

In many factory and mill buildings wood sub-floors of 2x6, 3x6, and other heavy lumber are used for floors carrying great weight. This lumber is either square edge stock, laid on edge and known as laminated flooring, or matched and beaded, laid either straight or diagonally. When keeping costs on work of this kind give

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the class of material used, and whether same is laid straight or diagonally, and the quantities by the thousand of feet of lumber placed.

On residence and other frame work keep the costs on weatherboarding or drop siding either by the square, containing 100 square feet, or per thousand feet of lumber. Give the width of material used and the lap where the measurement is given by the square.

Central Hospital		Frank R. Walker Company							LABOR DISTRIBUTION		Sheet No. <u>26</u>
Building		LABOR DISTRIBUTION							Week Ending <u>APR 6 - 1916</u>		Job No. <u>165</u>
Class <u>"HP-2"</u>		OCCUPATION							HOURS	RATE	AMOUNT
		F	S	S	M	T	W	T			
1	(C) Carpenters	88	44		88	46	80	40	436	70	305.20
2	Laborers	48	24		48	56	40	24	240	40	96.00
3											
4											
5											
6											
7											
8											
Total										1401.20	
	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day			
Previous	337K	276.00	8.36	875'							
This Week	527K	1401.20	7.71	950'							
Total	864K	1677.20	7.87	910'							

Fig. 57. Keeping Costs on Laying Wood Floors.

Under figure 57 an example of cost keeping in connection with wood floors is given. The total quantity of lumber in place is given together with the pay roll cost to date and the average unit cost per thousand feet of lumber. The

average number of feet of lumber a carpenter would place per 8-hour day is also given. On the back of this card, figure 58, are given the

COST ANALYSIS RECORD								
UNIT LABOR COSTS				UNIT <i>Per 100 Ft Lbr B.M.</i>				
(c)	1	2	3	4	5	6	7	8
Previous	6.36	2.00						
This Week	5.87	1.84						
Total	6.06	1.91						
TOTAL LABOR HOURS				UNIT				
	1	2	3	4	5	6	7	8
Previous	300	165						
This Week	436	240						
Total	736	405						
LABOR HOURS PER UNIT				UNIT <i>Per 100 Ft Lbr B.M.</i>				
	1	2	3	4	5	6	7	8
Previous	9 Hrs	5 Hrs						
This Week	8 $\frac{1}{2}$ Hrs	4 $\frac{3}{4}$ Hrs						
Total	8 $\frac{3}{4}$ Hrs	4 $\frac{3}{4}$ Hrs						

Fig. 58. Analyzed Costs on Laying Wood Floors.

separate units which go to make up the average unit cost on the job; the total number of hours required by the various trades, and the number of hours required by the different classes of workmen to frame and place one thousand feet of lumber.

In placing wood furring strips or grounds on ceilings, walls, or floors, note whether it was necessary to plug the walls for same. The measurement should be given either in square feet of area covered, or in lineal feet of furring strips or grounds placed.

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Building Central Hospital		Frank R. Walker Company		LABOR DISTRIBUTION		Sheet No. <u>27</u>					
Class "HP. 3"		Week Ending APR 6 - 1916		Job No. <u>165</u>							
OCCUPATION	F	S	S	M	T	W	T	HOURS	RATE	AMOUNT	
1 (a) Carpenters	16	8		16	16	16	16	88	70	6160	
2 Laborers	4	—		4	—	—	2	10	40	400	
3											
4											
5 (b) Carpenters	32	—		32	16	16	32	128	70	8960	
6 Laborers	4	—		4	—	—	12	12	40	480	
7											
8											
Total	(a)							(b)			16000
	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day			
Previous	1400'	32.70	.023	260'	870'	27.60	.035	185'			
This Week	3100'	65.60	.0216	273'	3100'	94.40	.03	194'			
Total	4500'	98.30	.0215	265'	3470'	122.00	.03	193'			

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Fig. 59. Keeping Costs on Wood Grounds and Furring Strips.

Figure 59 gives a practical example of keeping costs on work of this kind. The total number of lineal feet of furring strips and grounds are given together with the total pay roll cost to date. The average labor cost per lineal foot of work in place and the average number of lineal feet a carpenter would place per 8-hour day is also given. On the back of this card, figure 60, the different units which enter into the total cost of same are given; the number of hours required by each class of workmen, and the number of hours required by the various tradesmen to place 100 lineal feet of furring strips or grounds.

COST ANALYSIS RECORD								
UNIT LABOR COSTS					UNIT <i>Per Lineal Foot</i>			
(a)	1	2	3	4	5(6)	6	7	8
Previous	.02	.0023			.03	.002		
This Week	.02	.0013			.029	.001		
Total	.02	.0023			.03	.0015		
TOTAL LABOR HOURS					UNIT			
	1	2	3	4	5	6	7	8
Previous	40	11 1/2			37 1/2	4 1/2		
This Week	88	10			128	17		
Total	128	21 1/2			165 1/2	16 1/2		
LABOR HOURS PER UNIT					UNIT <i>Per 100 Lineal Feet</i>			
	1	2	3	4	5	6	7	8
Previous	2 1/2 Hrs.	3/4 Hrs.			4 1/2 Hrs.	1/2 Hrs.		
This Week	2 3/4 Hrs.	1/3 Hrs.			4 1/2 Hrs.	1/3 Hrs.		
Total	2 6/8 Hrs.	1/2 Hrs.			4 1/2 Hrs.	2/3 Hrs.		

Fig. 60. Analyzed Costs on Placing Wood Grounds and Furring Strips.

The costs of laying wood floors are usually kept by the square containing 100 square feet, or by the thousand feet of flooring. The difference between the two methods takes into consideration the allowance for waste, which will vary from 25 to 50 per cent, depending upon the width of the flooring used. Where the floors are to be scraped, traversed, or sanded, the costs are usually kept by the square foot of floor area covered; the cost of same varying with the number of operations necessary.

Figure 61 gives the method of keeping costs on floor laying; the number of squares of flooring laid and the total pay roll cost of same.

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The costs per 100 square feet of flooring and the number of squares of floor a floor-layer will lay or scrape per 8-hour day are also given. On

Building Central Hospital		Frank R. Walker Company							LABOR DISTRIBUTION		Sheet No. 28
Class "HP-4"		Week Ending APR 6 - 1916							Job No. 165		
OCCUPATION	F	S	S	M	T	W	T	HOURS	RATE	AMOUNT	
1 (a) Floor Layers	32	16		32	32	24	16	152	75	11400	
2 Laborers	8	—		8	11	4	—	24	40	960	
3											
4 (b) Floor Scrapers	24	12		16	16	16	16	100	75	7500	
5 Laborers	—	—		—	—	—	—		40		
6											
7											
8 Flooring 7/8 x 2 1/2" Oak Board Cont. - Direct.											
Total										19860	
Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day				
Previous 80 Sq	176.00	2.20	3 Sq	20 Sq	52.00	1.73	3 1/2 "				
This Week 64 "	123.60	1.93	3 1/2 "	41 "	75.00	1.83	3 1/2 "				
Total 144 "	299.60	2.08	3 1/2 "	71 "	127.00	1.80	3 3/4 "				

Fig. 61. Distribution and Labor Costs on Hardwood Floors.

COST ANALYSIS RECORD								Per Square Of 100 Square Feet.	
UNIT LABOR COSTS				UNIT					
(a) 1	2	3	4 (b)	5	6	7	8		
Previous 1.90	.30		1.73						
This Week 1.78	.15		1.83						
Total 1.84	.23		1.80						
TOTAL LABOR HOURS				UNIT					
1	2	3	4	5	6	7	8		
Previous 203	60		70						
This Week 152	24		100						
Total 355	84		170						
LABOR HOURS PER UNIT				UNIT				Per Square of 100 Square Feet	
1	2	3	4	5	6	7	8		
Previous 2 1/2 Hrs	45 Min		2 1/2 Hrs						
This Week 2 1/5 Hrs	22 1/2 Min		2 1/2 Hrs						
Total 2 1/2 Hrs	35 Min		2 1/5 Hrs						

Fig. 62. Method of Analyzing Costs on Hardwood Floors.

the back of this card, figure 62, are given the unit costs which make up the total unit; the number of hours required on the entire job and the time required for a floor-layer to lay or scrape 100 square feet of floor.

The cost of dipping and laying shingles is usually given by the thousand shingles, or by the square containing 100 square feet and the distance to the weather should be noted.

Central Hospital		Frank R. Walker Company							Sheet No. <u>29</u>		
Building		LABOR DISTRIBUTION							Job No. <u>165</u>		
Class "HP-5"		Week Ending <u>APR 6 - 1916</u>							Job No. <u>165</u>		
OCCUPATION		F	S	S	M	T	W	I	HOURS	RATE	AMOUNT
1	(a) Carpenters	8	4		8				20	70	14.00
2											
3											
4	(b) Carpenters				3	16	16	16	80	70	56.00
5											
6											
7											
8											
Total		"a"					"b"			70.00	
	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day			
Previous	48	12.00	25	2 1/2	13	27.00	2.07	2.7			
This Week	54	14.00	26	2 1/2	27	56.00	2.07	2.7			
Total	102	26.00	25 1/2	2 1/2	40	83.00	2.07	2.7			
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Fig. 63. Keeping Costs on Laying Wood Shingles.

Under figure 63 the method of keeping cost on dipping and laying wood shingles is given. The quantities are given per thousand shingles dipped and laid, with the total pay roll cost of same. The cost of laying a thousand shingles

and the number of shingles a carpenter would dip or lay per 8-hour day are also given. On the back of this card, figure 64, the separate

COST ANALYSIS RECORD								
UNIT LABOR COSTS				UNIT <i>Per 1000 Shingles</i>				
(a)	1	2	3	4	5	6	7	8
Previous	25			2.07				
This Week	26			2.07				
Total	75½			2.07				
TOTAL LABOR HOURS				UNIT				
	1	2	3	4	5	6	7	8
Previous	17			84½				
This Week	20			80				
Total	37			164½				
LABOR HOURS PER UNIT				UNIT <i>Per 1000 Shingles</i>				
(a)	1	2	3	4	5	6	7	8
Previous	21½ Min			28 Min				
This Week	22 Min			9 Hrs				
Total	21¾ Min			28 Min				

Fig. 64. Analyzed Labor Costs on Laying Wood Shingles.

unit costs per thousand shingles are given; the total number of hours worked on the job and the number of hours required to dip and lay one thousand shingles.

The cost of framing and placing rough wood stairs should be given by the length of the string; the number of risers, and the length of same.

Costs on placing wood shelves in closets and pantries should be given by the number of shelves placed and the length and width of same.

CHAPTER XI

MILL WORK AND INTERIOR FINISH

Costs on mill work are kept in several ways. Some contractors take the entire bill of materials coming from the mill and estimate the labor at a certain per cent of the cost of the material, which will vary from 35 to 50 per cent. Other contractors will keep the cost of each class of work separately; such as putting together wood door and window frames when they come to the job knocked down, the labor cost of setting wood door and window frames, and the cost of hanging and fitting wood sash, etc.

Separate costs are also kept on fitting and hanging wood doors, and the labor required erecting trim for same.

The cost of placing jamb linings and casing window openings are also separate items.

Separate costs are kept on handling and placing book cases, closet cases, wardrobes, pantry cases, etc.

The smaller items such as wood base, chair

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rail, plate rail, and picture mould are usually kept separately, and the quantities are given at so many lineal feet of material in place.

Central Hospital		Frank R. Walker Company							LABOR DISTRIBUTION		
Building		Week Ending							Sheet No. <u>30</u>		
Class "IP-1"		APR 6 - 1916							Job No. <u>165</u>		
OCCUPATION	F	S	S	M	T	W	T	HOURS	RATE	AMOUNT	
1 (C) Carpenters	16	4			16	16		52	70	3640	
2 Laborers	16	12						28	40	1120	
3											
4											
5											
6											
7											
8											
Total										4760	
	Quantity Work in Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day	Quantity Work in Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day			
Previous	47	21.50	.46	16							
This Week	83	47.60	.574	13							
Total	130	69.10	.53	15							

Fig. 65. Distribution and Costs on Setting Window Frames.

Under figure 65 are given the methods of keeping costs on setting wood door and window frames. The number of frames set is given; likewise the total pay roll cost of same, and the average cost to handle and set one frame. The number of frames a carpenter will average per 8-hour day is also given.

On the back of the card, figure 66, the separate cost units which go to make up the average labor cost are given; the number of hours put

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in by the different classes of men employed, and the time required by the different trades to handle and set one frame.

UNIT LABOR COSTS		COST ANALYSIS RECORD							
		UNIT <i>Per Wndn Frame</i>							
	1	2	3	4	5	6	7	8	
Previous	25	11							
This Week	44	13 1/2							
Total	39 1/2	12 1/4							
TOTAL LABOR HOURS		UNIT							
	1	2	3	4	5	6	7	8	
Previous	73 1/2	13							
This Week	52	28							
Total	75 1/2	41							
LABOR HOURS PER UNIT		UNIT <i>Per Wndn Frame</i>							
	1	2	3	4	5	6	7	8	
Previous	1/2 Hrs	1/4 Hrs							
This Week	3/8 Hrs	1/3 Hrs							
Total	3/8 Hrs	1/3 Hrs							

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 Fig. 66. Method of Analyzing Costs on Setting Wood Frames.

Central Hospital		Frank R. Walker Company				LABOR DISTRIBUTION		Sheet No. 31		
Building		LABOR DISTRIBUTION				Week Ending APR 6 - 1916		Job No. 165		
Class "IP-1"		OCCUPATION				HOURS		RATE		
		F	S	S	M	T	W	T	AMOUNT	
1	(F) Carpenters	8	4		16	16	16	76	70	53.20
2	Laborers	8	4		8			20	40	8.00
3										
4										
5	(G) Carpenters	8	4		8	8		28	70	19.60
6	Laborers	8						8	40	3.20
7										
8										
Total		(F) Doors Hung				(G) Sides of Trim Erected				84.00
	Quantity Work in Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day	Quantity Work in Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day	AMOUNT	
Previous	12	15.60	1.30	5.20	18	10.70	.60	5.20	12	
This Week	44	61.20	1.40	4.40	40	22.80	.57	4.40	11	
Total	56	76.80	1.37	4.40	58	33.50	.59	4.40	10 1/2	

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 Fig. 67. Cost Keeping on Fitting and Hanging Doors.

Figure 67 gives the method used in keeping cost on fitting and hanging doors and trimming openings. The total number of doors hung to date is given together with the total pay roll cost on same. The next item gives the average labor cost to fit and hang one door and the average number of doors a carpenter would fit and hang per 8-hour day. On the back of this card, figure 68, the unit costs which enter into

COST ANALYSIS RECORD <i>f. Per Door</i>								
UNIT LABOR COSTS				UNIT <i>g. Per Side of Trim</i>				
	<i>1(f)</i>	2	3	4	<i>5(g)</i>	6	7	8
Previous	<i>112</i>	<i>18</i>			<i>52</i>	<i>.08</i>		
This Week	<i>121</i>	<i>19</i>			<i>49</i>	<i>.08</i>		
Total	<i>1,162</i>	<i>182</i>			<i>1,502</i>	<i>.08</i>		
TOTAL LABOR HOURS				UNIT				
	1	2	3	4	5	6	7	8
Previous	<i>19</i>	<i>11</i>			<i>15</i>	<i>4</i>		
This Week	<i>76</i>	<i>20</i>			<i>28</i>	<i>8</i>		
Total	<i>95</i>	<i>31</i>			<i>43</i>	<i>12</i>		
LABOR HOURS PER UNIT				UNIT <i>f. Per Door</i> <i>g. Per Side of Trim</i>				
	<i>1(f)</i>	2	3	4	<i>5(g)</i>	6	7	8
Previous	<i>1 1/2 Hrs</i>	<i>1/2 Hrs</i>			<i>1 1/2 Hrs</i>	<i>1/4 Hrs</i>		
This Week	<i>1 1/2 Hrs</i>	<i>1/2 Hrs</i>			<i>1 1/2 Hrs</i>	<i>1/4 Hrs</i>		
Total	<i>1 1/2 Hrs</i>	<i>3/4 Hrs</i>			<i>3 1/2 Hrs</i>	<i>1/4 Hrs</i>		

Fig. 68. Analyzed Costs on Fitting and Hanging Doors.

the total unit cost are given; the number of hours required by the different classes of workmen, the number of hours required by each class of men to fit and hang one door, and the time required to place the trim on one side of the door opening.

The costs on setting finished jambs, glass stops, and trimming borrowed lights should be given by the number of openings completed; giving the average size of same where possible.

In erecting wood stairs, newels, hand rail, etc., it is important that the length of the stringers be given together with the number of treads, risers, landings, if any, the number of newels, the number of balusters to place, and the number of pieces and length in lineal feet of wood hand rail. Costs should be given on each flight of stairs.

CHAPTER XII

LATHING AND PLASTERING

The labor cost on placing wood lath should be given by the thousand lath or by the square yards of lath in place. Also give the length and width of the lath, as there are several sizes of same now on the market. The cost of placing the various makes of plaster and wall board should also be given by the thousand square feet or by the square yard.

Building <u>Central Hospital</u>		Frank R. Walker Company							Sheet No. <u>32</u>	
Class <u>"J.P.I."</u>		LABOR DISTRIBUTION							Job No. <u>165</u>	
		Week Ending <u>APR 6 - 1916</u>								
OCCUPATION	F	S	S	M	T	W	T	HOURS	RATE	AMOUNT
1 <u>(b) Lathers</u>	16	8		16	16	16	16	88	70	61.60
2										
3										
4 <u>(c) Lathers</u>	24	12		24	24	24	24	132	70	92.40
5										
6										
7										
8 <u>Wood Lath on ceilings - Plaster on walls</u>										
Total										154.00
	Quantity Work in Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day	Quantity Work in Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day		
Previous	5477	30.00	545	1.000	1,000.44	54.60	.052	103.44		
This Week	1274	61.60	513	1.092	1,800	92.40	.0513	109.46		
Total	17671	91.60	524	1.060	2,800	147.00	.0524	106.4		
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Fig. 69. Keeping Costs on Placing Wood Lath and Plaster Board.

Under figure 69 are given the costs on plac-

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ing wood lath and plaster board. The quantities of wood lath are given in so many thousands of lath and the plaster board is given in square yards. In each instance the total amount of the pay roll to date is included with the unit labor cost per thousand lath and per square yard of plaster board. The average quantities per 8-hour day are also given, making the costs applicable for use at any rate of wage. On the back of the card, figure 70, the separate units which

COST ANALYSIS RECORD <i>Per 1000 Wood Lath</i>								
UNIT LABOR COSTS				UNIT (C) <i>Per Sq. Yard</i>				
	1	2	3	4	5	6	7	8
Previous	<i>1/8</i>			<i>(C)</i>				
This Week	<i>0.19 Yd</i>			<i>0.25 Yd</i>				
Total	<i>0.24 Yd</i>			<i>0.25 Yd</i>				
TOTAL LABOR HOURS								
	1	2	3	4	5	6	7	8
Previous	<i>43</i>			<i>78</i>				
This Week	<i>88</i>			<i>132</i>				
Total	<i>131</i>			<i>210</i>				
LABOR HOURS PER UNIT				UNIT (A) <i>Per 1000 Lath & 100 Sq. Yds</i> (C) <i>Per 100 Sq. Yds.</i>				
	1	2	3	4	5	6	7	8
Previous	<i>1 1/8 Hrs 100 Yds</i>			<i>7 3/4 Hrs 100 Yds</i>				
This Week	<i>1 3/8 Hrs 100 Yds</i>			<i>1 1/2 Hrs " "</i>				
Total	<i>1 3/8 Hrs 100 Yds</i>			<i>7 1/2 Hrs " "</i>				

Fig. 70. Analyzed Labor Costs on Placing Wood Lath and Plaster Board.

go to make up the total average unit are given and the total number of hours required to complete the job to date. On the bottom of the same card are given the number of hours neces-

sary for a man to place a thousand lath or one hundred square yards of lath. The time necessary for a lather to place 100 square yards of plaster board is also given.

If metal lath are to be placed on wood studs the same method as given for wood lath is to be used.

The labor in connection with the erection and installation of solid metal partitions, suspended ceilings of metal lath, Rib-Trus, Hy-Rib, and other materials of a like nature, are usually given by the square yard. On ornamental work, such as beams, cornices, etc., the work in place is usually measured by the square foot.

The costs of placing metal corner beads, invisible metal picture mould, etc., are given by the lineal foot. Mention should also be made with regard to whether or not it was necessary to plumb same for an ordinary or a first-class job.

A practical example is given under figure 71, which shows the number of square yards of suspended metal ceiling in place and the number of lineal feet of metal corner beads. The total pay roll cost to date is given, together

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with the unit labor cost per square yard and per lineal foot. The quantity of work a man averaged per 8-hour day is included.

Building <u>Central Hospital</u>		Frank R. Walker Company						Sheet No. <u>33</u>	
Class <u>"JPI"</u>		LABOR DISTRIBUTION						Job No. <u>165</u>	
		Week Ending <u>APR 6 - 1916</u>							
OCCUPATION	F	S	M	T	W	T	HOURS	RATE	AMOUNT
1 (f) <u>Lathers</u>	<u>3</u>	<u>2</u>			<u>3</u>	<u>1</u>	<u>16</u>	<u>70</u>	<u>89.60</u>
2									
3									
4									
5 (K) <u>Lathers</u>	<u>8</u>	<u>4</u>		<u>8</u>	<u>8</u>	<u>8</u>	<u>44</u>	<u>70</u>	<u>308.0</u>
6 <u>Corner beads-on-File "Plumbed"</u>									
7									
8									
Total	(f)					(K)			170.40
	Quantity Work in Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 hour Day	Quantity Work in Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 hour Day	
Previous	<u>2044.0</u>	<u>61.00</u>	<u>30%</u>	<u>18.440</u>	<u>312'</u>	<u>15.00</u>	<u>.05</u>	<u>112'</u>	
This Week	<u>330</u>	<u>89.60</u>	<u>.27</u>	<u>20 1/2 "</u>	<u>618'</u>	<u>30.80</u>	<u>.05</u>	<u>112'</u>	
Total	<u>530</u>	<u>150.60</u>	<u>.28 1/2</u>	<u>19 3/8 "</u>	<u>930'</u>	<u>45.80</u>	<u>.05</u>	<u>112'</u>	

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Fig. 71. Method of Keeping Costs on Suspended Metal Ceilings and Metal Corner Bead.

COST ANALYSIS RECORD (f) Per Square Yard							
UNIT LABOR COSTS				UNIT (K) Per Lineal Foot.			
	1 (f)	2	3	4	5 (K)	6	7
Previous	<u>30%</u>				<u>.05</u>		
This Week	<u>.37</u>				<u>.05</u>		
Total	<u>.38 1/2</u>				<u>.05</u>		
TOTAL LABOR HOURS				UNIT			
	1	2	3	4	5	6	7
Previous	<u>87</u>				<u>7.13</u>		
This Week	<u>128</u>				<u>11.4</u>		
Total	<u>215</u>				<u>6.5 1/2</u>		
LABOR HOURS PER UNIT				UNIT Time Per 100 Sq. Yds " " " 100 Lin. Ft.			
	1 (f)	2	3	4	5 (K)	6	7
Previous	<u>53 1/2 Hrs</u>				<u>7 Hrs</u>		
This Week	<u>39 Hrs</u>				<u>7 Hrs</u>		
Total	<u>40 1/2 Hrs</u>				<u>7 Hrs</u>		

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Fig. 72. Analyzed Costs on Placing Suspended Metal Ceilings and Corner Bead.

