

CONSTRUCTION INDUSTRY

CHAPTER I.—INAUGURATION AND SCOPE

INTRODUCTION

For many years, statistics relating to agriculture and to the manufacturing industries of the United States have been collected and compiled by the Federal Bureau of the Census, but it was not until 1930 that an effective effort was made by the National Government to obtain basic statistics of one of our largest industries. In that year, the first census of the contracting group of the construction industry was inaugurated as part of the decennial census.

Almost coincident with the inauguration of the census, high authorities emphasized the importance of public works construction as the "balance wheel" of American industry for securing and maintaining general prosperity throughout the Nation. Quotations from publication No. 17 of the National Bureau of Economic Research entitled "Planning and Control of Public Works" (1930) clearly indicate the importance which was ascribed by national leaders to construction as one of the principal controlling factors in preserving economic stability: "In May, 1929, the committee on recent economic changes of the President's Conference on Unemployment published its report on postwar developments in American economic life, particularly those since the recovery from the depression of 1920-21. At the suggestion of President Hoover, and with the assistance of the National Bureau of Economic Research and the Department of Commerce, the committee undertook, in July, 1929, an examination of the planning and control of public works and their relation to employment."

The report of this committee states further: "Recent experiences have reinforced the committee's conviction of the necessity of studying more intensively the factors which make for the maintenance of economic balance.

"Now the most active and influential factors . . . should be segregated and subjected to analysis, with the hope of contributing to a practical, workable technique designed to promote a reasonable balance of economic forces. . . . Two inquiries . . . were taken in hand by the committee shortly after the conclusion of work upon its first report on recent economic changes in the United States. One of these was an exploration into the broad field of price relationships. The other was a preliminary examination of public construction as an element in any program of economic stability.

"But obviously, it is only one factor. The business community can not expect to operate without restraints of its own or to counterbalance careless excesses by undue reliance solely on public construction. In its proper place, however, as one among a number of steadying influences, and at its proper time, the acceleration of public construction may well become useful. This is the conclusion which emerges from consideration by the committee of the information put before it."

EXISTING STATISTICS

Statistics of construction had previously been gathered by various organizations to serve certain definite purposes, but it had never been feasible for such agencies to undertake a comprehensive census such as this. Statistics of building permits have been gathered for years for cities where such permits are required. Usually, however, no permits are required for public buildings for Federal, State, county, and municipal governments. Quasi-public or community buildings such as churches, colleges, institutions, etc., are also frequently exempt from this requirement. A great amount of building construction is also done outside the corporate limits of cities, in which case no permits are required. Engineering construction such as railroad work, sewers, waterworks, and the like, is not ordinarily covered by building permits, even though the approval of some engineering official may be required. Moreover, the fact that some construction work authorized by building permits is never carried out, and that there is usually a lag between the issuance of a permit and the actual time of starting operations, are factors which must always be taken into account in using permit figures. Thus, because of their many limitations, building permit figures have fallen short of giving an adequate measure of construction activity for the country as a whole.

For many years, other private agencies have been gathering statistics of the value of contracts awarded, but up to the present time these have never covered the entire United States, nor have they included much, if any, of the considerable volume of smaller construction work. Statistics of contracts awarded can be used in a general way as a gauge of the actual volume of construction work, or as a measure of proposed construction, or an index of construction trends. There

is usually a lag, however, between the time of letting the contract and that of actually starting the work. In the case of very large projects, on the other hand, the actual work may extend over a period of years, although the total value of the contract is listed with contract awards of the time when it was actually let. As a result, these ever variable factors must be taken into account in correlating contract award figures with other data to determine markets or prospective demand.

Numerous other studies relating to some specific problem or aspect of the construction industry have been made from time to time by individuals, trade publications, or governmental or private agencies. Each of these, however valuable for its intended purpose, must ever remain an isolated unit of information which can not readily be correlated with information on some other phase of activity from another source.