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On the back of the card, figure 72, the separate unit costs are given, which make up the totals and the number of hours required to complete the work to date. In the lower columns are given the number of hours it required a man to complete 100 square yards of suspended ceiling and the time necessary to place 100 lineal feet of metal corner beads.

The costs on plain plastering are usually kept by the square yard of surface covered. A great many plasterers make no deductions for openings, while others make an allowance for one-half of all openings containing over 15 square feet. Whichever method is adopted, it should be noted on the card, thus, "one-half openings deducted," or "no openings deducted."

Building Central Hospital		Frank R. Walker Company							LABOR DISTRIBUTION		Sheet No. <u>31</u>
Class <u>"JP-2"</u>		Week Ending <u>APR 6 - 1916</u>							Job No. <u>165</u>		
OCCUPATION	F	S	S	M	T	W	T	HOURS	RATE	AMOUNT	
1 (b) Plasterers	40	20		40	40	48	48	236	75	177.00	
2 Laborers	40	24		36	48	40	52	240	50	120.00	
3											
4											
5 (c) Plasterers	16	8		32	72	72	80	280	75	210.00	
6 Laborers	16	8		40	64	64	72	264	50	132.00	
7											
8											
Total	(b)							(c)		639.00	
	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day			
Previous	1970.44	161.00	.0815	120.45	1800.00	176.00	.098	100.00			
This Week	2712.44	297.00	.08	126.00	3650.00	342.00	.094	104.00			
Total	5682.88	458.00	.086	123.00	5450.00	518.00	.095	102.00			

Fig. 73. Method of Keeping Costs on Plastering.

Separate time should be kept on both the scratch and brown coats, and whether it was placed on wood lath, plaster board, brick or tile walls, metal lath, etc. Figure 73 will offer a practical example of this work, as the costs are given for applying both the scratch and brown coats. The quantities are given in square yards with the total pay roll cost on each to date. The average unit cost per square yard and the number of square yards of each class of work a plasterer would apply per 8-hour day is given. On the back of this card, figure 74, the separate

COST ANALYSIS RECORD								
UNIT LABOR COSTS				UNIT <i>Per Square Yard</i>				
	1 (b)	2	3	4	5 (c)	6	7	8
Previous	.05	.23 $\frac{5}{8}$			.06	.03 $\frac{3}{8}$		
This Week	.04 $\frac{3}{4}$	.03 $\frac{1}{4}$			.05 $\frac{3}{4}$	.03 $\frac{3}{8}$		
Total	.04 $\frac{7}{8}$	.03 $\frac{1}{4}$			.05 $\frac{1}{2}$	.03 $\frac{1}{2}$		
TOTAL LABOR HOURS				UNIT				
	1 (b)	2	3	4	5 (c)	6	7	8
Previous	131	126			131	137		
This Week	236	240			280	264		
Total	367	366			411	401		
LABOR HOURS PER UNIT				UNIT <i>Per 100 Sq. Yds.</i>				
	1	2	3	4	5	6	7	8
Previous	6 $\frac{3}{8}$ Hrs	6 $\frac{3}{8}$ Hrs			7 $\frac{3}{8}$ Hrs	7 $\frac{3}{8}$ Hrs		
This Week	6 $\frac{3}{8}$ Hrs	6 $\frac{1}{2}$ Hrs			7 $\frac{1}{2}$ Hrs	7 $\frac{1}{4}$ Hrs		
Total	6 $\frac{3}{8}$ Hrs	6 $\frac{1}{2}$ Hrs			7 $\frac{1}{2}$ Hrs	7 $\frac{3}{8}$ Hrs		

Fig. 74. Method of Analyzing Costs on Plastering.

unit costs which enter into and make up the totals are given, also the total number of hours

required by plasterers and helpers to date and the number of hours required by the various classes of workmen to apply 100 square yards of both scratch and brown coats is given.

The time required to apply the white or "skim" coat should be kept separately from the time applying sand finish work, as the latter usually requires a little more time for plasterers. On both these classes of work measurement is taken by the square yard, as given under scratch and brown coats. Figure 75 shows the costs on

Building <u>Central Hospital</u>		Frank R. Walker Company		LABOR DISTRIBUTION		Sheet No. <u>35</u>						
Class <u>"J.P. 2"</u>		Week Ending <u>APR 6 - 1916</u>		Job No. <u>165</u>								
	OCCUPATION	F	S	S	M	T	W	T	HOURS	RATE	AMOUNT	
1	(d) Plasterers	80	40		88	72	80	80	440	75	330.00	
2	Laborers	30	28		40	36	40	32	206	50	103.00	
3												
4												
5	(e) Plasterers	16	8		16	16			56	75	42.00	
6	Laborers	6	4		6	6			22	50	11.00	
7												
8												
Total		(d) White Coat						(e) Sand Finish				486.00
	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per Hour Day	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per Hour Day				
Previous	2100 1/2	217.00	10 1/2	80 1/2								
This Week	4250 "	433.00	10 1/2	77 "	420 1/2	53.00	12 1/2	60 1/2				
Total	6350 "	650.00	10 1/2	78 1/2 "	420 "	53.00	12 1/2	60 "				

Fig. 75. Distribution and Costs on Applying the Finish Plaster Coats.

both white and sand finish work, giving the number of square yards of each completed, the total pay roll costs, and the average labor cost

for each class of the completed work. The average number of square yards a plasterer would complete per 8-hour day is also given. On the back of the card, figure 76, the separate unit

COST ANALYSIS RECORD								
UNIT LABOR COSTS				UNIT <i>Per Square Yard</i>				
	1	2	3	4	5(c)	6	7	8
Previous	08	02 $\frac{1}{2}$						
This Week	08	02 $\frac{1}{2}$			10	02 $\frac{1}{2}$		
Total	08	02 $\frac{1}{2}$			10	02 $\frac{1}{2}$		
TOTAL LABOR HOURS				UNIT				
	1	2	3	4	5	6	7	8
Previous	274	98						
This Week	440	206			56	22		
Total	664	304			56	22		
LABOR HOURS PER UNIT				UNIT <i>Per 100 Sq Yds.</i>				
	1	2	3	4	5(c)	6	7	8
Previous	10 $\frac{1}{2}$ Hrs	4 $\frac{3}{4}$ Hrs						
This Week	10 $\frac{3}{4}$ Hrs	4 $\frac{3}{4}$ Hrs			13 $\frac{1}{2}$ Hrs	5 $\frac{1}{4}$ Hrs		
Total	10 $\frac{1}{2}$ Hrs	4 $\frac{3}{4}$ Hrs			13 $\frac{1}{2}$ Hrs	5 $\frac{1}{4}$ Hrs		

Fig. 76. Analyzed Costs on Applying Finish Plaster Work.

costs are given and the total number of hours for each class of work to date, while the lower column gives the time required for each class of workmen to complete 100 square yards of finished plaster.

Nearly all classes of interior plastering, cement wainscoting, etc., are measured by the square yard, and costs should be kept accordingly in order that they be useful for future estimates.

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The costs on running ceiling coves, bull nose corners, etc., should be kept by the lineal foot.

The costs of running cement base are also figured by the lineal foot of base. Keep separate time placing grounds and give height of base, mentioning whether with or without cove.

The costs on all classes of exterior plaster work are kept in the same manner as interior work—by the square yard. Separate costs should be kept on applying the scratch coat, brown coat, and finish coat. The finish coats, which are usually float or rough cast finish, should be kept separately, and the class of work should be noted. State the class of material used, whether Portland cement, Kellastone, Stone-kote, etc.

Central Hospital		Frank R. Walker Company							Sheet No. 36		
Building		LABOR DISTRIBUTION							Job No. 165		
Class "JP-3"		Week Ending APR 6 - 1916									
OCCUPATION	F	S	S	M	T	W	T	HOURS	RATE	AMOUNT	
1 (a) Plasterers	16	8		16	16	16	16	88	75	66.00	
2 Laborers	16	8		16	16	12	12	80	50	40.00	
3											
4											
5 (b) Plasterers	16	8		16	16	16	16	88	75	66.00	
6 Laborers	16	8		12	12	12	12	72	50	36.00	
7											
8											
Total	(a)				(b)					208.00	
	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day			
Previous	440 Yd	52.00	.12	81 Yd	200 Yd	50.00	.12 1/2	75 Yd			
This Week	890 "	106.00	.12	81 "	825 "	102.00	.12 1/2	75 "			
Total	1330	158.00	.12	81 "	1225 "	152.00	.12 1/2	75 "			

Fig. 77. Costs on Applying Exterior Plaster.

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Figure 77 gives an example of applying the scratch and brown coats on exterior work. The total quantities are given in square yards, together with the total pay roll cost to date and the average labor cost per square yard. The number of square yards a plasterer will apply per 8-hour day is also given. On the back of this card, figure 78, are given the separate unit

COST ANALYSIS RECORD								
UNIT LABOR COSTS				UNIT <i>Per Square Yard</i>				
	(a)	2	3	4	(b)	6	7	8
Previous	.080	.04			.08	.04 $\frac{1}{2}$		
This Week	.075	.045			.08	.04 $\frac{1}{2}$		
Total	.077 $\frac{1}{2}$	.044			.08	.04 $\frac{1}{2}$		
TOTAL LABOR HOURS				UNIT				
	1	2	3	4	5	6	7	8
Previous	47	35			43	36		
This Week	88	80			88	77		
Total	135	115			131	108		
LABOR HOURS PER UNIT				UNIT <i>Per 100 Sq Yds.</i>				
	1	2	3	4	5	6	7	8
Previous	10 $\frac{3}{4}$ Hrs	8 Hrs			10 $\frac{3}{4}$ Hrs	9 Hrs		
This Week	9 $\frac{1}{2}$ Hrs	9 Hrs			10 $\frac{3}{4}$ Hrs	8 $\frac{3}{4}$ Hrs		
Total	10 $\frac{1}{2}$ Hrs	8 $\frac{1}{2}$ Hrs			10 $\frac{3}{4}$ Hrs	8 $\frac{3}{4}$ Hrs		

Fig. 78. Costs as Analyzed on Exterior Plastering.

costs and the total number of hours worked by plasterers and helpers to date. The lower column gives the number of hours required for the plasterers and helpers to apply 100 square yards of scratch and brown coats.

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Building		Frank R. Walker Company		LABOR DISTRIBUTION		Sheet No. <u>37</u>				
Class		Week Ending		APR 6 - 1916		Job No. <u>105</u>				
"JP. 3"										
OCCUPATION	F	S	S	M	T	W	T	HOURS	RATE	AMOUNT
1 (C) Plasterers	24	17	16	16	16	16	16	100	75	7500
2 Laborers	17	8	17	12	16	12	12	72	50	3600
3										
4										
5										
6										
7										
8										
Total										11100
Quantity Work in Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day	Quantity Work in Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day			
Previous 250 Yd.	5700	23	38 Yds							
This Week 470 "	11100	24	37 1/2							
Total 720 "	16800	23 1/2	37 3/4							

Fig. 79. Keeping Costs on Applying the Finish Coat on Exter Plastering.

Figure 79 is kept on the same basis as figure 77, with the exception that figure 79 shows the

COST ANALYSIS RECORD							
UNIT LABOR COSTS				UNIT Per Square Yard			
1	2	3	4	5	6	7	8
Previous	15	08					
This Week	16	08					
Total	15 1/2	08					
TOTAL LABOR HOURS				UNIT			
1	2	3	4	5	6	7	8
Previous	50	110					
This Week	100	72					
Total	150	112					
LABOR HOURS PER UNIT				UNIT Per 100 Sq Yds.			
1	2	3	4	5	6	7	8
Previous	20 Hrs	16 Hrs					
This Week	21 1/2 Hrs	15 1/2 Hrs					
Total	20 3/4 Hrs	15 3/4 Hrs					

Fig. 80. Analyzed Costs on Applying the Finish Plaster Coat to Exterior Walls.

system used on the float finish coat; otherwise the units to be arrived at are identical. Figure 80, which is the back of figure 79, is the same as figure 78, and the results are the same throughout.

Exterior ornamental work run in Portland, Keene's, or other cement is usually measured by the lineal foot when under one foot in girth and by the superficial foot when over one foot in girth.

Ornamental plaster work, such as cornices, plaster bases, and caps, plaster enrichments, wall and ceiling panels, and all other classes of ornamental plaster work are measured by the lineal foot where the members are less than one foot in girth and by the superficial foot where the members are over one foot in girth.

Separate time should be kept on all shop work, such as making models, casting ornaments, etc.; also separate costs should be kept on all work done on the job; and the measurements and costs should be given as stated above.

Under figure 81 are given examples of cost keeping on ornamental plaster work. Item (a) includes the time of plasterers and helpers running plaster cornices on the job, and item (b) gives the time of the same men sticking plaster

ornaments and enrichments on cornices and beams. On the bottom of the card are given the number of lineal or superficial feet completed

Building <u>Central Hospital</u>		Frank R. Walker Company							LABOR DISTRIBUTION		Sheet No. <u>38</u>	
Class <u>"J.P.A."</u>		Week Ending <u>APR 6 - 1916</u>							Job No. <u>165</u>			
	OCCUPATION	F	S	S	M	T	W	T	HOURS	RATE	AMOUNT	
1	(a) Plasterers	16	8		16	16	16	16	88	.75	66.00	
2	Laborers	4	2		4	4	4	4	22	.50	11.00	
3												
4												
5	(b) Plasterers	16	8		8	8	8	8	56	.75	42.00	
6	Laborers	4	2		2	2	1	1	12	.50	6.00	
7												
8												
Total		<u>"a"</u>							<u>46</u>		<u>125.00</u>	
	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day				
	Previous	840'	151.00	.18	35'	1800'	94.00	.054			135'	
	This Week	428'	77.00	.18	26'	457'	48.00	.05			137'	
	Total	1268'	228.00	.18	35.24	2757'	142.00	.054			136'	

Fig. 81. Cost Keeping on Ornamental Plaster Work.

to date and the total amount of pay roll to date. The unit labor costs per superficial foot or lineal foot and the average quantity of work a man would complete per 8-hour day is also given. On the back of the card, figure 82, are given the separate unit costs which go to make up the total units as given on the front of the card. The total number of hours worked by plasterers and helpers to date and the number of hours required by both plasterers and helpers

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to complete 100 superficial feet or lineal feet of ornamental cornices or enrichments are also given.

COST ANALYSIS RECORD (a) Per Super Foot UNIT LABOR COSTS UNIT (b) Per Lineal Foot								
	1(a)	2	3	4	5(b)	6	7	8
Previous	.154	.024			.044	.007		
This Week	.154	.024			.044	.007		
Total	.154	.024			.044	.007		
TOTAL LABOR HOURS				UNIT				
	1	2	3	4	5	6	7	8
Previous	174	112			108	27		
This Week	88	22			56	12		
Total	262	64			164	39		
LABOR HOURS PER UNIT				UNIT (a) Per 100 Super Feet Per 100 Lineal Feet				
	1(a)	2	3	4	5(b)	6	7	8
Previous	20 3/4 Hrs	5 Hrs			6 Hrs	1 1/2 Hrs		
This Week	20 1/2 Hrs	5 1/4 Hrs			5 1/2 Hrs	1 1/2 Hrs		
Total	20 3/8 Hrs	5 Hrs			6 Hrs	1 3/8 Hrs		

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Fig. 82. Method of Analyzing Costs on Ornamental Plaster Work.

CHAPTER XIII

SHEET METAL WORK, CORNICES, SKYLIGHTS, METAL CEILINGS, FIRE PROOF DOORS AND WINDOWS

Under sheet metal work will come the items of fire proof doors and windows, the labor in connection with the setting of the frames, hanging the doors, and glazing of both doors and windows. The cost of setting the frames should be kept separately from the time of hanging the doors or glazing same.

Under figure 83 examples of cost keeping as

Building <u>Central Hospital</u>		Frank R. Walker Company							Sheet No. <u>39</u>		
Class <u>"K.P.-I"</u>		LABOR DISTRIBUTION							Job No. <u>165</u>		
		Week Ending <u>APR 6 - 1916</u>									
OCCUPATION	F	S	S	M	T	W	T	HOURS	RATE	AMOUNT	
1 (6) Sheet Metal Wrkr.	8	4		8	8	8	-	36	70	2520	
2 " " Helper	8	4		8	8	8	-	36	40	1440	
3											
4 (4) Sheet Metal Wrkr.	16	8		16	16	16	-	72	70	5040	
6 " " Helper	-	-		-	-	-	-				
7											
8											
Total	(6) Setting Frames 4'0" x 7'0"			(4) Frames 3'6" x 18'0"						90.00	
	Quantity Work in Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per Hour Day	Quantity Work in Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per Hour Day			
Previous	17	18.70	1.56	6	17	73.20	1.93	3			
This Week	25	39.60	1.58	5 1/2	26	50.40	1.94	3			
Total	37	58.30	1.57	5 1/2	38	73.60	1.94	3			

Fig. 83. Keeping Costs on Setting Metal Door and Window Frames.

applied to setting metal frames for doors and windows are given. The number of frames set and the size of same are given, also the total pay roll cost to date, the average labor cost of setting each frame, and the average number of frames of each kind a sheet metal worker will set in place per 8-hour day are given. On the back of this card, figure 84, are given the sepa-

COST ANALYSIS RECORD (6) Per Window Frame									
UNIT LABOR COSTS				UNIT (d) " Door "					
	1 (a)	2	3	4	5 (c)	6	7	8	
Previous	1.00	.56			1.93				
This Week	1.01	.57			1.94				
Total	1.00 1/2	.56 1/2			1.94				
TOTAL LABOR HOURS				UNIT					
	1	2	3	4	5	6	7	8	
Previous	16	17			33				
This Week	36	36			72				
Total	52	53			105				
LABOR HOURS PER UNIT				UNIT (c) Per Window Frame (d) Per Door Frame					
	1 (b)	2	3	4	5 (c)	6	7	8	
Previous	1 1/8 Hrs	1 1/5 Hrs			2 3/4 Hrs				
This Week	1 1/5 Hrs	1 1/5 Hrs			2 3/4 Hrs				
Total	1 1/5 Hrs	1 1/5 Hrs			2 3/4 Hrs				
Form 106	2 1/5 Hrs Per Frame				Copyright 1916 By Frank R. Walker				(Over)

Fig. 84. Costs as Analyzed on Setting Metal Door and Window Frames.

rate unit labor costs which make up the totals as given on the front of the card. The total number of hours worked on the entire job for both sheet metal workers and helpers are also given, as well as the average time required for both to handle and set a door or window frame.

In keeping costs on placing metal skylights always give the style of skylight erected, whether single pitch, double pitch, or hip skylight. If side lights are included, give the time on placing mullions and sash separately. Costs should be kept by the number of skylights placed and the size of the same. Separate time should also be kept on handling and placing sash operating devices, and the total lineal feet of operating device installed should be reported.

The costs on vent ducts should be kept by the size of the duct in both lineal and square feet and the class of work erected.

The cost of erecting in place metal gutter or down spouts should be kept by the lineal feet of gutter or conductor placed; and the size of same should be mentioned.

In keeping costs on the erection of metal ceilings, the quantity of work should be reported in square feet or per square containing 100 square feet. If it is necessary to place wood furring strips before placing the ceiling, this time should also be kept separately.

Cost keeping on steel siding should also be kept by the square containing 100 square feet or by the square foot.

The labor in connection with the erection of

SHEET METAL WORK

metal cornices should be given in lineal feet, and the girth of same should also be given so that it can be reduced to superficial feet if desired.

All classes of tin, lead, galvanized iron, and metal shingle or tile roofs are measured by the square containing 100 square feet. Always state kind of roof and conditions encountered in applying same.

Building <u>Central Hospital</u>		Frank R. Walker Company							Sheet No. <u>40</u>	
Class <u>"K.P. 2"</u>		LABOR DISTRIBUTION							Job No. <u>165</u>	
		Week Ending <u>APR 6 - 1916</u>								
OCCUPATION		F	S	M	T	W	T	HOURS	RATE	AMOUNT
1	(a) Sheet Metal Wrkrs	8	4	8	8	8	8	44	70	3080
2	" " Helpers	8	4	8	8	8	8	44	40	1760
3										
4										
5	(c) Sheet Metal Workers			8	8	4		20	70	1400
6	" " Helpers			8	8	4		20	40	800
7										
8										
Total		(a) Metal Ceilings					(c) Met Spanish Tile			7040
	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day		
Previous			20.50							
This Week	22.50	48.40	2.20	4.50	6.50	22.00	3.67	2 1/2 Sq.		
Total	22.50	48.40	2.20	4.50	6.50	22.00	3.67	2 1/2 Sq.		

Fig. 85. Costs on Installing Metal Ceilings and Roofing.

Under figure 85 are given examples of cost keeping applied to both metal ceilings and labor applying metal roof of imitation Spanish tile. The quantities are all given per square contain-

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ing 100 square feet, together with the total pay roll costs on same and the average labor cost to apply one square of ceiling or roof. The average number of square feet a mechanic and helper will place per 8-hour day is also given. On the back of this card, figure 86, are given the separate labor units which make up the average unit

COST ANALYSIS RECORD								
UNIT LABOR COSTS				UNIT				
				Per Square 100 Sq. Ft.				
	1(a)	2	3	4	5(c)	6	7	8
Previous	—	—	—	—	—	—	—	—
This Week	1.40	.80			2.33	.34		
Total	1.40	.80			2.33	.34		
TOTAL LABOR HOURS				UNIT				
	1	2	3	4	5	6	7	8
Previous	—	—	—	—	—	—	—	—
This Week	44	44			20	20		
Total	44	44			20	20		
LABOR HOURS PER UNIT				UNIT Per Square 100 Sq. Ft.				
	1(a)	2	3	4	5(c)	6	7	8
Previous	—	—	—	—	—	—	—	—
This Week	2 Hrs	2 Hrs			3 1/2 Hrs	3 1/2 Hrs		
Total	2 Hrs	2 Hrs			3 1/2 Hrs	3 1/2 Hrs		
Farm 106	4 Hrs Per Sq.				6 1/2 Hrs Per Sq.		(Over)	

Fig. 86. Analyzed Costs on Metal Ceilings and Roofing.

cost as given on the front of the card. The total number of hours required for both mechanics and helpers and the number of hours required by each to apply a square containing 100 square feet is also given.

CHAPTER XIV

ROOFING—COMPOSITION, FELT, TILE, ASBESTOS, SLATE, ETC.

When preparing estimates on new work, nearly all kinds of roofing are measured by the square containing 100 square feet. Consequently, for this reason alone, the job costs should be kept in the same manner.

In keeping costs on applying composition tar and gravel roofs a description of the roof should be given, whether it was over wood or concrete, and whether the first ply of paper is laid on the roof dry or on a mopped surface. On composition roofs always state the number of plies of paper applied and the number of moppings necessary. Separate costs should also be kept on the time for hoisting the gravel to the roof, mopping the roof with pitch, and spreading the gravel.

Figure 87 gives an example of the methods employed on keeping cost on composition roofing. Under item (b) the time required by roofers applying the pitch and felt is given and the

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number of thicknesses applied, while item (c) gives the time required to mop the roof and hoist and spread the gravel. Always state the

Building <u>Central Hospital</u>		Frank R. Walker Company						LABOR DISTRIBUTION		Sheet No. <u>41</u>	
Class <u>"L.P.I."</u>		Week Ending <u>APR 6 - 1916</u>						Job No. <u>165</u>			
OCCUPATION	F	S	M	T	W	T	HOURS	RATE	AMOUNT		
1 (b) Roofers	24	17		24	24	22	116	65	7540		
2 Team & Driver	8	4					12	50	600		
3											
4											
5 (c) Roofers					32	32	64	65	4160		
6 Team & Driver					8	8	16	50	800		
7											
8											
Total	(b) 3-Ply Composition roof						(c) Mop & Gravel		131.00		
	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day			
Previous											
This Week	231 Sq	81.40	.35	144.59	231 Sq	49.60	.214	23	59		
Total	231 "	81.40	.35	144.59	231 "	49.60	.214	23	59		
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Fig. 87. Method of Keeping Costs on Composition Roofing.

quantity of gravel required to each square of roof, or give the total amount of gravel used so that the quantities may be figured at the office. The quantities on the card are given by the number of squares of felt and gravel applied, together with the total pay roll cost on same to the present time. The unit labor costs are given per square of roof and the average quantity of work a roofer would complete per 8-hour day. On the back of this card, figure 88, are given the separate labor units which enter into the

total units as given on the front of the card. The total number of hours required by roofers and teams are also given, as well as the num-

COST ANALYSIS RECORD								
UNIT LABOR COSTS				UNIT <i>Per Square 100 Sq. Ft.</i>				
	1 (b)	2	3	4	5 (c)	6	7	8
Previous	—	—						
This Week	<i>3 1/2</i>	<i>0 2 1/2</i>			<i>18</i>	<i>0 3 1/2</i>		
Total	<i>3 1/2</i>	<i>0 2 1/2</i>			<i>18</i>	<i>0 3 1/2</i>		
TOTAL LABOR HOURS				UNIT				
	1	2	3	4	5	6	7	8
Previous	—	—						
This Week	<i>116</i>	<i>12</i>			<i>64</i>	<i>16</i>		
Total	<i>116</i>	<i>12</i>			<i>64</i>	<i>16</i>		
LABOR HOURS PER UNIT				UNIT <i>Per Square 100 Sq. Ft.</i>				
	1 (b)	2	3	4	5 (c)	6	7	8
Previous	—	—						
This Week	<i>1/2 Hrs</i>	<i>1/20 Hrs</i>			<i>1/2 Hrs</i>	<i>1/20 Hrs</i>		
Total	<i>1/2 Hrs</i>	<i>1/20 Hrs</i>			<i>1/2 Hrs</i>	<i>1/20 Hrs</i>		

Fig. 88. Analyzed Costs as Applied to Composition Roofing.

ber of hours required by a roofer to place one square of roof.

In keeping costs on applying asphalt, asbestos, or slate roofing, the size of the shingles and the quantities should be given by the square containing 100 square feet. Also state the average number of nails required to a shingle, as a man can place more shingles where he drives only one nail to a shingle than where he drives two nails.

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Figure 89 is an example of cost keeping on applying asphalt shingles and roofing slate. In both instances the quantities are given in squares

Building Central Hospital		Frank R. Walker Company		LABOR DISTRIBUTION		Sheet No. 42				
Class "P.I."		Week Ending APR 6 - 1916		Job No. 165						
OCCUPATION	F	S	S	M	T	W	T	HOURS	RATE	AMOUNT
1 (d) Shinglers	16	8		24	16	16	24	104	75	78.00
2										
3										
4										
5 (g) Slate Roofers	16	8		16	16	16	16	88	75	66.00
6										
7										
8										
Total	(d) Asphalt 128 sq			(g) Slate 128 sq						144.00
	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day		
Previous	10 Sq	14.00	1.40	4 1/2	55 Sq	13.00	2.60	2 1/4	59	
This Week	57 Sq	78.00	1.37	4 1/2	73 Sq	66.00	2.87	2 "		
Total	67 Sq	92.00	1.37 1/2	4 1/2 "	78 "	79.00	2.82	2 "		

Fig. 89. Keeping Costs on Laying Asphalt Shingles and Slate Roofing.

COST ANALYSIS RECORD								
UNIT LABOR COSTS				UNIT Per Square 100 Sq. Ft.				
	1 (d)	2	3	4	5 (g)	6	7	8
Previous	1.40				2.60			
This Week	1.37				2.87			
Total	1.37 1/2				2.82			
TOTAL LABOR HOURS				UNIT				
	1	2	3	4	5	6	7	8
Previous	18 1/2				17 1/4			
This Week	104				88			
Total	122 1/2				105 1/4			
LABOR HOURS PER UNIT				UNIT Per Square 100 Sq. Ft.				
	1	2	3	4	5	6	7	8
Previous	1 1/8 Hrs				3 1/4 Hrs			
This Week	1 1/8 Hrs				3 1/4 Hrs			
Total	1 1/8 Hrs				3 1/4 Hrs			

Fig. 90. Method of Analyzing Costs on Asphalt Shingles or Slate Roofing.

containing 100 square feet, together with the total pay roll cost to date. The average labor cost to apply one square of roofing and the average number of squares a roofer would apply per 8-hour day is also given. On the back of this card, figure 90, are given the separate unit labor costs, the total number of hours required on the entire job, and time required for a roofer to apply one square of either asphalt shingles or slate roofing.

The cost of placing the various kinds of deadening felts and papers over sub-floors and under finish wood floors should also be given in square feet or in squares containing 100 square feet each. Under figure 91 we have an example of

Building <u>Central Hospital</u>		Frank R. Walker Company						LABOR DISTRIBUTION			Sheet No. <u>43</u>
Class <u>"L.P.R."</u>		Week Ending <u>APR 6 - 1916</u>						Job No. <u>165</u>			
OCCUPATION		F	S	S	M	T	W	T	HOURS	RATE	AMOUNT
1	(a) <u>Carpenters</u>	2	2		8	8	—	—	20	70	14.00
2	<u>laborers</u>	—	—		2	—	—	—	2	40	80
3											
4											
5											
6											
7											
8	<u>Placing deadening felt on floors.</u>										
Total											14.80
	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day			
Previous	6900'	15.60	.0022	26.80'							
This Week	6700'	14.80	.0022	26.80'							
Total	13600'	30.40	.0022	26.80'							

Fig. 91. Method of Keeping Costs on Placing Deadening Quilt Under Finish Wood Floors.

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cost keeping on this class of work. The quantities are given in square feet, and the total payroll cost is also given. The unit labor costs are given per square foot, with the average number of square feet a man would lay per 8-hour day. On the back of the card, figure 92, the separate

COST ANALYSIS RECORD								
UNIT LABOR COSTS				UNIT <i>Per Square 100 Sq. Ft.</i>				
	1	2	3	4	5	6	7	8
Previous	<i>22⁸</i>							
This Week	<i>21</i>							
Total	<i>43</i>							
TOTAL LABOR HOURS				UNIT				
	1	2	3	4	5	6	7	8
Previous	<i>22</i>							
This Week	<i>22</i>							
Total	<i>44</i>							
LABOR HOURS PER UNIT				UNIT <i>Per Square 100 Sq. Ft.</i>				
	1	2	3	4	5	6	7	8
Previous	<i>1/3 Hrs</i>							
This Week	<i>1/3 Hrs</i>							
Total	<i>1/3 Hrs</i>							

Fig. 92. Analyzed Costs on Placing Deadening Quilt.

unit costs are given, the total number of hours required to complete the job, and the length of time required to place 100 square feet of felt.

CHAPTER XV

INTERIOR MARBLE, SLATE, AND SCAGLIOLA WORK

The labor cost on setting marble of the various kinds are usually kept by the lineal or superficial foot of material placed.

Marble base, wainscot rails, wall panels, and other work under one foot in width is usually kept by the lineal foot, while toilet backs, wainscoting, etc., are usually kept by the superficial foot.

When keeping costs on placing marble wainscot, etc., always give the height of same, as it is almost as difficult to place a slab three feet high as one five feet high; therefore the heights should be given for comparisons.

In keeping costs on setting marble stair treads and risers always give the dimensions where possible; also give the length of same, because in this class of work it is as difficult to set a tread two feet long as one four feet long.

Under figure 93 examples of cost keeping on marble base and wainscot are given; the quan-

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tities on the former are given in lineal feet and on the latter in superficial feet. The total pay roll costs are given in both instances, and the

Building		Frank R. Walker Company							Sheet No.	
"MP-1"		LABOR DISTRIBUTION							44	
Class		Week Ending							Job No.	
		APR 6 - 1916							165	
OCCUPATION	F	S	S	M	T	W	T	HOURS	RATE	AMOUNT
1 (b) Setters	16	8		16	16	-	16	72	.75	54.00
2 Helpers	16	8		16	16	-	16	72	.50	36.00
3 Laborers	8	4		8	8	-	8	36	.40	14.40
4 Eng. & Hoist	1	1		1	1	-	1	5	1.50	7.50
5 (d) Setters	32	16		32	32	32	32	176	.75	132.00
6 Helpers	32	16		32	32	32	32	176	.50	88.00
7 Laborers	16	8		16	16	16	16	84	.40	33.60
8 Eng. & Hoist	2	2		2	1	1	2	10	1.50	15.00
Total	(b) Base 8' High - 16' x 16' Bot							(d) Wainscot 6' x High		380.50
Previous	Quantity Work in Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day	Quantity Work in Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day		
This Week	927'	225.00	24 1/4	53'	4300'	530.00	12 1/4	101'		
Total	1377'	336.90	24 3/4	53'	6460'	798.60	12 1/4	99'		
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Fig. 93. Distribution and Costs on Setting Marble Base and Wainscot.

average labor costs per lineal foot and per superficial foot of material placed are noted under each item. The average number of feet a man will place per 8-hour day is also given. On the back of the card, figure 94, are given the separate unit costs which go to make up the total units as given on the front of the card. The total number of hours worked by each class of labor is also given, as well as the num-

ber of hours required by each class of labor to handle and set either 100 lineal or superficial feet of base or wainscoting.

COST ANALYSIS RECORD (b) Per Lineal Foot								
UNIT LABOR COSTS				UNIT (c) Per Super. Foot.				
(b)	2	3	4	(d)	6	7	8	
Previous	.12	.08	.03	.01 $\frac{1}{4}$	.06	.04	.01 $\frac{1}{2}$	.00 $\frac{1}{2}$
This Week	.12	.08	.03 $\frac{1}{4}$	.01 $\frac{3}{4}$	.06 $\frac{1}{2}$	.04 $\frac{1}{2}$	.01 $\frac{3}{4}$	.00 $\frac{1}{2}$
Total	.12	.08	.03 $\frac{1}{2}$	.01 $\frac{1}{2}$	.06	.04	.01 $\frac{1}{2}$	.00 $\frac{1}{2}$
TOTAL LABOR HOURS				UNIT				
1	2	3	4	5	6	7	8	
Previous	148 $\frac{1}{4}$	148	70	16	344	344	86	20
This Week	72	72	36	5	176	176	84	10
Total	220 $\frac{1}{4}$	220	106	21	520	520	170	30
LABOR HOURS PER UNIT				UNIT (b) Per 100 Lineal Feet (c) Per 100 Super. Feet.				
(b)	2	3	4	(d)	6	7	8	
Previous	16 Hrs	16 Hrs	7 $\frac{1}{2}$ Hrs	1 $\frac{1}{4}$ Hrs	8 Hrs	8 Hrs	2 Hrs	1 $\frac{1}{2}$ Hrs
This Week	16 Hrs	16 Hrs	8 Hrs	1 $\frac{3}{4}$ Hrs	8 Hrs	8 Hrs	3 $\frac{3}{4}$ Hrs	1 $\frac{1}{2}$ Hrs
Total	16 Hrs	16 Hrs	7 $\frac{3}{4}$ Hrs	1 $\frac{1}{2}$ Hrs	8 Hrs	8 Hrs	3 Hrs	1 $\frac{1}{2}$ Hrs

Fig. 94. Analyzed Costs on Setting Marble Base and Wainscot.

Marble floor slabs, thresholds, plinths, and other special work should be kept by the piece wherever possible.

The cost on laying and finishing marble tile floors are kept by the square foot of area covered. In work of this kind always state the size of the tile used.

Figure 95 is an illustration of cost keeping on laying and smoothing marble floors. The size of

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the tile are given; likewise the area completed in square feet, and the total pay roll cost of same. The average labor cost per square foot

Building <u>Central Hospital</u>		Frank R. Walker Company							Sheet No. <u>45</u>	
Class <u>"MP. 2"</u>		LABOR DISTRIBUTION							Job No. <u>165</u>	
		Week Ending <u>APR 6 - 1916</u>								
	OCCUPATION	F	S	M	T	W	T	HOURS	RATE	AMOUNT
1	(b) <i>Setters</i>	16	8	16	16	16	16	88	.75	66.00
2	<i>Helpers</i>	16	8	16	16	16	16	88	.50	44.00
3	<i>Laborers</i>	8	4	8	12	12	12	56	.40	22.40
4	<i>Engr & Hoist</i>	1	1	2	2	2	1	9	1.50	13.50
5	(c) <i>Setter</i>	—	—	—	8	8	8	24	.75	18.00
6	<i>Helper</i>	—	—	—	8	8	8	24	.50	12.00
7										
8										
Total		(b) <i>12"x12" Marble Tile</i>					(c) <i>Smoothing & Rubbing</i>			<i>17.590</i>
	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day		
	Previous	<i>560'</i>	<i>72.00</i>	<i>.19^d</i>	<i>102^d</i>	<i>650^d</i>	<i>20.00</i>	<i>.03</i>	<i>345^d</i>	
	This Week	<i>1150'</i>	<i>145.90</i>	<i>.1234</i>	<i>105^d</i>	<i>1050^d</i>	<i>30.00</i>	<i>.03</i>	<i>350^d</i>	
	Total	<i>1710'</i>	<i>217.90</i>	<i>.1234</i>	<i>104^d</i>	<i>1700^d</i>	<i>50.00</i>	<i>.03</i>	<i>695^d</i>	
Form 106		Copyright 1916 By Frank R. Walker <i>Machine Method</i>								

Fig. 95. Cost Keeping as Applied to Laying Marble Floors.

of floor and the number of square feet a man will complete per 8-hour day is also given. On the back of this card, figure 96, are given the separate units which make up the total as given on the front of the card. The total number of hours worked by all classes of workmen and the number of hours required by the various tradesmen to complete 100 square feet of finished work are also given.

The costs on structural slate work should be given in the same manner as all classes of marble work.

The costs on scagliola work are divided into two classes, viz., the shop work, which includes all modeling and making of the various

COST ANALYSIS RECORD							
UNIT LABOR COSTS				Per Square Foot			
(1)	2	3	4	(5)	6	7	8
Previous	.06	.04	.02	.01	.02	.01	
This Week	.05 ³ / ₄	.03 ⁴ / ₅	.02	.01 ⁵ / ₅	.01 ⁷ / ₄	.01 ⁴ / ₄	
Total	.05 ⁷ / ₈	.04	.02	.01 ¹⁰ / ₁₀	.02	.01	
TOTAL LABOR HOURS							
UNIT				UNIT			
1	2	3	4	5	6	7	8
Previous	45	45	28	7 ¹ / ₂	17	13	
This Week	88	88	56	9	24	24	
Total	133	133	84	16 ¹ / ₂	41	37	
LABOR HOURS PER UNIT				Per Square 100 Sq. Ft.			
(1)	2	3	4	(5)	6	7	8
Previous	8 Hrs	8 Hrs	5 Hrs	1 ¹ / ₃ Hrs	2 ² / ₅ Hrs	2 Hrs	
This Week	7 ³ / ₄ Hrs	7 ³ / ₄ Hrs	4 ⁸ / ₁₀ Hrs	7 ⁴ / ₄ Hrs	2 ³ / ₃ Hrs	2 ⁴ / ₄ Hrs	
Total	7 ³ / ₄ Hrs	7 ³ / ₄ Hrs	4 ⁸ / ₁₀ Hrs	1 Hrs	2 ⁵ / ₅ Hrs	2 ⁵ / ₅ Hrs	

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 Fig. 96. Method of Analyzing Labor Costs on Laying Marble Floors.

classes of scagliola ready for the setter on the job, and the labor cost of setting, which will take about the same headings and classifications as interior marble work. On all columns give the diameter, and state whether plain or fluted; also give the height of same, so that the entire contents may be arrived at in square feet. On plain work under one foot in width the measurements should be given by the lineal foot, and in work over one foot in width the measurement should be given in superficial feet.

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Building <u>Central Hospital</u>		Frank R. Walker Company							LABOR DISTRIBUTION		Sheet No. <u>46</u>
Class <u>"MP-3"</u>		Week Ending <u>APR 6 - 1916</u>							Job No. <u>165</u>		
OCCUPATION	F	S	S	M	T	W	T	HOURS	RATE	AMOUNT	
1 (a) <u>Shop men</u>	16	8		16	16	16	16	88	62 $\frac{1}{2}$	55.00	
2											
3											
4											
(d) <u>Setters</u>	8	8		16	16	16	16	80	75	60.00	
6 <u>Helpers</u>	8	8		16	16	16	16	80	40	32.00	
7											
8											
Total	(b) <u>160' x 80' P.C.</u>						(c) <u>Setters</u>				<u>147.00</u>
	Quantity Work In Place	Pay Roll Cents	Labor Average Unit Cost	Average Quantity Per Hour Day	Quantity Work In Place	Pay Roll Cents	Labor Average Unit Cost	Average Quantity Per Hour Day			
Previous	<u>240'</u>	<u>115.00</u>	<u>48</u>	<u>10$\frac{1}{2}$'</u>	<u>80'</u>	<u>18.50</u>	<u>23$\frac{1}{2}$</u>	<u>40'</u>			
This Week	<u>117'</u>	<u>55.00</u>	<u>47</u>	<u>11'</u>	<u>315'</u>	<u>92.00</u>	<u>29</u>	<u>31'</u>			
Total	<u>357'</u>	<u>170.00</u>	<u>47$\frac{1}{2}$</u>	<u>10$\frac{1}{2}$'</u>	<u>395'</u>	<u>110.50</u>	<u>28</u>	<u>32'</u>			

Fig. 97. Keeping Costs on Scagliola Work.

Figure 97 gives an illustration of cost keeping as applied to scagliola work. The quantities of work manufactured and set are given in

COST ANALYSIS RECORD								
UNIT LABOR COSTS				UNIT <u>Per Square Foot</u>				
	1 (a)	2	3	4	5 (a)	6	7	8
Previous	<u>48</u>				<u>19</u>	<u>.04$\frac{1}{2}$</u>		
This Week	<u>47</u>				<u>19</u>	<u>10</u>		
Total	<u>47$\frac{1}{2}$</u>				<u>19</u>	<u>.09</u>		
TOTAL LABOR HOURS				UNIT				
	1	2	3	4	5	6	7	8
Previous	<u>184</u>				<u>72</u>	<u>13$\frac{1}{2}$</u>		
This Week	<u>88</u>				<u>80</u>	<u>80</u>		
Total	<u>272</u>				<u>102</u>	<u>93$\frac{1}{2}$</u>		
LABOR HOURS PER UNIT				UNIT <u>Per 100 Sq. Ft.</u>				
	1	2	3	4	5	6	7	8
Previous	<u>77 Hrs</u>				<u>25 Hrs</u>	<u>17 Hrs</u>		
This Week	<u>75 Hrs</u>				<u>25 Hrs</u>	<u>25 Hrs</u>		
Total	<u>76 Hrs</u>				<u>25 Hrs</u>	<u>23$\frac{1}{2}$ Hrs</u>		

Fig. 98. Analyzed Costs on Scagliola Work.

lineal or superficial feet, together with the total pay roll cost on same. The unit labor costs are given per square foot of material manufactured or set, and the average number of feet of completed work a man will average per 8-hour day. On the back of the card, figure 98, the separate units which enter into the total units are given, the total labor hours required on the job up to the present time and the hours required by each class of labor to manufacture and set 100 square feet of scagliola.

CHAPTER XVI

TILE AND MOSAIC WORK, TERRAZZO, ETC.

To keep accurate costs on the various kinds of tile and mosaic floors it is absolutely essential that the different classes of work be classified for the time-keeper or foreman.

The labor cost on placing all rough concrete fill which goes under the tile floors should be kept separately from the cost of laying the floors. Give the number of square feet of fill placed, the average thickness of same, and the class of work, whether in a large area or in small vestibules, bath rooms, etc. Give the area in square feet and the number of rooms completed to date.

The labor cost on laying the various kinds of tile floors will vary considerably with the kind of tile being used. All classes of tile floors which come to the job mounted on paper or in sheets should be kept under one classification, as they are much easier and faster laid than the tile which are unmounted.

An illustration of this method is given under figure 99, which gives the separate time required in placing the rough concrete floor fill and the

Central Hospital		Frank R. Walker Company							Sheet No. <u>47</u>	
Building		LABOR DISTRIBUTION							Week Ending <u>APR 6 - 1916</u>	
Class <u>"NP-I"</u>		Job No. <u>165</u>								
OCCUPATION	F	S	S	M	T	W	T	HOURS	RATE	AMOUNT
1 (b) <u>Tile Setters</u>	8	4		8	—	—	—	20	75	15.00
2 <u>Helpers</u>	24	12		24	—	—	—	60	50	30.00
3										
4										
5 (c) <u>Tile Setters</u>	—	—		—	24	24	24	72	75	54.00
6 <u>Helpers</u>	—	—		—	24	24	24	72	50	36.00
7										
8										
Total	<u>(b) Cement</u>				<u>(c) 1" Hex. No border</u>					<u>135.00</u>
Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day			
Previous	<u>200 sq'</u>	<u>15.00</u>	<u>.075</u>	<u>50 sq'</u>	<u>360 sq'</u>	<u>47.50</u>	<u>.13</u>	<u>75 sq'</u>		
This Week	<u>1760 sq'</u>	<u>45.00</u>	<u>.025</u>	<u>176 sq'</u>	<u>750 sq'</u>	<u>90.00</u>	<u>.12</u>	<u>83 sq'</u>		
Total	<u>1960 sq'</u>	<u>60.00</u>	<u>.03</u>	<u>150 sq'</u>	<u>1110 sq'</u>	<u>137.50</u>	<u>.12 2/3</u>	<u>79 sq'</u>		

Fig. 99. Keeping Costs on Laying Tile Floors.

time required placing the tile floors. The class of floors being laid is also noted. All quantities are given in square feet, together with the total pay roll costs to the present time. The average unit labor cost per square foot of floor and the number of square feet of completed work a setter will average per 8-hour day is also given. On the back of the card, figure 100, are given the separate unit labor costs which make up the total unit cost as given on the front of the card. The total number of hours worked on the en-

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tire job and the time in hours required by setters and helpers to handle and place 100 square feet of floor tile are also given.

COST ANALYSIS RECORD (b) Per Square foot								
UNIT LABOR COSTS				UNIT (c) " " "				
	1 (b)	2	3	4	5 (c)	6	7	8
Previous	.025	.05			.08	.05		
This Week	.009	.016			.072	.048		
Total	.01	.02			.076	.049		
TOTAL LABOR HOURS				UNIT				
	1	2	3	4	5	6	7	8
Previous	7	20			38	36		
This Week	20	60			72	72		
Total	27	80			110	108		
LABOR HOURS PER UNIT				UNIT Per 100 Square Feet				
	1 (b)	2	3	4	5 (c)	6	7	8
Previous	3 1/2 Hrs	10 Hrs			10 1/2 Hrs	10 Hrs		
This Week	1 1/2 Hrs	3 3/8 Hrs			9 3/8 Hrs	9 3/8 Hrs		
Total	1 1/8 Hrs	4 Hrs			10 Hrs	9 3/8 Hrs		

Fig. 100. Method of Analyzing Costs on Laying Tile Floors.