DEMAND FOR A CENSUS OF THE CONSTRUCTION INDUSTRY

Following the cessation of all except the most necessary building during the World War, a veritable orgy of construction set in about 1922 and the contractor began to sense his real importance in the scheme of things. As a result of the organization of new and revival of old national and local associations of contractors, more intensive study of the industry was soon under way and increasing stress was placed upon the fact that construction, in all its ramifications, constituted a far-reaching industry. Leaders in the industry became convinced of the necessity of obtaining more complete and accurate statistics of their business, in order to promote efficiency in handling it and, as already stated, it was at their urgent request that this census was undertaken.

A committee representing the national contractors' associations and various individuals informed on matters relating to construction assisted the Bureau of the Census in the preparation of a report blank and helped in other ways in launching the projected work. Account was taken of the fact that there had been a very rapid increase in construction activities up to and including 1925, and thereafter a much more modest increase year by year, up to the peak of activity in the United States in 1928, when an estimated annual volume of construction of all kinds, valued at \$7,000,000,000 or more was attained. There was a falling off of construction in 1929 so that its total value approximated that of 1925. The consensus of opinion was that the most accurate measure of construction would be found in statistics of actual construction work done during 1929. Upon this basis it seemed possible to obtain, upon a nation-wide scale, definite ratios of the many factors entering into the

construction business which were not available from any other source.

Supplementing the previous studies made by governmental and private statistical organizations and contractors', architects', and engineers' associations which have delved deeply into the facts underlying the construction industry, it was anticipated that the results of this census would give the contractor definite information, obtainable from no other source, regarding labor costs and employment, overhead costs, equipment and material costs, together with many other items of interest in connection with his business. It was also expected that the data would be of benefit to the industry as a whole by showing the importance of a closer cooperation between architect, engineer, manufacturer, distributor, contractor, and laborer, as well as of value to building material manufacturers and dealers in giving them accurate information regarding the demand for their products and the distribution of those products in various areas throughout the United States.

ORGANIZATION AND METHOD

As part of a new distribution division in the Bureau of the Census, under Director William M. Steuart, the construction section was organized to handle the work of the census of the construction industry. The problems involved in inaugurating this entirely new undertaking were many, but there are three principal steps involved in the taking of any census, namely, determining the information required and preparing suitable inquiries to obtain it; preparing for and making the necessary canvass of persons able to give the information; and compiling and publishing the results. The last of these is the most laborious.

The report blank.—Although a tentative list of questions, designed to obtain the information desired, was prepared when the movement started for the inclusion of a census of construction in the Fifteenth Decennial Census, many revisions were required before a wholly adequate list was completed and ready for use in February, 1930.

In general, the inquiries on the schedule were designed to obtain information regarding the organization of the establishment; the number of salaried employees and total salaries paid; the number of skilled and unskilled workmen employed on specified dates, or nearest normal working day, during each month of the year; total wages paid during the year; the length of working day and week; information on contractors' equipment and the various operating and overhead expenses of the contractor; the total value of the year's business by type of work handled under subcontract, by class of construction handled under general contract or directly for the owner, and by class of ownership; the value of construction business

in the home city, in the home State, and elsewhere; and, finally, the value of the various materials furnished and used, and building equipment installed by the reporting contractor on his various construction projects under way during 1929.

Provisions of the census act.—Replies were required with the assurance, as provided by the census act, that the Bureau of the Census would hold all such information in strict confidence, only employees of the Bureau of the Census, sworn to secrecy, being permitted to examine reports. The act also provided that these data should not be used as a basis for taxation of any kind; and that the information, when analyzed, tabulated, and made available, should not reveal individual operations.

Establishments required to report.—All persons and establishments engaged in construction business of any kind, provided their gross business for the year amounted to at least \$25,000, were required to furnish detailed reports. Such contractors included general contractors, whether working wholly as general contractors or partly as general and partly as subcontractors; subcontractors, or specialized contractors, whether working wholly as subcontractors or in part directly for the owner; and operative or speculative builders working for their own account or otherwise. Many real estate firms act in the latter capacity. Manufacturers or fabricators of construction materials which they also erect on construction jobs, as well as dealers and jobbers who operate a construction or installation department in connection with their sales business were also required to make reports. Furthermore, all kinds of construction work, including the erection of buildings and installation of equipment essential to their proper operation, as well as engineering construction, such as highways, streets, water-power developments, railroads and car lines, bridges and tunnels, docks and piers, sewage disposal and drainage, airports, and all kinds of public works and utilities construction except that done on "force account,"¹ were to be reported for this census. The construction business reported was also to include repairs and remodeling as well as new work.