The labor cost on setting all unmounted floor tiles, such as 2 or 3-inch squares or hexagons, and quarry or other tile, from 4x4 inches to 12x12 inches, should be kept separately, and in each instance the size and kind of tile should be given, as it is only by classifying the work that the costs derived from same will be of value. The cost of placing the concrete sub-floor or fill should be kept separately, as previously stated.

An example of work of this kind is given

under figure 101, where the floor is composed of 2-inch hexagon tile, unmounted. Separate time is kept on placing the concrete "under fill"

Building <u>Central Hospital</u>		Frank R. Walker Company						Sheet No. <u>48</u>			
Class <u>"N.P.I."</u>		LABOR DISTRIBUTION						Job No. <u>165</u>			
OCCUPATION		F	S	M	T	W	T	HOURS	RATE	AMOUNT	
1	(b) Tile Setters	—	—	8	8	—	—	16	75	12.00	
2	Helpers	—	—	24	32	—	—	56	50	28.00	
3											
4											
5	(c) Tile Setters	—	—	—	—	24	24	48	75	36.00	
6	Helpers	—	—	—	—	24	24	48	50	24.00	
7											
8											
Total		<u>(b) Cement Fill</u>				<u>(c) 2" Hex Unmounted</u>				<u>100.00</u>	
	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day			
Previous	<u>576.0'</u>	<u>12.00</u>	<u>.02</u>	<u>170.0'</u>	<u>147.0'</u>	<u>18.00</u>	<u>.123</u>	<u>80.0'</u>			
This Week	<u>1400.0'</u>	<u>40.00</u>	<u>.027</u>	<u>155.0'</u>	<u>342.0'</u>	<u>60.00</u>	<u>.175</u>	<u>57.0'</u>			
Total	<u>1976.0'</u>	<u>52.00</u>	<u>.026</u>	<u>165.0'</u>	<u>489.0'</u>	<u>78.00</u>	<u>.16</u>	<u>62.0'</u>			

Fig. 101. Distribution and Costs on Laying Floor Tile.

and on the tile floors. The quantities are given in square feet, and the total pay roll costs are given in each instance. The average cost per square foot of floor and the average number of square feet of floor a man would complete per 8-hour day are given. On the back of this card, figure 102, are given the separate units making up the total unit as given on the front of the card. The total number of hours worked by setters and helpers and the time required by each to place 100 square feet of fill and floor tile are also given.

COST ANALYSIS RECORD								
UNIT LABOR COSTS				UNIT <i>Per Square Foot</i>				
	1	2	3	4	5	6	7	8
Previous	.005	.01½			.09	.03½		
This Week	.008	.02			.10½	.07		
Total	.007	.01¾			.10	.06		
TOTAL LABOR HOURS.				UNIT				
	1	2	3	4	5	6	7	8
Previous	4	18			18	10		
This Week	16	56			48	48		
Total	20	74			66	58		
LABOR HOURS PER UNIT				UNIT <i>Per 100 Square Feet.</i>				
	1	2	3	4	5	6	7	8
Previous	¾ Hrs	3¼ Hrs			12 Hrs	6¾ Hrs		
This Week	1¼ Hrs	4 Hrs			14 Hrs	14 Hrs		
Total	1 Hrs	3¾ Hrs			13½ Hrs	12 Hrs		

Fig. 102. Analyzed Costs on Laying Floor Tile.

The labor cost of setting wall tile should be kept separately, as this cost is much different than the various kinds of floor tile.

The cost of setting tile base should be kept separately from the wall tile, as the labor required in laying out the work, squaring the corners, etc., requires more time than laying a foot of tile on the walls after it has been laid out. Always state the size of the base, whether 1, 2, 4 or 6 inches high. The quantities should be given in lineal feet of base set. After the wall tile have been set, separate time should be kept on the cost of placing the tile cap. These quantities should also be given in lineal feet.

The cost on setting the various kinds of wall

TILE AND MOSAIC WORK 189

tile should be kept separately, and the quantities should be given by the number of square feet of tile set in place. Always state the size of the tile, whether 2x6 inches, 3x6 inches, or 6x6 inches, and whether laid with straight or broken joints.

Building <u>Central Hospital</u>		Frank R. Walker Company							Sheet No. <u>49</u>	
Class <u>"NP-2"</u>		LABOR DISTRIBUTION							Job No. <u>165</u>	
		Week Ending <u>APR 6 - 1916</u>								
OCCUPATION	F	S	S	M	T	W	T	HOURS	RATE	AMOUNT
1 (c) <u>Tile Setters</u>	8	4		8	8	8	8	44	75	3300
2 <u>Helpers</u>	8	4		8	8	8	8	44	50	2200
3										
4										
5 (c) <u>Tile Setters</u>	16	8		16	16	16	16	88	75	6600
6 <u>Helpers</u>	16	8		16	16	16	16	88	50	4400
7										
8										
Total	<u>(a) 6" Gro Base Ea Rn 3' Dia</u>							<u>(c) 3x6 Wainscoting</u>		<u>165.00</u>
	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day		
Previous	160'	25.00	.1572	66'	250.0'	50.00	.20	250.0'		
This Week	352'	55.00	.1573	64'	576.0'	110.00	.19	576.0'		
Total	512'	80.00	.1573	65'	826.0'	160.00	.194	826.0'		

Fig. 103. Keeping Costs on Setting Tile Base and Wainscoting.

Figure 103 furnishes an illustration of cost keeping on tile base and wainscoting. The quantities of base and wainscoting are given in lineal and superficial feet, respectively, together with the total pay roll cost on same and the average labor cost per lineal foot of base and per superficial foot of wall tile, respectively. The average quantity of work a setter will per-

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COST ANALYSIS RECORD (c) Per Lineal Foot								
UNIT LABOR COSTS				UNIT (c) Per Square Foot				
	1(c)	2	3	4	5(c)	6	7	8
Previous	.10	.05½			.12	.08		
This Week	.09½	.06½			.11½	.07½		
Total	.09¾	.06			.11¾	.07¾		
TOTAL LABOR HOURS				UNIT				
	1	2	3	4	5	6	7	8
Previous	20	18			40	40		
This Week	44	44			88	88		
Total	64	62			128	128		
LABOR HOURS PER UNIT				UNIT (c) Per 100 Lineal Feet (e) Per 100 Square Feet				
	1	2	3	4	5	6	7	8
Previous	12½ Hrs	11¼ Hrs			16 Hrs	16 Hrs		
This Week	12½ Hrs	12½ Hrs			15¼ Hrs	15¼ Hrs		
Total	12½ Hrs	12 Hrs			15½ Hrs	15½ Hrs		

Fig. 104. Analyzed Costs on Tile Base and Wainscoting.

form per 8-hour day is also given. On the back of this card, figure 104, are given the separate unit costs which make up the total units given on the other side of the card and the total number of hours worked by setters and helpers to complete the work. In the lower columns are given the number of hours required by both setters and helpers to place 100 lineal feet of base and 100 square feet of wall tile.

Figure 105 furnishes an illustration of cost keeping on laying cork tile floors. The costs are given in square feet, together with the size of the tile and the total pay roll cost of same to date. The labor cost per square foot of tile

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Building: Central Hospital		Frank R. Walker Company				Sheet No. <u>50</u>						
Class: "WP-3"		LABOR DISTRIBUTION				Job No. <u>165</u>						
		Week Ending APR 6 - 1916										
1	OCCUPATION	F	S	S	M	T	W	T	HOURS	RATE	AMOUNT	
		8	4		8	8	8	8				44
2												
3												
4												
5												
6												
7												
8												
Total: (W) Setting 9"x9" Cork Tile											33.00	
	Quantity Work in Place	Pay Roll Cost	Labor Average Unit Cost	Average Quantity Per 8-Hour Day	Quantity Work in Place	Pay Roll Cost	Labor Average Unit Cost	Average Quantity Per 8-Hour Day				
Previous	5750'	30.00	.06	1040'								
This Week	1570'	33.00	.06	1040'								
Total	10850'	63.00	.06	1040'								
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Fig. 105. Keeping Labor Costs on Laying Cork Tile Floors.

and the average number of square feet a man would place per 8-hour day is given. On the

COST ANALYSIS RECORD								
UNIT LABOR COSTS				UNIT <i>Per Square Foot</i>				
	1	2	3	4	5	6	7	8
Previous	.06							
This Week	.06							
Total	.06							
TOTAL LABOR HOURS				UNIT				
	1	2	3	4	5	6	7	8
Previous	40							
This Week	44							
Total	84							
LABOR HOURS PER UNIT				UNIT <i>Per 100 Square Feet</i>				
	1	2	3	4	5	6	7	8
Previous	7 1/2 Hrs							
This Week	7 1/2 Hrs							
Total	7 1/2 Hrs							
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Fig. 106. Analyzed Labor Costs on Laying Cork Tile Floors.

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back of the card, figure 106, the separate unit costs are given and the total number of hours worked by the mechanics; also the number of hours required to place 100 square feet of floor tile.

In keeping time on terrazzo work, separate costs should be kept on the men placing the terrazzo fill and troweling same and the cost of rubbing and polishing. The costs on base should be kept separately from the floor and the quantities should be given in lineal feet of base and square feet of floor.

Building <u>Central Hospital</u>		Frank R. Walker Company							Sheet No. <u>51</u>		
Class <u>"N.P.A"</u>		LABOR DISTRIBUTION							Job No. <u>165</u>		
OCCUPATION		Week Ending <u>APR 6 - 1916</u>							Total		
		F	S	M	T	W	T	HOURS	RATE	AMOUNT	
1	(C) Terrazzo Wkrs	16	8		16	12	16	16	84	70	58.80
2											
3											
4											
5	(C) Terrazzo Wkrs	8	4		8	8	16	16	60	70	42.00
6	" Helpers	24	12		24	8	16	16	100	40	40.00
7											
8											
Total		(A) 6" Core Base							(C) Plain Terraz.		
	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8-Hour Day	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8-Hour Day	140.80		
Previous	102'	18.00	.18	31'	132.0'	19.00	.144	70.0'			
This Week	330'	58.80	.18	31'	490.0'	82.00	.1634	65.0'			
Total	432'	76.80	.18	31'	632.0'	101.00	.16	66.0'			

Fig. 107. Keeping Costs on Installing Terrazzo Floors and Base.

Figure 107 shows the method used in keeping cost on installing both terrazzo floor and base.

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The costs of the base are given in lineal feet and the floor in square feet. On the back of the card, figure 108, the separate unit costs are given which enter into the total units as given on the front of the card. The total hours

COST ANALYSIS RECORD (a) Per Lineal Foot.								
UNIT LABOR COSTS				UNIT (c) Per Square Foot.				
	1	2	3	4	5 (c)	6	7	8
Previous	18				.08 1/2	.06		
This Week	18				.08 1/2	.08 1/2		
Total	18				.08 1/2	.07 1/2		
TOTAL LABOR HOURS				UNIT				
	1	2	3	4	5	6	7	8
Previous	26				16	20		
This Week	84				60	100		
Total	110				76	120		
LABOR HOURS PER UNIT				UNIT (a) Per 100 Lineal Feet (c) Per 100 Square Feet				
	1	2	3	4	5	6	7	8
Previous	26 Hrs				12 1/4 Hrs	15 Hrs		
This Week	25 1/2 Hrs				12 1/4 Hrs	20 1/2 Hrs		
Total	25 1/2 Hrs				12 1/4 Hrs	19 Hrs		

Fig. 108. Analyzed Labor Costs on Terrazzo Floors and Base.

as worked by all classes of mechanics and helpers and the number of hours required by the various tradesmen to install 100 lineal feet of base and 100 square feet of terrazzo floor are given.

On tile mantels, fire places, and hearths the costs should not only be kept by the square foot, but also the quantity of each class of work

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necessary to complete each mantle or hearth. The quantities should be given in square feet of tile laid, the wall tile and the floor or hearth tile being kept separately. Also give the number of hearths or mantel fronts a setter will average per 8-hour day.

Building <u>Central Hospital</u>		Frank R. Walker Company							Sheet No. <u>052</u>		
Class <u>"NP-5"</u>		LABOR DISTRIBUTION							Job No. <u>165</u>		
		Week Ending <u>APR 6 - 1916</u>									
OCCUPATION	F	S	S	M	T	W	T	HOURS	RATE	AMOUNT	
1 <u>(b) Tile Setters</u>	8	4		8	8	8	8	44	75	3300	
2 <u>Helpers</u>	8	4		8	8	8	8	44	50	2200	
3											
4											
5											
6											
7 <u>Hearths</u>											
8											
Total	<u>(b) 6'x2' Tile Straight</u>									<u>5500</u>	
	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day			
Previous	1104'	24.00	22								
This Week	253 ⁰⁰	55.00	21 ⁷⁰	46 ⁰⁰	<u>at 4 hearths per 8 hour day</u>						
Total	363 ⁰⁰	79.00	21 ⁷⁰								

Fig. 109. Keeping Costs on Tile Mantels and Hearths.

Under figure 109 we have an illustration of cost keeping on work of this kind. The total quantity of work in place is given in square feet and the number of square feet contained in each hearth. The total pay roll costs and the average labor cost per square foot of tile are given. The number of square feet of tile and the number of completed hearths a setter will

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average per 8-hour day are also given. On the back of this card, figure 110, the separate units

COST ANALYSIS RECORD								
UNIT LABOR COSTS			UNIT <i>Per Square Foot</i>					
	1	2	3	4	5	6	7	8
Previous	.65	.07						
This Week	.19	.08 3/4						
Total	.14	.08						
TOTAL LABOR HOURS			UNIT					
	1	2	3	4	5	6	7	8
Previous	72	16						
This Week	44	44						
Total	66	60						
LABOR HOURS PER UNIT			UNIT <i>Per 100 Sq. Ft.</i>					
	1	2	3	4	5	6	7	8
Previous	20 Hrs	14 1/2 Hrs						
This Week	17 1/2 Hrs	17 1/2 Hrs						
Total	18 1/2 Hrs	16 1/2 Hrs						

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Fig. 110. Method of Analyzing Labor Costs on Tile Mantels and Hearths.

are given which make up the total units as given on the front of the card and the total number of hours required to complete the work. The number of hours required by each class of labor to complete 100 square feet of tile or 11 hearths is given.

CHAPTER XVII

GLASS AND GLAZING

Separate costs should be kept on glazing ordinary window and plate glass. The average size of the lights should be arrived at and notation should be made whether same are glazed with putty or wood stops. Costs should also be kept on special glass, such as mirrors, plates, etc., that are set in iron, elevator or other door frames. In glazing leaded and art glass give the average size, state whether plain window or

Building <u>Central Hospital</u>		Frank R. Walker Company							Sheet No. <u>53</u>		
		LABOR DISTRIBUTION									
Class <u>"OP.I"</u>		Week Ending <u>APR 6 - 1916</u>							Job No. <u>165</u>		
OCCUPATION		F	S	S	M	T	W	T	HOURS	RATE	AMOUNT
1	<u>(b) Glaziers</u>	24	8		16	16	16	8	88	.70	61.60
2											
3											
4											
5	<u>(c) Glaziers</u>	8	4		8	8	8	8	44	.70	30.80
6											
7											
8											
Total		<u>(b) D.T.H. 28x30 Average</u>					<u>(c) D.T.H. 12x16 H.C.</u>				
	Quantity Work in Piece	Pay Roll Costs	Labor Average Unit Cost	Average Quantity per 8-Hour Day	Quantity Work in Piece	Pay Roll Costs	Labor Average Unit Cost	Average Quantity per 8-Hour Day			
Previous	720	27.40	.038	145	252	16.20	.064	86			
This Week	1570	61.60	.039	143	462	30.80	.067	84			
Total	2290	89.00	.039	143	714	47.00	.065	85			

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Fig. 111. Distribution and Labor Costs on Glazing Plate and Window Glass.

plate glass, and mention the number of lights placed per 8-hour day.

Under figure 111 are given the methods of keeping costs of glazing ordinary window or plate glass set in either putty or with wood stops. The quantities are given by the number of lights set and the average size of same. The total pay roll cost to date, with the average unit cost per light and the number of lights a glazier will average per 8-hour day are also given. On

COST ANALYSIS RECORD								
UNIT LABOR COSTS				UNIT <i>Per Light</i>				
	(6)	2	3	4	5 (C)	6	7	8
Previous	.038				.064			
This Week	.039				.0634			
Total	.039				.063			
TOTAL LABOR HOURS								
	1	2	3	4	5	6	7	8
Previous	29				23			
This Week	88				44			
Total	127				67			
LABOR HOURS PER UNIT				UNIT <i>Per 100 Lights</i>				
	(6)	2	3	4	5 (C)	6	7	8
Previous	5 3/4 Hrs				9 1/2 Hrs			
This Week	5 3/4 Hrs				9 1/2 Hrs			
Total	5 3/4 Hrs				9 1/2 Hrs			

Fig. 112. Analyzed Labor Costs on Glazing Window Glass.

the back of the card, figure 112, are given the unit costs per light, the total hours glaziers' time required to complete the work, and the

number of hours it required for one man to glaze 100 lights of glass.

Glazing of steel sash is usually accomplished with metal clips and litharge putty; therefore special costs should be kept on work of this nature by giving the kind of glass and the average size of the lights.

An illustration of cost keeping on work of this character is given under figure 113, which

Central Hospital		Frank R. Walker Company							LABOR DISTRIBUTION			
Building		LABOR DISTRIBUTION							Sheet No.	54		
Class	"O.P.I."	Week Ending							APR 6 - 1916		Job No.	165
OCCUPATION		S	S	M	T	W	T	HOURS	RATE	AMOUNT		
(18) Glaziers		8	4		8	8	8	—	36	70	2520	
(17) Glaziers		16	8		16	16	16	88	70	6160		
Total		(6) Ew. Drs. Mat. Steps 12x16"					(17) Steel Sash 14x20"			8680		
	Quantity Work in Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day	Quantity Work in Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day				
Previous	124 1/2	30.80	.25	23	247 1/2	30.80	.124	48				
This Week	108	25.20	.23 1/3	24	57 1/2	61.60	.10 2/3	52				
Total	232 1/2	56.00	.24	24	823	92.40	.11 1/5	50				

Fig. 113. Distribution and Costs on Glazing Steel Sash.

gives the total number of lights glazed and the total pay roll cost of same. The unit costs per light of glass and the average number a glazier will set per 8-hour day are also given. On the back of the card, figure 114, the separate unit

costs are given and the total number of labor hours worked up to the present time. The hours required to place 100 lights of glass of the various kinds are also given in the lower columns.

COST ANALYSIS RECORD								
UNIT LABOR COSTS				UNIT <i>Per Light</i>				
	1	2	3	4	5	6	7	8
	1(0)				5(6)			
Previous	25				12 1/2			
This Week	23 1/2				10 3/4			
Total	24				11 1/2			
TOTAL LABOR HOURS				UNIT				
	1	2	3	4	5	6	7	8
Previous	44				44			
This Week	36				88			
Total	80				132			
LABOR HOURS PER UNIT				UNIT				
	1	2	3	4	5	6	7	8
	1(0)				5(6)			
Previous	25 1/2 Hrs				17 1/2 Hrs			
This Week	23 1/2 Hrs				15 3/4 Hrs			
Total	34 1/2 Hrs				16 Hrs			

Fig. 114. Method of Analyzing Labor Costs on Glazing Steel Sash.

CHAPTER XVIII

PAINTING, VARNISHING, AND PAPER HANGING

Nearly all classes of painting are measured by the square containing 100 square feet, and inasmuch as the estimates are prepared on this basis, it is advisable to keep the costs the same way.

Separate time should be kept on the different kinds of exterior and interior work, stating whether painting is being done on wood, brick or cement walls, ceilings or roofs. When the quantities are given by the square, keep separate time for applying the priming coat, as it will usually require a little more time to apply the primer coat than any of those following.

Separate time should also be kept on all classes of interior finish, such as wood work, trim, staining, filling, shellacing, varnishing and waxing floors, and the costs in each instance should be given by the square containing 100 square feet.

On all classes of painting on interior plastered walls the time required on each coat should

PAINTING AND VARNISHING 201

average about the same, with the exception of stippling, which should be kept separately.

In keeping costs on all classes of painting no allowances are to be made for openings. All measurements are taken full; therefore costs should be kept accordingly. Under figure 115

Central Hospital		Frank R. Walker Company							Sheet No. <u>55</u>		
Building		LABOR DISTRIBUTION							Week Ending <u>APR 6 - 1916</u> Job No. <u>165</u>		
Class <u>"P.P.I."</u>											
OCCUPATION	F	S	S	M	T	W	T	HOURS	RATE	AMOUNT	
1 (B) Painters	16	8		16	16	16	--	72	70	5040	
2											
3											
4											
5 (C) Painters	32	16		32	24	24	24	152	70	10640	
6											
7											
8											
Total	(B) Painting Frames of Work (C) Rub. Coat									15680	
	Quantity Work in Place	Pay Roll Costs	Labour Average Unit Cost	Average Quantity Per 8 Hour Day	Quantity Work in Place	Pay Roll Costs	Labour Average Unit Cost	Average Quantity Per 8 Hour Day			
Previous	48 Sq	21 90	46	12 Sq	108 Sq	22 70	49	11 1/2 Sq			
This Week	102 "	50 40	49 1/2	11 1/2 "	221 "	106 40	48	11 1/2 "			
Total	150 "	72 30	48	11 1/2 "	329 "	159 10	48 1/2	11 1/2 "			

Fig. 115. Keeping Costs on Exterior Painting.

are given examples of cost keeping on painters' work. The quantities are given in squares of 100 square feet, together with the total pay roll cost on each class of work. The costs are then reduced to the unit per square and the number of squares a painter will average per 8-hour day. On the back of the card, figure 116, the unit costs per square are given, the total num-

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COST ANALYSIS RECORD								
UNIT LABOR COSTS				UNIT				
	1	2	3	4	5	6	7	8
Previous	46				49			
This Week	49 1/2				48			
Total	48				48 1/2			
TOTAL LABOR HOURS				UNIT				
	1	2	3	4	5	6	7	8
Previous	31				75			
This Week	72				152			
Total	103				227			
LABOR HOURS PER UNIT				UNIT				
	1	2	3	4	5	6	7	8
Previous	1/3 Hrs				1/10 Hrs			
This Week	1/10 Hrs				1/10 Hrs			
Total	1/10 Hrs				1/10 Hrs			

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Fig. 116. Method of Analyzing Costs on Painting.

ber of hours for painters required on the entire job, and the number of hours painters' time re-

Central Hospital		Frank R. Walker Company									
LABOR DISTRIBUTION					Sheet No. <u>156</u>						
Building <u>"DPI"</u>		Week Ending <u>APR 6 - 1916</u>			Job No. <u>165</u>						
CLASS											
OCCUPATION		F	S	S	M	T	W	T	HOURS	RATE	AMOUNT
1	(A) Painters	16	8		16	16	-	-	56	70	3920
2											
3											
4											
5	(B) Painters	-	-	-	16	16	8		40	70	2800
6											
7											
8											
Total		(A) Stain Floors				(B) Fill Floors				6720	
Total		Quantity Work in Place	Pay Rate Costs	Lease Average Unit Cost	Average Quantity per 10 Hour Day	Quantity Work in Place	Pay Rate Costs	Lease Average Unit Cost	Average Quantity per 10 Hour Day		
Previous											
This Week		87 Sq	39.20	45	12 1/2 Sq	61 Sq	28.00	46	12 Sq		
Total		87 "	39.20	45	12 1/2 "	61 "	28.00	46	12 "		

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Fig. 117. Distribution and Costs on Staining and Filling Floors.

quired to apply one square of one coat of paint on the various classes of wood work.

If interior finish is to be rubbed to obtain a "rubbed finish" or "egg shell gloss," separate time should be kept on this work and the quantities given in squares of 100 square feet.

Figure 117 illustrates the manner in which costs are kept on staining and filling wood floors, as the quantities are all given in squares; also the total pay roll costs on the job are given. The unit costs are then reduced to the cost per square and the number of squares a man will complete per 8-hour day. On the back of this

COST ANALYSIS RECORD								
UNIT LABOR COSTS					UNIT <i>Per Square 100 Sq. Ft.</i>			
	1	2	3	4	5	6	7	8
Previous								
This Week	<i>f</i>				<i>(fL)</i>			
Total	<i>45</i>				<i>46</i>			
TOTAL LABOR HOURS					UNIT			
	1	2	3	4	5	6	7	8
Previous								
This Week	<i>56</i>				<i>40</i>			
Total	<i>56</i>				<i>40</i>			
LABOR HOURS PER UNIT					UNIT <i>Per Square 100 Sq. Ft.</i>			
	1	2	3	4	5	6	7	8
Previous								
This Week	<i>3/8 Hrs</i>				<i>3/8 Hrs</i>			
Total	<i>3/8 Hrs</i>				<i>3/8 Hrs</i>			

Fig. 118. Analyzed Costs on Staining and Filling Floors.

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card, figure 118, are given the unit costs of the different classes of work, the total number of hours painters' time required to date, and the time required for one painter to complete one square of the different classes of work.

Where costs are to be kept on all kinds of wall work, the method employed is the same as given above. Under figure 119 are given examples of applying wall size and calcimine to plastered

Building Central Hospital		Frank R. Walker Company							Sheet No. 57		
Class "P.P.R."		LABOR DISTRIBUTION							Job No. 165		
		Week Ending APR 6 - 1916									
OCCUPATION	F	S	S	M	T	W	T	HOURS	RATE	AMOUNT	
1 (a) Painters	8	4		16	16	16	—	60	70	42.00	
2											
3											
4											
5 (b) Painters	—	—		24	24	24	24	96	70	67.20	
6											
7											
8											
Total	(a) Wall Size				(b) Calcimine						109.20
	Quantity Work in Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day	Quantity Work in Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day			
Previous	110 Sq	12.00	.11	44 Sq	50 Sq	16.40	.33	16 2/3 Sq			
This Week	322 "	42.00	.13	43 "	196 "	67.20	.34 1/2	16 1/3 "			
Total	432 "	54.00	.12 1/2	43 1/2 "	246 "	83.60	.34	16 1/2 "			

Fig. 119. Keeping Costs on Applying Wall Size and Calcimine.

walls. The quantities are given in squares of 100 square feet, and the total pay roll cost to the present time is also given. The costs are given for applying one square of wall size and calcimine and the average quantity a painter

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will complete per 8-hour day is also given. On the back of this card, figure 120, the separate

COST ANALYSIS RECORD								
UNIT LABOR COSTS				UNIT <i>Per Square 100 Sq. Ft.</i>				
	1 (A)	2	3	4	5 (B)	6	7	8
Previous	11				33			
This Week	13				34 1/2			
Total	12 1/2				34			
TOTAL LABOR HOURS				UNIT				
	1	2	3	4	5	6	7	8
Previous	17				23 1/2			
This Week	60				96			
Total	77				119 1/2			
LABOR HOURS PER UNIT				UNIT <i>Per 100 Squares.</i>				
	1	2	3	4	5	6	7	8
Previous	15 1/2 Hrs				47 Hrs			
This Week	18 3/4 Hrs				49 Hrs			
Total	17 3/4 Hrs				48 1/2 Hrs			

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Fig. 120. Analyzed Costs on Applying Wall Size and Calcimine.

Frank R. Walker Company											
Building <u>Central Hospital</u>		LABOR DISTRIBUTION					Sheet No. <u>58</u>				
Class <u>"PP-2"</u>		Week Ending <u>APR 6 - 1916</u>					Job No. <u>165</u>				
OCCUPATION	F	S	S	M	T	W	T	HOURS	RATE	AMOUNT	
1 (C) Painters	16	8		16	16	-	-	56	70	3920	
2											
3											
4											
5 (F) Painters	-	-		-	-	16	16	32	70	2240	
6											
7											
8											
Total	(C) <u>Painting Walls</u>					(F) <u>Stippling Only</u>					<u>6160</u>
	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8-Hour Day	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8-Hour Day			
Previous	152.5	58.60	38 1/2	15.59	64.59	11.30	17 1/2	34.59			
This Week	103	39.20	38	15 "	137.59	22.40	16 1/2	34			
Total	255 "	97.80	38 1/2	15 "	201 "	33.70	16 1/2	34 "			

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Fig. 121. Distribution and Costs on Painting Interior Walls.

unit costs are given and the total hours required to date. On the bottom of the card is the average time required to apply 100 squares of wall size and calcimine.

Figure 121 gives a practical example of wall work where the walls are painted with lead and oil and stippled. The costs are given for the total quantity of the different classes of work completed, the total expenditure for labor to the present time, the average cost per square for painting and stippling, and the number of squares of each class of work a painter will complete per 8-hour day. The back of the card, figure 122, gives the same data as is shown on figure 120.

COST ANALYSIS RECORD								
UNIT LABOR COSTS					UNIT <i>Per Square 100 Sq. Ft.</i>			
	1 (C)	2	3	4	5 (f)	6	7	8
Previous	38 $\frac{1}{2}$				.17 $\frac{1}{2}$			
This Week	38				.16 $\frac{1}{2}$			
Total	38 $\frac{1}{2}$				.17			
TOTAL LABOR HOURS					UNIT			
	1	2	3	4	5	6	7	8
Previous	84				16			
This Week	56				32			
Total	140				48			
LABOR HOURS PER UNIT					UNIT <i>Per 100 Squares.</i>			
	1	2	3	4	5	6	7	8
Previous	55 Hrs				25 Hrs			
This Week	54 $\frac{1}{2}$ Hrs				23 $\frac{1}{2}$ Hrs			
Total	55 Hrs				24 Hrs			

Fig. 122. Analyzed Costs on Painting and Stippling.

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In keeping the costs on applying whitewash, cold water paint, etc., the costs should be given in the same manner as on other classes of wall work and the quantities should be given in so many squares of single coat work, because in work of this kind each coat requires about the same length of time.

In figuring wall paper and paper hanging the measurement is usually taken by the roll of paper, which contains 36 square feet or 4 square yards. This is for a single roll, and the costs should be kept on the same basis.

Central Hospital		Frank R. Walker Company						Sheet No. <u>59</u>		
Building "PPZ"		LABOR DISTRIBUTION						Job No. <u>165</u>		
		Week Ending <u>APR 6 - 1916</u>								
OCCUPATION	F	S	S	M	T	W	T	HOURS	RATE	AMOUNT
1 <i>(2) Paper Hangers</i>	16	8		16	16	16	16	88	70	61.60
2										
3										
4										
5										
6										
7										
8										
Total	<i>(2) Single Rolls</i>									61.60
	Quantity Work in Piece	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8-Hour Day	Quantity Work in Piece	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8-Hour Day		
Previous	115 R/s	30.20	.26	22 R/s						
This Week	241 R/s	61.60	.25 1/2	22 "						
Total	356 "	91.80	.25 2/3	22 "						

Fig. 123. Keeping Costs on Applying Wall Paper.

Figure 123 gives an illustration of keeping costs on hanging wall paper. The quantities

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are given by the number of rolls of paper used and the total pay roll cost on the job to date is also given. The totals are then reduced to the cost per roll of paper and the average number

COST ANALYSIS RECORD								
UNIT LABOR COSTS				UNIT <i>Per Roll.</i>				
	1	2	3	4	5	6	7	8
Previous	26							
This Week	25 1/2							
Total	25 1/2							
TOTAL LABOR HOURS				UNIT				
	1	2	3	4	5	6	7	8
Previous	143							
This Week	88							
Total	131							
LABOR HOURS PER UNIT				UNIT <i>Per 100 Rolls.</i>				
	1	2	3	4	5	6	7	8
Previous	37 1/2 Hrs							
This Week	36 1/2 Hrs							
Total	37 Hrs							

Fig. 124. Analyzed Costs on Applying Wall Paper.

of rolls a paper hanger will apply per 8-hour day. On the back of the card, figure 124, the unit costs per roll are given, the total number of hours worked on the job to date, and the number of hours required by paper hangers to apply 100 rolls of paper.

CHAPTER XIX

STRUCTURAL AND ORNAMENTAL IRON, AND STEEL WORK

Cost keeping on structural steel work should be divided into five separate items as follows: (a) The cost of unloading the steel from the cars, hauling it to job, and unloading same in stock piles; (b) the cost of distributing the steel from storage pile to derricks; (c) the cost of placing hoisting engines, air compressors, derricks, etc., and removing same at completion of

Building <u>Central Hospital</u>		Frank R. Walker Company							Sheet No. <u>60</u>	
		LABOR DISTRIBUTION								
Class <u>"QP-I"</u>		Week Ending <u>APR 3 - 1916</u>							Job No. <u>165</u>	
OCCUPATION	F	S	S	M	T	W	T	HOURS	RATE	AMOUNT
1 <u>Iron Workers</u>	<u>32</u>	<u>16</u>		<u>32</u>	<u>32</u>	<u>32</u>	<u>32</u>	<u>176</u>	<u>.70</u>	<u>123.20</u>
2 <u>Engineers</u>	—	—		<u>8</u>	<u>8</u>	<u>8</u>	<u>8</u>	<u>32</u>	<u>.75</u>	<u>24.00</u>
3										
4										
5										
6										
7 <u>10 Story Bldg</u>	<u>10' x 170' Damage 500T</u>									
8										
Total										<u>147.20</u>
	Quantity Work in Place	Pay Roll Costs	<u>700T</u> Labor Average Unit Cost Per Ton	Average Quantity Per 8 Hour Day	Quantity Work in Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day		
Previous										
This Week	<u>500 T</u>	<u>147.20</u>	<u>.30</u>							
Total	<u>500 T</u>	<u>147.20</u>	<u>.30</u>							

Fig. 125. Distribution and Costs on Placing Engines and Derricks.

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work; (d) the cost of handling, hoisting, and erecting all classes of structural steel work; (e) the cost of riveting or bolting the connections. All classes of structural steel work are given per ton of steel, and the rivets are usually figured by the number driven and by the ton of steel.

Figure 125 furnishes a practical example of cost keeping on placing hoisting engines, air compressors and derricks on the job. The quantities are given by the number of tons of steel in the job, together with the total pay roll cost on same,

COST ANALYSIS RECORD								
UNIT LABOR COSTS				UNIT <i>Per Ton</i>				
	1	2	3	4	5	6	7	8
Previous	—	—						
This Week	.25	.05						
Total	.25	.05						
TOTAL LABOR HOURS				UNIT				
	1	2	3	4	5	6	7	8
Previous	—	—						
This Week	176	32						
Total	176	32						
LABOR HOURS PER UNIT				UNIT <i>Per Ton</i>				
	1	2	3	4	5	6	7	8
Previous	—	—						
This Week	21 Min	4 Min						
Total	21 Min	4 Min						

Fig. 126. Analyzed Labor Costs on Placing Engines and Derricks.

and the average unit labor cost per ton of steel. On the back of the card, figure 126, the separate

STRUCTURAL IRON AND STEEL 211

unit costs are given, the total number of hours for the various classes of workmen, and the number of hours required for plant per ton of steel.

The labor sub-divisions on erecting structural steel should consist of the time required to handle, hoist, and set same in place with temporary bolts or connections after the steel has been unloaded on the job. The costs on this work should be given by the number of tons of steel erected and the unit cost of driving each rivet.

Central Hospital		Frank R. Walker Company						Sheet No. <u>604</u>		
Building		LABOR DISTRIBUTION						Job No. <u>165</u>		
Class <u>"O.P.I."</u>		Week Ending <u>APR 3 - 1916</u>						Job No. <u>165</u>		
OCCUPATION	F	S	S	M	T	W	T	HOURS	RATE	AMOUNT
1 (d) Iron Markers	8	4		96	96	96	88	496	70	347.20
2 Hoist Eng	8	4		8	8	8	8	44	75	33.00
3										
4										
5 (G) Iron Markers	32	16		32	32	32	32	176	70	123.20
6										
7										
8										
Total	(d) Skeleton Frame 16 x 120'						(G) Heat & Rivet		503.40	
Quantity Work in Place	Pay Roll Costs	Labor Average Unit Cost $\frac{78-750}{2000}$	Average Quantity Per 8 Hour Day	Quantity Work in Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day			
Previous 30 Tons	176.40	5.88	2000*	947	57.60	06 2/3	340	9.99		
This Week 56 Tons	380.20	6.80	1806**	1950	123.20	06 1/3	355			
Total 86 Tons	556.60	6.47	1906**	2897	180.80	06 1/2	350			

Fig. 127. Costs on Erecting Steel and Driving Rivets.

Under figure 127 are given examples of this class of work, giving the number of tons of steel

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erected and the number of rivets driven. The total pay roll expenditures to date, the average cost to place a ton of steel, and the unit costs of driving rivets are also given. The average quantity of steel a man will set, and the number of rivets driven by the gang per 8-hour day are also noted. On the back of the card, figure 128, the separate unit costs are given which go to make up the total cost as stated on the front

COST ANALYSIS RECORD (d) Per Ton								
UNIT LABOR COSTS				UNIT (e) Per Rivet				
	1 (c)	2	3	4	5 (g)	6	7	8
Previous	5.40	48			.067			
This Week	6.20	60			.063			
Total	5.80	54			.065			
TOTAL LABOR HOURS								
	1	2	3	4	5	6	7	8
Previous	231	19			82			
This Week	496	44			176			
Total	727	63			258			
LABOR HOURS PER UNIT				UNIT (f) Per Ton (h) Per 100 Rivets				
	1	2	3	4	5	6	7	8
Previous	7 1/2 Hrs	7 3/8 Hrs			8 7/10 Hrs			
This Week	8 1/2 Hrs	4 1/2 Hrs			9 Hrs			
Total	8 1/2 Hrs	7 1/4 Hrs			8 7/10 Hrs			

Fig. 128. Method of Analyzing Costs on Erecting Structural Steel and Driving Rivets.

of the card. The total number of hours for iron workers and engineers worked on the job to date, as well as the number of hours required to handle and erect one ton of steel and drive 100 rivets, are also given.

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The cost of erecting steel stacks and other classes of plate work should also be kept by the ton. The size of the stack or tank should be noted, together with the height of same. The cost of driving rivets should be kept separately.

Under ornamental and miscellaneous iron work will come the items of iron stairs, newels, balusters, fire escapes, ladders and platforms, etc. Costs on this class of work should be kept by the number of flights of stairs erected, and a general description of same should be given

Building <u>Central Hospital</u>		Frank R. Walker Company					Sheet No. <u>61</u>			
Class <u>QP. I"</u>		LABOR DISTRIBUTION					Job No. <u>165</u>			
		Week Ending <u>APR 3 - 1916</u>								
OCCUPATION	F	S	S	M	T	W	T	HOURS	RATE	AMOUNT
1 <u>(2) Orn. Iron Workers</u>	16	8		16	16	16	16	88	75	66.00
2										
3										
4										
5 <u>(1) Iron Workers</u>	16	8		16	16	16	-	72	70	50.40
6										
7										
8										
Total	<u>20 Risers Each</u>									
	<u>(1) Typ. Stairs 4' x 12' x 12' High</u>						<u>(1) Steel Sash</u>			116.40
	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day		
Previous	2 Flights	34.00	17.00	3 Days	530'	27.60	.054	110'		
This Week	3 "	66.00	22.00	3 1/2 Days	1020'	50.40	.0494	113'		
Total	5 "	100.00	20.00	3 3/4 Days	1550'	78.00	.05	111'		
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Fig. 129. Labor Costs on Erecting Ornamental Iron Stairs.

wherever possible. On figure 129 are given examples of the methods used on ornamental iron

stairs and fire escapes. The number of flights of stairs are given, together with the total number of risers, width of stair, story height, etc. The total pay roll expenditure to date, the average unit labor cost per flight of stairs, and the time required to erect each flight of stairs are also given. Under item (1) on the same card are given the costs of erecting or setting steel sash in place. The total number of square feet of sash are given, together with the total pay roll cost on same and the average unit cost per square foot of sash erected. Under the same

COST ANALYSIS RECORD (1) Per Flight of Stairs								
UNIT LABOR COSTS				UNIT (1) Per Sq. Ft. Sash.				
	(1)	2	3	4	(2)	6	8	
Previous	17.00				.054			
This Week	22.00				.0494			
Total	39.00				.05			
TOTAL LABOR HOURS				UNIT				
	1	2	3	4	5	6	8	
Previous	45				40			
This Week	88				72			
Total	133				112			
LABOR HOURS PER UNIT				UNIT (1) Per Flight of Stairs (2) Per 100 Sq. Ft. Sash.				
	(1)	2	3	4	(2)	6	8	
Previous	22 1/2 Hrs				1 1/2 Hrs			
This Week	30 Hrs				7 Hrs			
Total	26 1/2 Hrs				7 1/4 Hrs			
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Fig. 130. Analyzed Labor Costs on Erecting Iron Stairs and Placing Steel Sash.

headings the average number of square feet of sash a man will erect per 8-hour day are stated.

On the back of the card, figure 130, the separate unit labor costs are given, the total number of hours required to date, and the number of hours iron workers' time required to erect one flight of stairs and place 100 square feet of steel sash.

Under the various kinds of ornamental and miscellaneous iron work, such as sidewalk doors, iron area gratings, coal hole doors and covers, coal chutes, cast iron bumpers, ornamental iron, copper or bronze store fronts, etc., it is very difficult to reduce the costs to a workable unit, but the time on the various classes of work should be kept separately, giving the sizes of the doors, etc., as far as possible.

CHAPTER XX

PLUMBING AND GAS FITTING

Under plumbing and gas fitting, the cost of unloading the materials from cars, hauling, and unloading at building should be kept separately. The time required digging sewers, man-holes, etc., should be kept as a separate item; likewise the time required laying tile, iron drain, or sewer pipe should be kept as a separate cost account. The cost of roughing in for toilets, lavatories, tubs, urinals, slop sinks, etc., should be kept as a separate item from the cost of setting the various kinds of fixtures.

Under gas fitting will come the piping for gas lights, ranges, and fire places. The quantities under gas fitting should be given by the number of lineal feet of pipe in place, giving the size of same wherever possible and the number of outlets for lights or fuel.

The cost of placing the fixtures is a separate item from the cost of running pipe and should be kept by the number of ranges or other fixtures connected during an 8-hour day.

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Central Hospital		Frank R. Walker Company		Sheet No. <u>62</u>						
Building		LABOR DISTRIBUTION		Job No. <u>165</u>						
Class <u>"R.P.I."</u>		Week Ending <u>APR 6 - 1916</u>								
OCCUPATION	F	S	S	M	T	W	T	HOURS	RATE	AMOUNT
1 (b) Plumbers	8	4			32	56	64	220	75	165.00
2 Helpers	8	4			8	8	8	44	40	17.60
3										
4										
5 (c) Plumbers	8	4		16	16	16		60	75	45.00
6 Helpers	8	4		8	8	8		36	40	14.40
7										
8										
Total	(b) Repair			(c) Set Fixtures						242.00
Form 105	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day		
Previous	16 Extra	90.00	5.62	1 Fixture	8 Extra	28.10	3.51	2 1/2 Extra		
This Week	30 "	182.60	6.09	1 "	18 Extra	59.40	3.30	7 1/2 Extra		
Total	46 "	272.60	5.93	1 "	26 Extra	87.50	3.37	2 1/2 "		

Fig. 131. Keeping Costs on Plumbing Work.

Under figure 131 an example of cost keeping on plumbing work is given. The total number

COST ANALYSIS RECORD								
UNIT LABOR COSTS				UNIT <i>Per Fixture</i>				
	1	2	3	4	5	6	7	8
	(b)				(c)			
Previous	5.50	.12			3.00	.51		
This Week	5.50	.59			2.50	.80		
Total	5.50	.43			2.75	.66		
TOTAL LABOR HOURS				UNIT				
	1	2	3	4	5	6	7	8
Previous	117	4			32	8		
This Week	220	44			60	36		
Total	337	48			92	44		
LABOR HOURS PER UNIT				UNIT <i>Per Fixture</i>				
	1	2	3	4	5	6	7	8
Previous	7 1/2 Hrs	1/4 Hrs			4 Hrs	1 Hrs		
This Week	7 1/2 Hrs	1 1/2 Hrs			3 1/2 Hrs	2 Hrs		
Total	7 1/2 Hrs	1 Hrs			3 3/4 Hrs	1 1/2 Hrs		

Fig. 132. Method of Analyzing Costs on Plumbing Work.

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of fixtures roughed in and the number of fixtures set are given, together with the total expenditures for labor to date. The average cost is given for roughing in for each fixture and the cost of setting each fixture. The average number of fixtures roughed in or set per 8-hour day is also noted. On the back of the card, figure 132, are given the separate unit costs as totaled on the front of the card and the total number of hours worked by plumbers and helpers on the job to date. On the bottom of the card are given the number of hours required by plumbers and helpers to rough in and set one fixture.

Figure 133 illustrates the cost methods used

Central Hospital		Frank R. Walker Company				Sheet No. <u>63</u>				
Building		LABOR DISTRIBUTION				Job No. <u>165</u>				
Class <u>"R.P.1"</u>		Week Ending <u>APR 6 - 1916</u>				Job No. <u>165</u>				
OCCUPATION	F	S	S	M	T	W	T	HOURS	RATE	AMOUNT
1 (d) Gas Fitters	8	4		8	8	8	8	44	75	3300
2										
3										
4										
5 (e) Gas Fitters				4	8	8		20	75	1500
6										
7										
8										
Total	(d) Run Gas Pipe 76'				(e) Connect Ranges.				48.00	
Previous	362'	1750	.048	131'						
This Week	712'	3300	.0463	129'	5	15.00	3.00	2		
Total	1074'	5050	.047	130'	5	15.00	3.00	2		
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Fig. 133. Distribution and Costs on Gas Fitting.

in running gas pipe and connecting ranges, etc. The total number of lineal feet of pipe and the size of same are given, together with the number of ranges connected to date. The total pay roll expenditures on both classes of work are carried and totaled separately, and the average cost to run one foot of pipe and to connect each range is given. Also are given the average number of lineal feet of pipe run per 8-hour day and the average number of fixtures set. On the

COST ANALYSIS RECORD (d) Per Lin Ft Pipe UNIT (e) Per Fixture								
UNIT LABOR COSTS								
	1 (d)	2	3	4	5 (e)	6	7	8
Previous	048				—			
This Week	046.3				3.00			
Total	047				3.00			
TOTAL LABOR HOURS					UNIT			
	1	2	3	4	5	6	7	8
Previous	24				—			
This Week	44				20			
Total	68				20			
LABOR HOURS PER UNIT					UNIT (d) Per 100 Lin Ft Pipe (e) Per Fixture			
	1	2	3	4	5	6	7	8
Previous	6 3/4 Hrs				—			
This Week	6 3/4 Hrs				4 Hrs			
Total	6 3/4 Hrs				4 Hrs			

Fig. 134. Analyzed Labor Costs on Gas Fitting.

back of the card, figure 134, the separate unit costs for running pipe and connecting fixtures are given, the total number of hours required to complete the job, and the number of hours re-

quired to run 100 lineal feet of pipe and connect each fixture.

The cost of covering pipe should also be kept by the number of lineal feet of covering completed and by giving the class of covering and the average size of same as accurately as possible.

CHAPTER XXI

STEAM, HOT WATER, AND FURNACE HEATING

The costs under the various kinds of heating will be as follows: (a) Unloading materials from cars, hauling to building, and unloading at building site; (b) labor setting boiler in place in the building; (c) labor bricking around boiler, if same is a fire-box boiler; (d) labor running all pipe and roughing in for radiators, which cost should be kept by the number of radiators roughed in; (e) the cost of setting radiators and connecting same ready for use; (f) the cost of setting and removing temporary radiators for temporary heat before the building is completed; (g) the cost of bronzing or painting radiators, which cost is to be given by the square foot of radiation; (h) labor installing the different kinds and sizes of pipe covering the quantities to be given per lineal foot of covering installed, together with the size of covering.

Under figure 135 are given the costs of setting boiler, the size of same, and the labor costs

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Building Central Hospital		Frank R. Walker Company LABOR DISTRIBUTION		Sheet No. 64						
Class "S.P.I."		Week Ending APR 6 - 1916		Job No. 165						
OCCUPATION	F	S	S	M	T	W	T	HOURS	RATE	AMOUNT
1 (b) <i>Steam Fitters</i>	—	—		16	16	16	—	48	75	3600
2 <i>Helpers</i>	—	—		16	16	16	—	48	60	2400
3										
4 (c) <i>Mason</i>	8	4		8	8	8	8	44	75	3300
5 <i>Laborers</i>	8	4		8	8	8	8	44	40	1760
6										
7										
8										
Total		(b) <i>Setting Boiler 5000'</i>				(c) <i>Brick up Boiler</i>				11060
	Quantity Work in Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day	Quantity Work in Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day		
Previous	—	—	—	—	—	—	—	—	—	—
This Week	1	60.00	—	—	874	50.60	632	145		
Total	1	60.00	—	—	874	50.60	632	145		

Fig. 135. Labor Costs on Setting Boiler and Bricking Same In.

of enclosing same with brick. Under the cost of setting the boiler are given the total pay roll

COST ANALYSIS RECORD (b) Cost Per Boiler UNIT LABOR COSTS UNIT (c) Cost Per # Brick								
	1 (b)	2	3	4 (c)	5	6	7	8
Previous	—	—		—	—			
This Week	36.00	24.00		4.12	2.20			
Total	36.00	24.00		4.12	2.20			
TOTAL LABOR HOURS UNIT								
	1	2	3	4	5	6	7	8
Previous	—	—		—	—			
This Week	48	48		44	44			
Total	48	48		44	44			
LABOR HOURS PER UNIT (b) Hours Per Boiler (c) Hours Per # Brick								
	1	2	3	4	5	6	7	8
Previous	—	—		—	—			
This Week	48	48		5 1/2 Hrs	5 1/2 Hrs			
Total	48	48		5 1/2 Hrs	5 1/2 Hrs			

Fig. 136. Analyzed Labor Costs on Setting Boiler.

costs for setting a certain size boiler and the masonry costs of bricking same in; also the total number of thousand brick laid and the average number a mason would lay per 8-hour day are also given. On the back of the card, figure 136, the unit labor costs which enter into the totals are given, the total number of hours for the various trades employed, and the number of hours required to set the boiler and to lay a thousand brick.

Building <u>Central Hospital</u>		Frank R. Walker Company							LABOR DISTRIBUTION			
Class <u>"S.P.I."</u>		Week Ending <u>APR 6 - 1916</u>							Sheet No. <u>65</u>			
OCCUPATION		F	S	S	M	T	W	T	HOURS	RATE	AMOUNT	
1	(d) Steam Fitters	16	8		16	16	16	16	88	75	66 00	
2	Helpers	16	8		16	16	16	16	88	80	44 00	
3												
4												
5	(e) Steam Fitters	-	-		-	-	8	8	16	75	12 00	
6	Helpers	-	-		-	-	8	8	16	80	8 00	
7												
8												
Total		(d) Rough In for Radiators					(e) Set Radiators					13 00 00
	Quantity Work in Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day	Quantity Work in Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day				
Previous	18	60.00	3.33	3	11	15.00	1.37	7				
This Week	33	110.00	3.33	3	16	20.00	1.25	8				
Total	51	170.00	3.33	3	27	35.00	1.30	15				

Fig. 137. Labor Costs on Roughing In and Placing Radiators.

Figure 137 illustrates the method of cost keeping as applied to running pipe, roughing in, and setting radiators. The number of radiators roughed in and set and the total pay roll costs

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to date are given. The unit cost for roughing in and setting each radiator and the average number of radiators a steam fitter and helper will rough in or set per 8-hour day are also given. On the back of the card, figure 138, the

COST ANALYSIS RECORD								
UNIT LABOR COSTS				UNIT <i>Cost Per Radiator</i>				
	1	2	3	4	5	6	7	8
Previous	2.00	1.33			.75	.62		
This Week	2.00	1.33			.75	.50		
Total	2.00	1.33			.75	.56		
TOTAL LABOR HOURS				UNIT				
	1	2	3	4	5	6	7	8
Previous	48	48			11	14		
This Week	88	88			16	16		
Total	136	136			27	30		
LABOR HOURS PER UNIT				UNIT <i>Time Per Radiator</i>				
	1	2	3	4	5	6	7	8
Previous	2 $\frac{3}{4}$ Hrs	2 $\frac{3}{4}$ Hrs			1 Hrs	1 $\frac{1}{2}$ Hrs		
This Week	2 $\frac{3}{4}$ Hrs	2 $\frac{3}{4}$ Hrs			1 Hrs	1 Hrs		
Total	2 $\frac{3}{4}$ Hrs	2 $\frac{3}{4}$ Hrs			1 Hrs	1 $\frac{1}{2}$ Hrs		
Form 106	Copyright 1916 By Frank R. Walker							(Over)

Fig. 138. Method of Analyzing Labor Costs on Roughing In and Placing Radiators.

separate unit costs are given which make up the totals and the total number of hours worked on the job by the various tradesmen. On the bottom of the card are given the number of hours required for steam fitter and helper to rough in and set each radiator.

CHAPTER XXII

ELECTRICAL WIRING, ETC.

Under electrical work the following classifications will prove sufficient for the ordinary job: (a) Labor unloading all materials from cars, hauling to job, and unloading at building site; (b) the labor necessary to run conduit measuring up to 1 inch in diameter, the quantities being given in the number of lineal feet of conduit run and the number of outlets wherever possible; (c) this item is practically the same as given under (b), except the costs on larger size conduits are being kept separately; (d) this item will include the time spent in placing switch boards, generators, dynamos, and other electrical machinery. The quantities of work of this kind should be given in the number of machines set. (e) The labor cost of installing telephones should be kept separately from other electrical work; (f) the labor required installing door bells, annunciators, etc., is another item on which separate costs should be kept; (g) in keeping the costs on pulling wire, the size of

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the wire should be given wherever possible, and the quantities should be given in the number of lineal feet of wire in place; (h) where it is necessary to install fixtures, the class of fixtures should be noted, as well as the number of fixtures in place. The item (i) is to take care of any of the miscellaneous items that come up during the course of the job on which there is no regular classification.

Central Hospital		Frank R. Walker Company							Sheet No. <u>66</u>		
Building		LABOR DISTRIBUTION							Job No. <u>165</u>		
Class " <u>TP 1</u> "		Week Ending <u>APR 6 - 1916</u>									
OCCUPATION		F	S	S	M	T	W	T	HOURS	RATE	AMOUNT
1	(B) Electricians	16	8		16				40	75	30.00
2											
3											
4											
5	(C) Electricians				16	16	16	48	75	36.00	
6											
7											
8											
Total:		(B) Running 1" Conduit					(C) Run 3" Conduit			66.00	
	Quantity Work in Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day	Quantity Work in Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day			
Previous	2100'	150.00	0714	80'	72'	18.00	25'	75'			
This Week	470'	30.00	07	84'	151'	36.00	24'	75'			
Total	2570'	180.00	07	84'	223'	54.00	24 1/2'	75'			

Fig. 139. Distribution and Costs on Running Electrical Conduit.

Figure 139 furnishes an illustration of the method used in keeping cost on running conduit of various sizes. The total number of lineal feet of conduit of the various sizes, together with

ELECTRICAL WIRING, ETC. 227

COST ANALYSIS RECORD								
UNIT LABOR COSTS				UNIT Cost Per Lin Foot				
	1	2	3	4	5(c)	6	7	8
Previous	0714				25			
This Week	07				24			
Total	07				24 1/2			
TOTAL LABOR HOURS								
	1	2	3	4	5	6	7	8
Previous	200				214			
This Week	140				148			
Total	240				362			
LABOR HOURS PER UNIT								
	1	2	3	4	5	6	7	8
Previous	9 1/2 Hrs				33 1/2 Hrs			
This Week	8 1/2 Hrs				31 1/2 Hrs			
Total	9 1/2 Hrs				32 1/2 Hrs			

Fig. 140. Analyzed Labor Costs on Placing Conduit.

the total pay roll cost of same, are given. The totals are then reduced to the cost per lineal foot of conduit and the average number of lineal feet

Central Hospital		Frank R. Walker Company						Sheet No. 67		
LABOR DISTRIBUTION		LABOR DISTRIBUTION						Job No. 165		
Class "TP-1"		Week Ending APR 6 - 1916								
OCCUPATION		F	S	M	T	W	T	HOURS	RATE	AMOUNT
(F) Electricians		8	4		8	-	-	20	75	1500
2										
3										
4										
(Q) Electricians		-	-	-	8	8	8	24	75	1800
6										
7										
B										
Total	(D) Door Bells							(Q) Pull Wire #12 Dup		3300
	Quantity Work in Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 100' Hour Pay	Quantity Work in Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 100' Hour Pay		
Previous	15	21.00	2.07	3	1070'	27.00	02 1/2	260'		
This Week	10	15.00	1.50	4	780'	18.00	02 1/4	260'		
Total	25	46.00	1.84	8 1/2	1850'	45.00	02 1/4	260'		

Fig. 141. Distribution and Costs on Pulling Wire.

of conduit of different sizes a man will place per 8-hour day. On the back of the card, figure 140, the separate unit costs are given per lineal foot of conduit and the total number of hours worked by electricians on the job to date. The number of hours of electricians' time required to run 100 lineal feet of the different size conduit are also given.

Under figure 141 the costs on installing door bells and the cost of pulling wire are given. The quantities are given by the number of bells installed and the number of lineal feet of wire placed. The total pay roll cost on the entire job is given, and the units reduced to the cost of installing each bell or running one foot of

COST ANALYSIS RECORD								
UNIT LABOR COSTS				UNIT (f) Cost Each				
	1	2	3	4	5	6	7	8
Previous	14				5			
This Week	207				52 1/2			
Total	150				57 1/2			
TOTAL LABOR HOURS								
	1	2	3	4	5	6	7	8
Previous	41				36			
This Week	20				24			
Total	61				60			
LABOR HOURS PER UNIT				UNIT (g) Time Each				
	1	2	3	4	5	6	7	8
Previous	2 7/8 Hrs				3 3/8 Hrs			
This Week	2 Hrs				3 1/2 Hrs			
Total	2 1/2 Hrs				3 5/8 Hrs			

Fig. 142. Analyzed Labor Costs on Pulling Wire.

wire. The average number of bells a man will install per 8-hour day and the number of lineal feet of wire pulled are also given. On the back of this card are given the separate costs of installing the bells and pulling the wires and the total number of hours worked by electricians on the different branches of work. The lower column gives the number of hours required to install one bell and run 100 lineal feet of wire.

CHAPTER XXIII

EXTRA WORK AND CHANGES

On every job there are a great many items to keep costs on which are not in the original contract, and the time and cost of same must be kept separately. On work of this kind, which includes all extra work on orders received from the architects or owners for changes or additions to the original contract and all work necessary for the general contractor to complete for the sub-contractors, such as removing rubbish from the building, repairing or replacing imperfect work, and other items that the sub-contractor failed to complete after receiving sufficient notice from the general contractor that certain items of work remain to be done or are imperfect.

The Distribution Sheets which are used for all classes of Extra and Sub-Contract work should be printed on a salmon colored card or paper, so that when the sheets are turned in to the office at the end of the week the book-keeper can tell at a glance just what items are charge-

EXTRA WORK AND CHANGES 231

Central Hospital		Frank R. Walker Company							Sheet No. <u>68</u>		
Building		LABOR DISTRIBUTION							Week Ending <u>APR 6 - 1916</u>		
Class <u>"XP-21"</u>		Job No. <u>165</u>									
OCCUPATION	F	S	S	M	T	W	T	HOURS	RATE	AMOUNT	
1 <i>Masons</i>	32	16		48	—	—	—	96	75	72.00	
2 <i>Laborers</i>	40	20		48	—	—	—	108	40	43.20	
3 <i>Eng'rs</i>	4	4		8	—	—	—	16	75	12.00	
4											
5											
6											
7 <i>Change and tear partitions 3rd floor</i>											
8 <i>Plumb wing. Architects order 21.</i>											
9											
Total										127.20	
	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day	Quantity Work In Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day			
Previous	—	—	—	—	—	—	—	—			
This Week	—	127.20	—	<i>Complete.</i>							
Total	—	127.20	—								

Fig. 143. Method of Keeping Costs on Extra Work.

able to the original contract and which ones are chargeable to others.

Under figure 143 examples of cost keeping on extra work are given. The "X" is the symbol of Extra and the "P" designates pay roll cost, as on all the other sheets, while the number "21" designates the number of the extra charge. The number on the extra charge should in all cases agree with the number on the "ORDER FOR CHANGE" sheet, as illustrated on the following page.

Figure 144 illustrates the Labor Distribution sheet where there are charges against any sub-contractor on the job. If the sub-contractor

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Central Hospital		Frank R. Walker Company							Sheet No. 69	
Building "XP-27"		LABOR DISTRIBUTION							Job No. 165	
Class		Week Ending APR 6 - 1916								
OCCUPATION	F	S	S	M	T	W	T	HOURS	RATE	AMOUNT
1 Laborers	16	8		16	16	—	—	56	40	22.40
2 Teams	8	4		8	8	—	—	28	75	21.00
3										
4	<i>Removing rubbish from premises along by to H. Condra Plastering Contractors - Charged to their account J. Smith Sup.</i>									
5										
6										
7										
8										
Total										45.40
Quantity Work in Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day	Quantity Work in Place	Pay Roll Costs	Labor Average Unit Cost	Average Quantity Per 8 Hour Day			
Previous										
This Week	45.40									
Total	45.40									

Fig. 144. Distribution and Costs on Work Chargeable to Others.

fails to remove rubbish or other work from the building after receiving notice from the contractor, the foreman, superintendent or time-keeper on the job makes out an "ORDER FOR CHANGE" slip, giving a description of the work to be done and the concern to whom it is to be charged and sends this slip to the office for the book-keeper's record when billing this work.

CHAPTER XXIV

ORDER FOR CHANGE

The "ORDER FOR CHANGE" sheet is the same size as the other forms which go into the book, viz., $4\frac{1}{8}$ inches by $6\frac{3}{4}$ inches. These sheets are furnished in three colors and are to be made out in triplicate on the job. The original sheet, which is white, is sent to the home office; the duplicate sheet, which is yellow, is given to the architect, owner or other party who orders the work done; and the triplicate, or pink copy, is kept on the job for reference in making out the different charges.

These "Order for Change" slips may be made out in any one of three ways: The work may be done for actual cost of materials and labor, plus a profit of 10 per cent; or the work may be completed for a fixed sum of money or a schedule of certain fixed hourly rates for the various classes of workmen are agreed upon, which is supposed to include all profit and overhead expense.

Under figure 145 is given an illustration of an "ORDER FOR CHANGE" sheet properly

Order for Change	
No. <u>27</u>	Date <u>MAY 1 - 1916</u> 191 <u>6</u>
Job <u>Central Hospital</u>	
Frank R. Walker Company, Chicago.	
Please furnish all necessary Materials and Labor required to perform the following work, and charge to our account, as noted below	
<p><i>Furnish additional concrete foundations in boiler room as shown on revised detail sheet # 127. Work to be completed not later than May 30th, 1916</i></p>	
1.	The above work to be paid for at actual cost of Labor and Materials, plus 10%.
2.	All of the above work to be done for the sum of <u>Two hundred twenty (\$220.00)</u> Dollars.
3.	_____
Signed	<i>Smith & Jones</i> Architect, Owner.
By	<i>H. J. Harris</i>
Form 101	Copyright 1916 By Frank R. Walker

Fig. 145. Order for Change Sheet.

made out and signed. It is always advisable not to start any extra work until you have an order in writing, as it is almost impossible to collect on an order given verbally. By using an order of this kind where the superintendent or foreman has the slips with him on the job at all times, if he should meet the architect or owner on the tenth floor of the building and they say, "Mr. Superintendent, I wish you would have that door opening changed so it will be just about two feet from the outside wall," the superintendent is in a position to say, "All right, Mr. Harris, if you will kindly sign this order I will start the work immediately, but my orders from the office do not permit me to start any extra work until I have received a written order for same." This method will not only eliminate many arguments and disputes, but the contractor will receive pay for many "little" extras that are usually performed and no charge made for same.

CASH STATEMENT

The Cash Statement is kept on the job and is forwarded to the main office each week with the pay roll. This statement is a memorandum of all cash expenditures made by the job during

the week, such as telephone and telegraph expense, carfare, expressage, freight charges, ice, advances made on the pay roll for men laid off or discharged, and any other cash expense that has been paid for by the job.

On the front of the sheet, figure 146, is given a summary of the items and the column numbers to which they are chargeable; also any advances that might be made to sub-contractors on the job and the advance pay roll items on the current pay roll are shown. The front of the sheet also states the amounts of money received from the home office during the week. The total expenditures are totaled with the total receipts near the bottom of the page.

On the bottom of the page, under "Cash," are summarized the total amount of cash received, stating the amount of cash on hand at the beginning of the week, the cash received during the current week, and the total amount of cash on hand and received up to the present date. From this total the cash expenditures are deducted, and the balance shows exactly the amount of cash on hand on the job at the beginning of the new week.

On the back of this sheet, figure 147, are given the different items for which cash has been paid

CASH DISTRIBUTION			
DATE	REMARKS	COL. NO.	AMOUNT
3/27	Carfare	AM1	50
3/27	Phone calls	AM1	75
3/28	Shovels (Bill etc)	AM2	750
3/28	Express shovels	AM2	70
3/29	Drayage Cement bags	CM2	150
3/29	Reprints for mixer	AM2	235
3/30	Phone	AM1	25
3/30	Carfare	AM1	60
4/1	Express P.M.	DM1	240
4/1	Freight post lamps	HM1	70
4/2	Car fare	AM1	25
4/2	Phone	AM1	50
4/3	Chas. Ray	Sub-Cont	15000
Form 103	Signed <i>Harry Jones</i>	TOTAL	16800

Fig. 147. Back of Cash Statement.

and on all items for merchandise, such as expressage, freight, etc. The receipted expense bills are sent to the office with the cash statement. These items may be entered on the Cash Distribution sheet each day and the totals extended at the end of the pay roll week.

These sheets will be found very convenient, as they are carried in the pocket in the same book with the time sheets, labor distribution sheets, etc., and are the standard size—4 by 6¾ inches.

LABOR COST RECORD SHEETS

If the contractor desires to enter the labor sub-division costs into the cost book after they have been received from the job, the sheet which is shown in figure 148 will prove very convenient and useful. These sheets are ruled as illustrated and are made the same size, as the other forms used—4 by 6¾ inches or they may be used with stock sized binders which take sheets either 11x17 inches or 14x17 inches, and each full-size sheet contains 9 columns for the different sub-divisions of labor.

Each week as the pay rolls and distribution sheets come in from the job the book-keeper enters the amount of money from the labor

LABOR COST RECORD														
PAY ROLL	COL. NO. F.P.I. (a)		COL. NO. F.P.I. (d)		COL. NO. G.P.I. (a)		COL. NO. G.P.Z. (a)							
	QUAN. WORK IN PLACE	UNIT LABOR COST	TOTAL PAY ROLL	QUAN. WORK IN PLACE	UNIT LABOR COST	TOTAL PAY ROLL	QUAN. WORK IN PLACE	UNIT LABOR COST	TOTAL PAY ROLL					
1916	7	234 6.50	15200	7	5.10	7600	31.27	77	100	7700				
May	14	346 6.27	21700	8.25	6.00	13200	4060	0.35	14200					
"	21	20.1 6.75	13600	12.25	15.75	19300	4330	0.4	17300					
"	28	79 6.68	52700	14.1	15.40	21700		0.375						
TOTAL	157	1571 6.56	103200	39.6	15.60	61800	9020	0.38	34015	7700				
Feb	4								74.5	0.425	31500	150	1.17	6800
"	11	18.6 7.12	13215	5.5	14.10	7680					60	1.21	7200	
"	18	27.4 6.45	17640	10.8	14.70	5900								
"	25	34.4 6.60	22730	18.0	15.10	27300	3800	0.4	15200					
TOTAL	237	51 6.60	156785	73.9	15.25	126800	20235	0.4	80715	287	1.10	31700		
Mar	3	24.4 6.45	15700	5.9	14.90	8720	6050	0.45	27215	157	1.25	19600		
"	10	24.8 6.57	16300	9.4	15.15	14200	3700	0.425	13618	54	1.32	7150		
"	17	22.8 6.24	14200	6.1	15.60	9575	4200	0.35	14700					
"	24	49.5 6.40	31700	8.5	15.00	12710								
"	31	13. 6.70	8700	3.	14.10	4245	755	0.4	7020					

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Form 108

Fig. 148. Labor Cost Record Sheet.

distribution sheets showing the amount expended during the past week, into the cost book. The quantity of work in place is taken from the bottom of the card and the unit labor cost is taken from the same place. By using this system the books are always up to date, and give the total amount of money that has been expended on pay rolls for the entire job to date, and the various sub-divided costs. The headings are filled in according to the requirements of the job. It is advisable to keep all labor and material costs separately, as in this way the totals on the entire job are more easily arrived at.

CHAPTER XXV

KEEPING COSTS ON MATERIALS

To arrive at the material costs on the various branches of work, the same system of cost keeping must be applied to the materials received on the job as applied to the pay roll costs; therefore a schedule of material costs will be given which will work in harmony with the cost schedule as applied to labor costs.

On the labor schedule the letter "P" was used to denote pay roll, so that any charges coming up where the second letter of the symbol was a "P" was recognized at once as being a pay roll or labor charge.

On all the charges for materials used on the job, the second or middle letter will be an "M" which will distinguish it at once as being a material cost.

MATERIAL COST SCHEDULE

"AM-1" General Conditions.

- (a) This item will cover all items of general expense on the job, such as telephones, stationery, photographs, tele-

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grams, and other items of general expense coming up on the job.

“AM-2”

- (a) This account will include all moneys spent for temporary buildings, tool sheds, cement sheds, offices, temporary enclosures over concrete mixers, hoisting engines, etc.
- (b) Under this heading will come all items of plant, such as tools bought for the job, concrete or mortar mixers, hoisting engines, shovels, hoes, picks, hose, oil, lanterns, torches, and all other classes of equipment.

WRECKING, SHORING AND EXCAVATING

“BM-1”

- (a) This item will include any item bought especially for the wrecking of this job that can not be used on other work and is not chargeable against plant.

“BM-2”

- (a) Under this head come such items as dynamite, oil, and other materials

necessary to carry on the work and not directly chargeable to plant.

“BM-3”

- (a) Under this head will come such items as lagging and iron rings which are directly chargeable to excavating and lagging for caissons.

“BM-4”

- (a) Under this classification come such items as are chargeable to driving wood or concrete piles.

“BM-5”

- (a) This includes all money spent for wood or steel sheet piling.

**FOUNDATIONS OF CONCRETE, STONE,
RUBBLE OR BRICK**

“CM-1”

- (a) All lumber required building wood foundation forms.
- (b) All nails, tie wire, and miscellaneous materials used erecting wood forms.

“CM-2” All materials used in the concrete foundations.

- (a) Cement.
- (b) Gravel or crushed stone.

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(c) Sand.

“CM-3”

(a) Reinforcing steel and tie wire.

“CM-4” Materials required for rubble work.

(a) Rubble or other stone.

(b) Mortar materials.

WATER AND DAMP PROOFING

“DM-1”

(a) All materials used in connection with water or damp proofing.

CEMENT FLOORS AND PAVEMENTS

“EM-1” Materials required in cement floors.

(a) Cement.

(b) Crushed stone or gravel.

(c) Sand.

“EM-2” Concrete or Cinder Fill.

(a) Cement.

(b) Crushed stone, gravel, cinders, or slag.

(c) Sand.

“EM-3” Concrete Curb and Gutter.

(a) Material required for all kinds of forms.

(b) Cement.

(c) Gravel or crushed stone.

- (d) Sand.
- “EM-4” Concrete Pavements.
 - (a) Cement.
 - (b) Gravel or crushed stone.
 - (c) Sand.
 - (d) Brick, wood blocks, etc.
- “EM-5” Materials required for cement finish floors and base.
 - (a) Cement.
 - (b) Sand.

**BRICK, STONE, GRANITE, TERRA
COTTA, AND GENERAL MATERIALS**

- “FM-1”
 - (a) Common brick.
 - (b) Paving brick.
 - (c) Fire brick.
 - (d) Face brick.
 - (e) Special face brick.
 - (f) Enamel or glazed face brick.
 - (g) Sand used in mortar.
 - (h) Lime used in mortar.
 - (i) Cement used in mortar.
 - (j) Flue lining.
 - (k) Salt glazed tile coping.
- “FM-2”
 - (a) Cost of cut stone.

- (b) Cost of mortar.
- (c) Cost of waterproof paints or plaster.

‘FM-3’

- (a) Cost of granite.
- (b) Cost of mortar.

‘FM-4’

- (a) Cost of terra cotta.
- (b) Cost of mortar.

‘FM-5’

- (a) Cost of materials, acid, brushes, etc., used in cleaning and pointing all classes of masonry work.

REINFORCED CONCRETE MATERIALS

“GM-1” Forms.

- (a) All kinds of lumber required for concrete forms.
- (b) Cost of metal column moulds.
- (c) Cost of nails, wire, etc.

“GM-2” Concrete Materials.

- (a) Cement.
- (b) Gravel or crushed stone.
- (c) Sand.
- (d) Miscellaneous concrete materials.

“GM-3” Reinforcing Steel.

- (a) Cost of reinforcing steel.
- (b) Cost of tie wire, chairs, etc.

“GM-4” Tile.

- (a) Cost of clay tile, metal domes, metal lath, gypsum domes, etc.

“GM-5” Tile Floor Arches.

- (a) Cost of tile for arches.
- (b) Cost of lumber and hangers for arches.
- (c) Cost of mortar.

“GM-6” Partition Tile.

- (a) Cost of all kinds of partition or column tile.
- (b) Cost of mortar.

ROUGH CARPENTRY

“HM-1”

- (a) Cost of all kinds of rough or framing lumber.
- (b) Cost of nails, joist hangers, stirrups, etc.

“HM-4”

- (a) Cost of all classes of hardwood or finish flooring.
- (b) Nails and other miscellaneous expense.

“HM-5”

- (a) Cost of wood shingles.
- (b) Cost of nails, etc.

MILL WORK AND INTERIOR FINISH**“IM-1”**

- (a) Cost of mill work.
- (b) Cost of stairs.
- (c) Nails, glue and miscellaneous materials required.

“IM-2”

- (a) Cost of all classes of metal doors and trim.

**LATHING AND PLASTERING
MATERIALS****“JM-1”**

- (a) Cost of all kinds of wood lath and plaster board.
- (b) Cost of all kinds of metal lath, channels, etc.
- (c) Cost of all kinds of corner bead.

“JM-2”

- (a) Cost of all kinds of plastering materials for scratch and brown coats.
- (b) Cost of all kinds of plastering materials for finish coat.
- (c) Cost of all kinds of plastering material for exterior work.
- (d) Cost of supplies for ornamental work, casting plaster, glue, etc.

**SHEET METAL WORK, METAL DOORS,
WINDOWS, ETC**

“KM-1”

- (a) Cost of all kinds of general sheet metal work.
- (a) Cost on all classes of metal doors and windows.
- (c) Cost of all kinds of metal roofing.
- (d) Cost of all kinds of metal ceilings.

ROOFING MATERIALS

“LM-1”

- (a) Cost of felt, pitch, and gravel.
- (b) Cost of asphalt or asbestos shingles.
- (c) Cost of roofing slate.
- (d) Cost of roofing tile.

“LM-2”

- (a) Cost of deadening felts.

MARBLE AND SCAGLIOLA WORK

“MM-1”

- (a) Cost of all classes of marble work; either f. o. b. cars or f. o. b. job.
- (b) Cost of plaster of Paris, wire, and miscellaneous supplies.

“MM-2”

- (a) Cost of all classes of scagliola work.

“NM-1”

- (a) Cost of all classes of floor and wall tile.
- (b) Cost of sand and cement.

“NM-2”

- (a) Cost of all classes of composition floors and base.

“NM-4”

- (a) Cost of sand, cement, and chips required in terrazzo work.

GLASS

“OM-1”

- (a) Cost of all kinds of glass.

**PAINT, VARNISH AND WALL
PAPER**

“PM-1”

- (a) Cost of all kinds of paint and varnish.
- (b) Cost of putty, sand paper, and miscellaneous items.
- (c) Cost of all kinds of wall paper.
- (d) Cost of paste, etc.

STRUCTURAL STEEL AND ORNAMENTAL AND MISCELLANEOUS IRON, STEEL AND BRASS

“QM-1”

- (a) Cost of structural steel and iron.
- (b) Cost of miscellaneous iron, such as, coal hole doors and covers, area gratings, coal chutes, bumpers, etc.
- (c) Cost of ornamental iron work.
- (d) Cost of brass and bronze work.

PLUMBING AND GAS FITTING

“RM-1”

- (a) Cost of pipe, fittings, tanks, etc.
- (b) Cost of all kinds of fixtures.
- (c) Cost of all kinds of pipe covering.
- (d) Cost of ranges, etc.

STEAM, HOT WATER, OR FURNACE HEATING

“SM-1”

- (a) Cost of all kinds of pipe and fittings.
- (b) Cost of boilers, tanks, furnaces, etc.
- (c) Cost of radiators.
- (d) Cost of pipe covering.

ELECTRIC WIRING

“TM-1”

- (a) Cost of all kinds of conduit.
- (b) Cost of all kinds of switches, receptacles, etc.
- (c) Cost of all kinds of wire.
- (d) Cost of telephones and other fixtures.
- (e) Cost of generators, dynamos, switchboards, etc.

EXTRA WORK

“XM-”

All materials used in connection with extra work should carry the same classification as the labor distribution, viz., “XM-21”, etc.

CHAPTER XXVI

MATERIAL COST RECORD SHEETS

The Material Cost Record Sheets are the same size as the Labor Cost Record Sheets, and are made to fit in the same book or card index taking cards 4 by $6\frac{3}{4}$ inches, or they may be used with a standard loose leaf binder, which takes sheets either 11x17 inches or 14x17 inches. This is the standard size binder and may be obtained at any book or stationery store.

These sheets are ruled as illustrated in figure 149, each sheet containing 9 columns for the quantities of material and the cost of same. The bills are all numbered as they are received, and the numbers only are entered in the cost book. As the materials are received on the job and the bills for same checked, these items are entered in the cost book at once regardless as to whether or not the bills have been paid. In this way it is possible to know just what the materials under each branch of the work have cost; and the book is up to date at all times. By this method any discrepancies or errors are

MATERIAL COST RECORD

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MATERIAL COST RECORD											
DATE OF INVOICE	INVOICE NUMBER	COL. NO. <i>F.M. 1 (a)</i>		COL. NO. <i>F.M. 1 (d)</i>		COL. NO. <i>F.M. 1 (g)</i>		COL. NO. <i>F.M. 1 (h)</i>		COL. NO. <i>F.M. 1 (a)</i>	
		QUAN.	AMOUNT	QUAN.	AMOUNT	QUAN.	AMOUNT	QUAN.	AMOUNT	QUAN.	AMOUNT
1916											
Mar 1	137	10#	6000								
" 1	138	11#	6600			50 YDS					
" 2	139					10	1250				
" 2	140							30	1800		
" 4	141									2#	4500
" 5	142	10#	6000								
" 9	143			11#	16500						
" 12	144					5	625				
" 13	144							30	1800		
" 15	145										
" 18	146										
" 18	147			10#	15000						
" 21	148					10	1250				
" 23	149									3#	7600
" 24	150	12#	7200								
		43#	25800	21#	3500	25	3125	60	3600	15#	33600

Form 109

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Fig. 149. Material Cost Record Sheet.

discovered before it is too late to remedy same.

At the end of each month the sheets are ruled up, and the totals of both the quantities of materials and cost of same are carried forward into the sheets for the next month.

This system has been used on many jobs, on some of them the materials were received in very large quantities, and the results were most satisfactory in every respect, as it was always possible to tell just what quantities of every class of materials had been received and what the cost of same was to date.

DAILY CONSTRUCTION REPORT

Nearly all of the larger building contractors or contractors doing work away from the home office require a daily construction report from the job. This report is 8½x11 inches and usually gives the name of the building, the location, weather conditions, and temperature; so that in case of delays, unsatisfactory progress, etc., the daily reports or diary, will give the reasons for same, and will show unusual conditions on the job, and other remarks that might prove of value to the home office. In penalty contracts especially it is advisable to use daily reports, making notations of all classes of men

at work on the job, and noting all delays and the reasons for same; as these items will prove very valuable in case of law suits.

The form as illustrated in figure 150, will prove a simple and very efficient daily report, as the number of men engaged on all classes of the work are given daily together with all necessary remarks regarding the progress of the work and the condition of the job. These sheets are made 8½ inches wide and 11 inches long and can be filed on the regular post file made for such sheets.

Where it is desirable to keep a copy of the reports on the job, a carbon copy can be made by using a hard indelible pencil with which to write the original; or, the better method is to have the blanks printed in purple copying ink and the reports written with either copying ink or indelible pencil and a letter press copy made with the tissue sheets dampened in the usual way. This system is by far the best, as the original copy is always on file on the job, and the cost of the stationery and printing are reduced by one-half.

DAILY MATERIAL REPORT

The Daily Material Report may be used in conjunction with the Daily Construction Report or as a separate report if desired. This report is intended to be a summary of all the materials received on the job during the day, what they are to be used for, the column number or charge for same, and from whom they were received. From these reports the bookkeeper in the office is able to check the bills as they come in from the various material supply companies, and it dispenses with the necessity of sending all the delivery tickets to the office, except in cases of discrepancies, or where the bills and the reports do not check. These reports may be printed on the back of the Daily Construction Report or on a separate sheet as may be desired, and they should be the same size as the other reports, viz., either 4 by 6 $\frac{3}{4}$ inches or 8 $\frac{1}{2}$ by 11 inches. They should either be made in duplicate and the carbon copy kept on the job, or the originals should be printed in copying ink and written with copying ink or indelible pencil, and a letter press copy kept as described under Daily Construction Reports. See figure 151.

Form 111

DAILY MATERIAL REPORT

Weather *Clear* Temp. *72°* Job *Central Hospital* Date *May 15, 1916.*

Railroad	Car No.	Col. No.	Materials Received and from Whom	Quantity
<i>S. C.</i>	<i>57276</i>	<i>GM60</i>	<i>Flowing Kelly Tule</i>	<i>1500^g 4"</i>
<i>Mr P</i>	<i>37156</i>	<i>GM20</i>	<i>Iron Nail Supply Co.</i>	<i>2000^g 6"</i>
			<i>Chilmark Cement Co.</i>	<i>200 Bbls.</i>
			<i>Marguette Cement Co.</i>	<i>30 Bbls</i>
			<i>Major Road No. 2 June</i>	
			<i>Stony Moulding Co.</i>	
<i>S. C.</i>	<i>121762</i>	<i>GM20</i>	<i>Shovel</i>	<i>78000 #</i>
<i>S. C.</i>	<i>97672</i>	"	<i>(C) Spruce Sand, Sand Co.</i>	<i>82000 #</i>
		<i>FM19</i>	<i>Bank Sand, from Crescent Quarry</i>	<i>10 Yds.</i>
		<i>AM20</i>	<i>100' 3" Ash</i>	<i>100'</i>
		<i>GM10</i>	<i>2 Argo 6" Cow Tails, A. Hammon</i>	<i>200 #</i>
		"	<i>5 " 10' A.H. Tails</i>	<i>500 #</i>
		<i>GM20</i>	<i>Gal. Anasels</i>	<i>10 Gal</i>
		<i>AM20</i>	<i>5 Gal. Galvanic Oil</i>	<i>5 "</i>
		"	<i>(b) 2 Gal. Gas Engine Oil</i>	<i>2 "</i>

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Fig. 151. Daily Material Report.

A great many contractors require their time-keepers or foremen to report the quantities of the different materials used on the job every day. This has its advantages and disadvantages for the reason that reports as made out every day will give the approximate quantities of sand, gravel, brick, cement, lumber, etc., used that day, which will prove successful until near the end of the job, or the bottom of the pile, when they find that there is either too little or too much material on hand to check with the bills of material actually received. The most satisfactory way is to charge the material as it is received on the job, and not make the daily reports of material used. If, however, the contractor desires the materials as used daily, reported to the office, the form as given under figure 152, will prove very efficient and simple to report. The headings are filled in on the job to conform with the work being performed on which the various classes of materials are being used.

WEEKLY PROGRESS REPORTS

Progress reports are used by a great many contractors and the forms are filled in and sent

MATERIALS RECEIVED AND USED									
	COMMON BRICK	FACE BRICK	LIME	MORTAR SAND	CEMENT MORTAR	4 INCH TILE	6 INCH TILE	8 INCH TILE	
Previous	125 M	40 M	175 Bbl	80 Yds	10 Bbl	1,500'	500'	—	—
To-Day	12 M	4 M	18 Bbl	8 Yds	2 Bbl	200'	—	350'	—
Total	137 M	44 M	193 Bbl	88 Yds	12 Bbl	1,700'	500'	350'	—
FOUNDATIONS									
	GRAVEL	SAND	CEMENT	FORM LUMBER	GRAVEL	SAND	CEMENT	FORM LUMBER	
Previous	600 Yds	290 Yds	650 Bbl	20 M	90 Yds	45 Yds	125 Bbl	10 M	—
To-Day	90 Yds	40 Yds	120 Bbl	4 M	25 Yds	13 Yds	35 Bbl	2 M	—
Total	690 Yds	330 Yds	770 Bbl	24 M	115 Yds	58 Yds	160 Bbl	12 M	—
REINF. CONCRETE									
	FRAMING LUMBER	GROUNDS	FURRING	ROUGH FLOORING	FINISH FLOORING	CUT STONE	LAFARGE CEMENT	R. I. M. PAINT	
Previous	8 M	1500' Lin	7000' Lin	15 M	18 M	700 Cu. Ft	25 Bbl	50 Gal	—
To-Day	2 M	—	250' Lin	5 M	3 M	—	—	—	—
Total	10 M	1500' Lin	7250' Lin	20 M	21 M	700 Cu. Ft	25 Bbl	50 Gal	—

Form 112

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Fig. 152. Record of Materials Received and Used.

to the home office each week. These reports are usually a drawing of the four elevations of the building and a typical floor plan. By the use of different colored crayons the various classes of work are distinguished, so that by a careful study of the chart it is possible to tell just how far up the brick, stone, or terra cotta walls are constructed on each elevation. The floor on which concrete has been poured, the number of square feet of forms erected, and the quantity of reinforcing steel in place, is also shown. The finish floors, partitions and plastering can also be given, so that the charts as turned in from the job each week, show the progress of the job from foundations to finish.

Figure 153, is an illustration of the progress chart as used by some of the larger building contractors.

ORDER BLANKS

An order should state in as few words as possible what materials are required, when, where, and the price of same.

The Form for Order as illustrated under figure 154, will give a very good idea of what these requirements should consist of and how they

FORM FOR ORDER

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FORM 113

FRANK R. WALKER COMPANY

30 NORTH MICHIGAN AVENUE
BUILDING CONTRACTORS
CHICAGO

ORDER NO. 176

DATE May 15, 1916.

BUILDING FIRST NAT'L.
BANK 232
JOB NO.

National Hardware Co.,
127 So. Franklin St.
Chicago.

PLEASE DELIVER TO US AT: New First National Bank Bldg.,

232 5th Ave, Decatur, Ill.

IT IS AGREED THAT DELIVERY WILL BE MADE ON OR BEFORE May 20th, 1916

OR RIGHT IS RESERVED TO CANCEL ORDER

IN ACCEPTING VERBAL ORDERS, PURCHASE ORDER NUMBER MUST BE OBTAINED BEFORE MAKING DELIVERY

- 5 kegs 20d common nails @ \$2.50 Base
- 2 kegs 16d common nails @ \$2.50 Base
- 4 kegs 10d common nails @ \$2.50 Base
- 10 kegs 6d common nails @ \$2.50 Base

200 lineal feet rubber hose $\frac{3}{4}$ " @ \$.10 per foot

- 6 mortar barrows, #241, 3 cubic feet cap. @ \$4.00
- 2 stone barrows, #273, @ \$3.50

Ship to us at Decatur, Ills, via, I.C.R.R.
c/o New First National Bank Bldg.,
232 Fifth Avenue.

RECEIPTS FOR ALL DELIVERIES MUST BE OBTAINED AND MAILED WITH INVOICE IN DUPLICATE TO MAIN OFFICE
INVOICE TO BE PREPARED THE 20TH OF THE MONTH FOLLOWING SATISFACTORY DELIVERY, UNLESS OTHERWISE NOTED
STATE ORDER NUMBER AND POINT OF DELIVERY
PRICES ON THIS ORDER NOT SUBJECT TO CHANGE

FRANK R. WALKER COMPANY

W. R. Walker
PRESIDENT

FIG. 154. Form for Order.

should be arranged to prove satisfactory for general use.

All orders should be made in triplicate. The original should go to the party from whom the material is purchased, the second or duplicate copy should go to the home office, and the third or triplicate copy should be retained on the job for reference. The orders should be printed on sheets $8\frac{1}{2}$ inches wide by $6\frac{1}{2}$ inches long, for use without folding, in the ordinary sized envelope $3\frac{3}{4}$ by $6\frac{3}{4}$ inches. Where a large order blank is required use sheets $8\frac{1}{2}$ by 11 inches. The original sheets should be printed on either white or yellow paper, the duplicate sheet on a buff paper, and the triplicate copy on a pale blue paper. By using sheets of different colors it is always possible to distinguish the original, office, and job copies at a glance.

ESTIMATE SHEETS

In order to prepare an intelligent estimate it is necessary that the cost of all materials and labor be estimated separately, as it is only by estimating work on this basis that it is possible to determine whether the job is gaining or losing on the estimate, and it is the only way by which an accurate check may be obtained between the

FORM OF ESTIMATE SHEET 267

GENERAL ESTIMATE									
BUILDING <u>First Nat. Bank</u>									
LOCATION <u>Dallas</u>									
ARCHITECTS <u>Conley & Smith</u>									
SUBJECT <u>Masonry</u>									
ESTIMATE NO. <u>1275</u>									
SHEET NO. <u>15</u>									
ESTIMATOR <u>Harris</u>									
CHECKER <u>Davis</u>									
DATE <u>May 12 1916.</u>									
DESCRIPTION	No. Pieces	DIMENSIONS	GROSS CONTENTS	NET CONTENTS	QUANTITY	UNIT PRICE	TOTAL MATERIAL	UNIT PRICE LABOR	TOTAL LABOR
<u>CONC. FINISHES</u>	<u>2 1/2</u>	<u>150'0" 10'0" 1'-6"</u>	<u>4500</u>	<u>4500</u>	<u>7000' 0.3</u>	<u>15</u>	<u>21000 0.5</u>	<u>15</u>	<u>35000</u>
	<u>725</u>	<u>100'0" 5'0" 2'-0"</u>	<u>1000</u>	<u>1000</u>	<u>700' 0.3</u>	<u>15</u>	<u>81600 1.5</u>	<u>15</u>	<u>30600</u>
<u>Common Brick</u>		<u>150'0" 20'0" 1'-0"</u>	<u>3000</u>	<u>6334</u>	<u>1144 1/2</u>	<u>7.00</u>	<u>102600 7.00</u>	<u>15</u>	<u>79800</u>
		<u>100'0" 20'0" 1'-8"</u>	<u>3334</u>	<u>6334</u>	<u>1144 1/2</u>	<u>7.00</u>	<u>102600 7.00</u>	<u>15</u>	<u>79800</u>
<u>FACE BRICK</u>		<u>250'0" 20'0" 0'-4"</u>	<u>5000</u>	<u>5000</u>	<u>354 1/2</u>	<u>18.5</u>	<u>63000 18.5</u>	<u>15</u>	<u>57500</u>
<u>ROOF DOISTS</u>	<u>57</u>	<u>2'2" X 12"</u>	<u>2280</u>	<u>3560</u>	<u>356 0.25</u>	<u>10.5</u>	<u>8900 10.5</u>	<u>10.5</u>	<u>3560</u>
<u>Callings</u>	<u>60</u>	<u>2'2" X 8"</u>	<u>1280</u>	<u>480</u>	<u>48 0.3</u>	<u>14.0</u>	<u>1440 0.8</u>	<u>10.5</u>	<u>3840</u>
<u>Reinconc. Coils</u>	<u>12 RAS</u>	<u>1'0" 10'0"</u>	<u>120</u>	<u>480</u>	<u>48 0.3</u>	<u>14.0</u>	<u>1440 0.8</u>	<u>10.5</u>	<u>3840</u>
" "	<u>Beams 8</u>	<u>1'0" 2'-0" 20'0"</u>	<u>320</u>	<u>800</u>	<u>800 0.3</u>	<u>10.5</u>	<u>2400 10</u>	<u>10.5</u>	<u>8000</u>
" "	<u>Slabs</u>	<u>7 50'0" 100'0" 0'-6"</u>	<u>2500</u>	<u>5000</u>	<u>500 0.5</u>	<u>10.5</u>	<u>15000 0.5</u>	<u>10.5</u>	<u>25000</u>
			<u>2940</u>	<u>5000</u>	<u>500 0.5</u>	<u>10.5</u>	<u>93600 1.50</u>	<u>150</u>	<u>16350</u>
<u>PLASTER.</u>		<u>250'0" 20'0"</u>	<u>5000</u>		<u>50.00</u>				
		<u>50'0" 100'0"</u>	<u>5000</u>	<u>10000</u>	<u>1111 1.3</u>		<u>14443 20</u>	<u>20</u>	<u>22220</u>

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Fig. 165. Form of Estimate Sheet.

Form 114

costs coming in from the job and the original estimate.

By keeping the material and labor costs separately on the estimate, it is also possible to go through the estimate and obtain the amount of estimated pay roll on the job for the liability insurance.

These forms will be found especially interesting to the contractor who is particular and demands estimates that can be checked and rechecked.

Under figure 155, is illustrated the estimate form with practical examples as used in estimating various branches of work. The most convenient size for the estimate sheet is either $8\frac{1}{2}$ by 11 or $9\frac{1}{4}$ by 12 inches.

SUMMARY OF ESTIMATE

After the detailed estimate has been prepared it is necessary to tabulate the total costs of the different branches of work on one sheet, so that the costs may be properly arranged to see that no branch of work has been omitted.

Under figure 156, is given an illustration of a Summary of Estimate Sheet together with the various headings used in connection with same.

SUMMARY OF ESTIMATE SHEET 269

SUMMARY OF ESTIMATE		
BUILDING <u>BERRY BARBOUR DORM</u> LOCATION <u>HUNY HARBOR MILN.</u> ESTIMATE NO. <u>1278</u> ARCHITECT <u>HILBERT KAHN</u> OWNER <u>UNIV. OF MICHIGAN</u> DATE <u>DEC. 31st 1917</u> CUBICAL CONTENTS <u>140,000 CU. FT.</u> COST, CUBIC FOOT <u>40</u> ESTIMATOR <u>WILSON</u> FLOOR AREA, SQUARE FEET <u>35,000</u> COST, PER SQUARE FOOT <u>400</u> CHECKER <u>LICKES</u>		
	ESTIMATE NO. 1278 UNIVERSITY OF MICHIGAN, ANN ARBOR, MICH.	
1. GENERAL CONDITIONS	Overhead Expense, Insurance, Plant and Equipment	7,000.00
2. WRECKING AND EXCAVATING	Excavating, Back-filling, Wrecking, Shoring and Underpinning	12,500.00
3. PILING OR CAISSONS	Wood or Concrete Piles, Caissons, Wood or Steel Sheet Piling	---
4. FOUNDATIONS	Concrete, Stone, Brick or Rubble	2,500.00
5. WATER AND DAMP-PROOFING	Water-proof Plasters and Plasters, Membraneous Water-proofing	14,500.00
6. CEMENT FLOORS AND WALKS	Finish Floors, Sidewalks, Floor Fill, Roof Saddles, Pavements	41,000.00
7. BRICK MASONRY	Brick, Glazed, Common or Fire Brick, Flue Lining, Coping	15,000.00
8. CUT STONE AND GRANITE	Cuttings, Cutting, Carving, Levelling, Setting, Clean and Point	12,500.00
9. ARCHITECTURAL TERRA COTTA	Cuttings, Anchors, Mortar, Setting, Clean and Point	---
10. REINFORCED CONCRETE	Floors, Beams, Columns, Stairs, Walls, Floor Tiles, Steel	20,500.00
11. TILE FIRE-PROOFING	Floor Arches, Columns and Beam Covering, Partitions, Furring	2,500.00
12. ROUGH CARPENTRY	Framing, Rough and Finish Floors, Grounds, Furring, etc.	3,000.00
13. FINISH CARPENTRY	Frames, Sash, Interior Finish, Cases, Cabinets, Stairs	16,750.00
14. LATHING AND PLASTERING	Wood and Metal Lathing and Furring, Plaster and Ornamental Plastering	17,750.00
15. FIRE-PROOF DOORS—WINDOWS	Hollow Metal Doors and Windows, Kaleidos, Art Metal Doors and Trim	10,000.00
16. STEEL SASH AND PARTITIONS	Solid Steel Frames and Sash, Steel Partitions	---
17. SHEET METAL WORK	Skylights, Coracles, Flashing, Gutters, Downspouts, Roofing	27,000.00
18. ROOFING	Prepared, Composition, Asphalt, Tile, Slate, Asbestos	---
19. TILE AND MOSAIC	Floors, Bases, Wainscoting, Terrazzo	37,500.00
20. ART MARBLE AND SCAGLIOLA	Floors, Treads, Risers, Columns, Bases, Ornamental Work	---
21. INTERIOR MARBLE AND SLATE	Bases, Floors, Wainscoting, Treads, Risers, Toilets, Blackboards	110,000.00
22. GLASS AND GLAZING	Window, Plate, Ribbed, Fancy, Art, Prisms, etc.	23,000.00
23. PAINTING AND DECORATING	Exterior and Interior, Floors, Paper Hanging, Calcimining	24,500.00
24. IRON AND STEEL WORK	Grillages, Structural Steel, Cast Iron, Steel, Miscellaneous	11,500.00
25. ORNAMENTAL IRON—BRONZE	Railings, Elevator Enclosures, Stairs, Tablets, Standards, etc.	24,000.00
26. HARDWARE	Rough Hardware, Finish Hardware	---
27. PLUMBING AND GAS FITTING	Plumbing, Sewerage, Gas Fitting	9,000.00
28. HEATING AND VENTILATING	Boilers, Pipe, Radiation, Ventilating Equipment Installed	100,000.00
29. POWER PLANT EQUIPMENT	Boilers, Engines, Dynamos, Generators, Switchboards, etc.	---
30. ELECTRIC WIRING	Coodulia, Outlet Boxes, Switches, Wiring, Bells, Telephones	4,000.00
31. LIGHT FIXTURES	Gas and Electric Lighting Fixtures, Lamps, etc.	20,000.00
32. ELEVATORS—DUMB WAITERS	Sidewalk Lifts, Dumb Waiters, Freight and Passenger Elevators	7,500.00
33. VACUUM CLEANING SYSTEM	Piping, Motors, Vacuum Cleaning System Installed	1,500.00
34. AUTOMATIC SPRINKLER SYSTEM	Piping, Tanks, Pumps, Sprinkler Heads, Installation	---
35. MAIL CHUTE	Mail Chute Installed in Place	---
36. MISCELLANEOUS ITEMS	Refrigerators, Dryers, Shades, Ranges, Wall Safes, Carpets	350.00
TOTAL COST		1,303,500.00
PROFIT		74,000.00
SURETY BOND 1 1/2%		21,000.00
AMOUNT OF BID		1,398,500.00

Fig. 156. Summary of Estimate Sheet.

Frank R. Walker Company
BUILDING CONSTRUCTION
30 NORTH MICHIGAN AVE.
CHICAGO

_____ 191_____

Please send us your bid for all work in your line on the

_____ Bldg.

at _____

_____ Architects

Bids to be in our office not later than _____

SEND YOUR BID PROMPTLY TO INSURE CONSIDERATION; IF NOT FIGURING, PLEASE SO ADVISE

Frank R. Walker Company

Fig. 157. Request for Bid Card.

REQUEST FOR BID CARDS

When the contractor is figuring on new work it is customary to receive bids from the various sub-contractors, such as Cut Stone, Terra Cotta, Plastering, Structural Steel, Ornamental Iron, and in fact, on every branch of work not performed by the general contractor. The Post Card, as illustrated under figure 157, will prove very convenient for this purpose, as it is a great time saver, being very much faster than using the telephone or any other method, providing the blank spaces are filled in with a "set up" rubber stamp made for the purpose.

COPY OF FREIGHT BILL

Where the contractor is performing out of town work and the different materials are shipped to the job, it will be necessary for the job office to handle such items as freight, etc. The main office usually requires all receipts for cash expended by the job to be turned in each week with the Cash Statement. The "Copy of Freight Bill," as illustrated under figure 158, will prove useful in instances where it is desirable to retain copies of all bills on the job, as

COPY OF FREIGHT BILL.

Consignor Ames Press & Engraving Co. Railway. Ames Press & Engraving Co. Consignee
C.R.D.P.

	DESCRIPTION OF ARTICLES	WEIGHT	RATE	AMOUNT
Car Number 12-1702	1 Car Box 12 #	65000	20	13000
Car Initials C.R.D.P.				
No. of W. B. 1172				
Date of W. B. 3/17/16				
Pro. No. 2437				
Shipped from Chicago				
Shipped to New Te				
Original of this Bill sent to <u>Chicago Office</u>		Total Freight		13000
Date that it was sent <u>Apr 1st. 1916</u>		Advance Charges		57.60
Journal Page <u>277</u>		Cartage		12.00
		Total Paid		142.00

Fig. 158. Copy of Freight Bill.

an exact copy of the original may be obtained by using this form.

FORM FOR COMBINATION CHECK AND VOUCHER

A convenient form for a combination check and voucher is illustrated under figure 159. This form has an advantage over many other check and voucher forms in use by contractors inasmuch as it is the exact size of a regular bank check; it is easily made out and gives the entire transaction on the face of it, so it is not necessary to turn the check and make notations on the back of it. In a great many other systems in use by contractors where the voucher form is used, it is necessary to make out the check in the regular way and in addition the regular voucher form must be made out, necessitating the writing of all names two or three times and doubling the work of the book-keeper in making out the checks. The form as illustrated will meet all the requirements of the average contractor, in addition to being very simple and easily kept.

Frank R. Walker Company

CHICAGO, _____ 191____ \$ _____ No. _____

PAY TO THE ORDER OF _____

DATE	DESCRIPTION	DOLLARS AMOUNT

TO THE
**CONTINENTAL AND COMMERCIAL
 TRUST AND SAVINGS BANK
 OF CHICAGO** 2-17

Frank R. Walker Company
 Pres.
 Secy.

Fig. 159.. Combination Check and Voucher.

IN CONCLUSION

While the average building contractor will not find use for all the forms as given in this book, the different blanks and forms are given so that he may choose those which best meet his individual requirements.

It is, of course, quite evident the larger contractors will find use for more of the forms than the smaller firms; but every contractor engaged in construction work should keep costs on his work; as it is only in this way and, by studying conditions, that the contracting business will be put on as conservative a basis as the other great industries and allow the contractor the fair margin of profit to which he is entitled but very seldom obtains.

Read These Comments on

“Practical Cost Keeping for Contractors”

THE ENGINEERING RECORD SAID:

The make-up of the forms for this system strikingly shows that cumbersome sheets of desk-top size are not needed even for keeping costs on the largest work. It also shows that the practice of entering time over and over in a multiplicity of check books, time books, report books, distribution books and finally on the payroll is useless.

One distribution sheet of the same small size as the payroll sheets is made up each week for each heading under which labor is distributed. . . . The card made out each week shows not only the total and unit cost for that class of work for the week but the total and unit cost of that class of work to date. It also shows, in addition to the unit costs in money, the unit cost in hours of each class of labor engaged in that operation for the week and to date. All this information can be set down in logical sequence with little necessity for computation. In fact, the entire system involves far less labor than is usually expended on other systems which give nothing but unit costs in money. . . . The method outlined for performing the actual work of keeping the time is exceedingly simple and effective. . . . Other features of job office accounting are treated in the book fully as well as the subject of keeping labor costs.

The opinion is ventured that there are few firms outside of the building field who could not derive a great deal of cash profit from a study of this book.

THE ENGINEERING NEWS SAID:

It is not a simple task to prepare a useful book on this subject, because the various kinds of contractors' organizations make any one system inapplicable to more than a limited number of firms. The prime requisite in systems designed for contractors is simplicity. If the system is not simple it is not workable. Mr. Walker in his book recognizes this principle. . . . This in itself suggests that the book is worth reading by anyone seeking to inform himself on the subject.

FRANK R. WALKER, Publisher

168 North Michigan Avenue

CHICAGO

"PRACTICAL" TIME AND COST KEEPING FORMS *for* CONTRACTORS

We furnish all kinds of forms required by progressive contractors for the successful conduct of their business; forms that are all standardized to fit into one compact little loose-leaf binder. By using these forms you not only reduce your stationery bills one-half, but you are adopting a system that gives you information of great value regarding your business.

These forms are the result of a practical time and cost keeping system developed and perfected "right on the job" where the pressure of work was so great that it permitted of no "red tape." Here is a time and cost keeping system that is 100 per cent efficient and can be used with satisfaction by both large and small contractors.

Send 25 cents in stamps for full set of sample forms.

PRICES OF PRACTICAL COST KEEPING FORMS

QUANTITY—Sheets	100	500	1000
Pay Roll Sheets.....	\$0.75	\$2.50	\$4.50
Labor Distribution Cards.....	.75	3.00	5.50
Foreman's Report Sheets.....	.75	1.75	2.75
Cash Expense Sheets.....	.75	2.75	4.75
Labor Cost Record Cards.....	.75	3.00	5.50
Material Cost Record Cards.....	.75	3.00	5.50
Daily Material Reports.....	.75	3.00	5.50
Order for Change Sheets (3 to a set)....	1.00	3.00	5.00
Pocket Estimate Sheets (4¼x6¾ in.)....	.75	3.00	5.00
Purchase Order Forms (3 to a set).....	1.25	3.50	5.50

The above prices are f. o. b. Chicago.

On orders for a total of 5000 time and cost keeping forms with not less than 1000 of each form ordered, we will print your firm name on same, if desired, at a cost of \$1 per 1000 extra.

FRANK R. WALKER, *Publisher*
168 North Michigan Avenue **CHICAGO**

**TRY OUR
SPECIAL INTRODUCTORY OFFER
of "PRACTICAL"
TIME AND COST KEEPING FORMS**

In order that all contractors may give this system of time and cost keeping a trial—convince themselves that it is more efficient and has more advantages than any other system now in use by contractors—we are making a special introductory price on the pocket size forms which we furnish.

**\$7.50 WORTH OF FORMS \$5
FOR ONLY**

100 Pay Roll Sheets.....	\$0.75
100 Labor Distribution Cards.....	.75
100 Foreman's Report Sheets.....	.75
100 Cash Expense Sheets.....	.75
100 Labor Cost Record Cards.....	.75
100 Material Cost Record Cards.....	.75
100 Daily Material Report Cards.....	.75
100 Pocket Estimating Sheets.....	.75
50 Sets Order for Change.....	.75
50 Sets Purchase Order Blanks.....	.75

\$7.50

Our Special Introductory Price \$5

The above price is f. o. b. Chicago.

FRANK R. WALKER, *Publisher*
168 North Michigan Avenue **CHICAGO**

**“PRACTICAL”
ESTIMATING SHEETS
for
CONTRACTORS**

Are the most satisfactory estimate sheets ever prepared for use by contractors as they contain all the essentials for the preparation of correct estimates.

1. Sufficient space is allowed to describe in detail all classes of work to be performed.
2. The ruling is correct, permitting the listing and tabulating of all quantities in the most practical manner.
3. Separate columns are given for the pricing of materials and labor, which enables the contractor to tell at a glance just what amount has been estimated for materials, and also the estimated pay-roll for any branch of work or the entire job.
4. The completed estimate is the most satisfactory estimate possible, as all quantities are listed in detail, all “guess-work” eliminated and the chance of loss reduced to a minimum.

Refer to illustration on page 267 for specimen estimate.

**FURNISHED IN TWO CONVENIENT SIZES IN PADS
OF 100 SHEETS EACH**

Quantity	100	500	1000	2000
Pocket Estimate Sheets (4¼x6¾ in.) ..	\$0.75	\$3.00	\$5.00	\$ 9.00
Large Estimate Sheets (9¼x12 in.) ..	1.00	4.50	8.50	15.00

The above prices are f. o. b. Chicago. Purchaser to pay express or parcel post charges.

FRANK R. WALKER, *Publisher*
168 North Michigan Avenue **CHICAGO**

Summary of Estimate Sheets

On page 269 of this book is illustrated the most practical and efficient estimate recapitulation sheet ever devised for use by contractors.

After the detailed estimate of quantities has been prepared, then the recapitulation must be made up, stating the total estimated amounts covering the different branches of work to be completed.

SUMMARY OF ESTIMATE SHEETS PREVENT MISTAKES AND LOSSES by checking every estimate submitted, making it impossible to forget or omit any branch of work.

The front of this sheet contains a printed list of every class of work or trade involved in the construction of any building, while on the back of the sheet is printed a detailed list of every construction operation imaginable in the 46 different branches of work.

How often the "low" or "successful" bidder is awarded the contract because he has forgotten to include the plastering, cut stone, carpentry, or some other equally important item, is a fact well known to all contractors.

STOP FORGETTING

USE SUMMARY of ESTIMATE SHEETS

Put up in pads containing 100 sheets, 9¼x12 inches in size. Price

\$1.50

Add 16 cents to this price for postage or express charges.

FRANK R. WALKER, Publisher

168 North Michigan Avenue

CHICAGO

CONSTRUCTION REPORTS

The present day contractor must possess an intimate knowledge of every job under construction if his work is to be completed on time and with a minimum amount of trouble and annoyance.

DAILY CONSTRUCTION REPORTS are absolutely essential on work of any importance, as they form an authentic record of all events taking place on each job, noting weather conditions, temperature, number of workmen employed on each branch of work, reasons for delays, records of changes in construction, together with a general description of the work being performed.

DAILY CONSTRUCTION REPORTS ARE INDISPENSABLE on jobs where time is a factor, because in case of disputes or law suits for damages or delays, the daily reports form a diary of the entire operation from start to finish, furnishing weighty evidence beyond dispute.

DAILY CONSTRUCTION REPORTS are furnished 9¼ by 12 inches in size, printed on high grade bond paper, and are a very satisfactory form for contractors' use. See page 257 for specimen.

QUANTITY	100	500	1000	2000
Daily Construction Reports.....	\$1.00	\$4.50	\$7.50	\$12.50

Construction reports are furnished with your firm name printed on same at \$1 per 1000 additional.

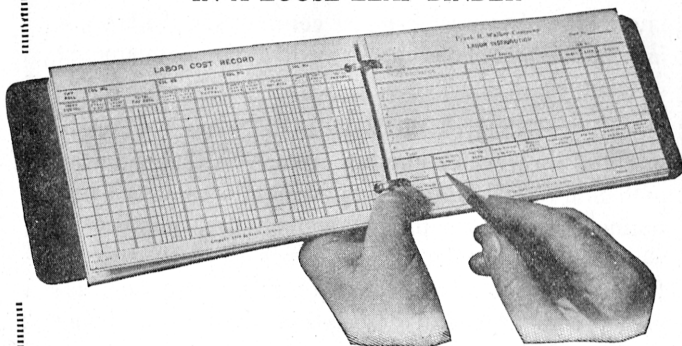
The above prices are f. o. b. Chicago.

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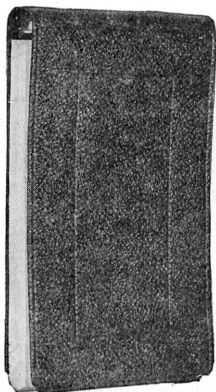
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CHICAGO

WHILE ON THE JOB
CARRY YOUR PAY ROLL AND COST RECORDS
IN A LOOSE LEAF BINDER



HERE is a practical way of carrying your time and cost keeping records on the job. A compact little book that can be carried in the pocket contains every form required for keeping time and costs on any job.



BY HAVING the foreman or timekeeper carry this book in his pocket, it is not necessary for him to leave the job for an instant, as all the information required is contained in this compact little book—and in his pocket when he wants it.

This binder holds all the sheets required on any job, as they can be changed as often as desired.

Furnished in the proper size to accommodate all of the different time and cost keeping forms, and in Black Levant Grain Ironcloth, each \$1.25.

Add 10 cents to the above price for postage.

**FURNISH EVERY JOB WITH ONE OR
 MORE OF THESE HANDY LITTLE
 BINDERS AND SAVE YOUR
 FOREMAN'S TIME—AND
 YOUR MONEY**

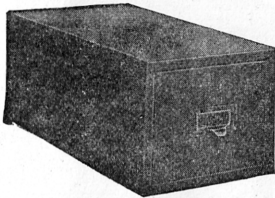
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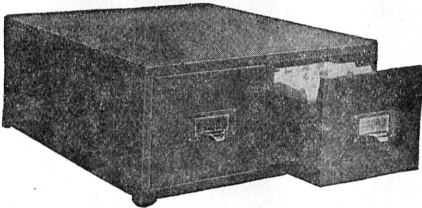
FILE YOUR COST RECORDS IN A METAL CARD INDEX CASE

Metal cases are the most convenient and practical form of filing all kinds of cost keeping records. Because they are compact, more fireproof, and at the same time keep your records in perfect condition.



Note the special metal corners on each case, which fit over the case underneath, permitting the stacking of cases to any desired height. Start your system with a two drawer case and keep adding as your records grow.

Each drawer will hold about 1500 cost keeping cards.

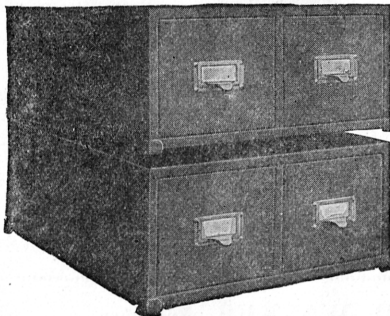


These cases are furnished with either one or two drawers as illustrated and are nicely finished in Olive Green baked enamel.

	Measurements Height	Depth	Filing Space	Shipping Weight	Price Each
Single Drawer Case	7¼ in.	17 in.	15½ in.	25 lbs.	\$5.00
Double Drawer Case	7¼ in.	17 in.	15½ in.	32 lbs.	7.00

If wanted with mahogany finish, add \$1.50 to price of either the one or two drawer case.

If wanted with rubber feet to prevent scratching desk, add 50 cents (per set of 4) to the price of the bottom case in the stack.



Flat key locks on each drawer, price \$1.75 each. Extra auto lock, locking two drawers at one time (on two drawer cabinets), price \$3.00 each.

All of the above prices are f. o. b. Chicago.

FRANK R. WALKER

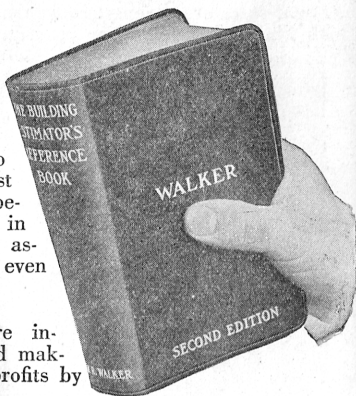
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CHICAGO

AN ESTIMATING BOOK THAT HAS NO EQUAL

The successful contractor must be efficient—and to be efficient he must be able to estimate correctly—he must know construction costs, because if mistakes are made in the estimates, losses are assumed before the job is even started.

Contractors everywhere are increasing their efficiency and making their jobs pay bigger profits by using



The Second Edition of The Building Estimator's Reference Book

1600 Pages, Size 4½x6½ inches, Flexible Binding, Illustrated.
Price \$5.00, postpaid.

This new book which has been entirely revised and rewritten contains 1600 pages of up-to-the-minute cost data applying to all classes of building construction, from the smallest cottage to the tallest skyscraper.

All of the data contained in this book is based on the best construction practice, with all data compiled so that it may be applied to any locality and under any conditions.

An invaluable reference for Contractors, Estimators, Architects, Engineers, Superintendents, Foremen and ambitious Time-keepers.

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