Reports for the construction census were not required of industrial concerns, public utilities, municipalities, or common carriers which maintain construction departments for the repair and maintenance of their own property. In consequence, information regarding this class of work has not been included in this census, except such part of that work as was let to contracting establishments from which reports were required. Statistics of new construction and maintenance costs during 1929 are available from the Interstate Commerce Commission for certain of the com-

mon carriers, and public service corporations, such as steam and electric railways, steamship lines, express and pipe-line carriers, as well as for telephone, telegraph, and cable companies.

In short, therefore, any individual or establishment utilizing construction materials and labor in construction work for others, or for himself for speculative purposes, was to be included in the canvass, although in the strict sense of the term he might not be considered as a builder or a contractor. Thus, the term contractor has been used throughout this census to designate any person or establishment responsible for handling any kind of construction business for others, whether under contract or not. This breadth of definition has greatly complicated the work of the canvass, because it necessitated the locating of many who did not consider themselves contractors in the literal sense, but the construction industry, not the contractors' work alone, was to be measured.

The directory of contractors.—With the questions prepared in the form of a printed schedule or report blank, the real task of the construction section commenced. The contractors had to be located and canvassed. The names of approximately 20,000 contractors were obtained through the courtesy of a bureau affiliated with one of the large national associations of contractors. Later, a large private statistical agency furnished an additional list of some 6,000 names. The next efforts were directed to the national and local contractors' associations, builders' exchanges, and various trade associations. Letters were addressed to the secretaries of these organizations requesting a list of their membership, a list of other organizations in allied lines in their city, and a list of nonmember contractors in their respective fields. Between 600 and 700 such organizations were solicited and a second request was sent to associations which had not responded by a certain date.

Requests were also addressed to the secretaries of approximately 4,500 chambers of commerce or similar business organizations. To those who did not respond, a second request was sent. About 4,000 letters were also sent to mayors of cities from which a sufficient number of names had not been previously received, or which had not already been covered, requesting them to furnish lists of contractors in their localities. In some cases even postmasters were solicited for such lists. Subsequently, the list was further increased through the cooperation of a national manufacturers' association and through the checking of classified telephone directories of a great many cities and towns. The total number of names thus listed from all sources was approximately 225,000.

In the card index formed from these lists, however, there were many duplications, which were traceable to a variety of causes. Chief of these, perhaps, were the many sources from which the lists were obtained and

¹ The term "force account" is used to indicate work by "day labor" or, labor employed directly by individuals, corporations, and municipal, county, State, or Government authorities, and not done under contract.

the high business mortality among construction establishments during 1929. Others were the result of listing the same firm under various names, or in different places in case the firm had changed its place of business during the year. Some names were eliminated by the discovery that they were not those of actual contractors, even in the broad sense used in this census. A considerable number of inquiries were also returned unclaimed, because of the decease of individuals, removals, or incomplete addresses. Thus, the final number which reported themselves as actively engaged in construction work during 1929, was reduced to 144,396, for which statistics are presented in this report.

The canvass.—After the report blanks or schedules were completed and the card index made ready for use, the problem was to get the schedules filled out and returned by each contractor. Since the benefits of the census would ultimately accrue to the contractors themselves, it seemed reasonable to depend upon them to fill out their reports promptly and accurately. Accordingly, it was proposed to start the canvass by mail.

Beginning in March, 1930, report blanks accompanied by the letter of transmittal signed by the Director of the Census, and approved by the Secretary of Commerce, shown as Forms 25 and 33 in the appendix to this volume, were sent to all those listed in the card index with the request that their reports be returned within 15 days. Full instructions for filling out the report blanks were either printed on the back of the letter of transmittal or incorporated in the schedule itself. A second request was then sent to those who had not responded by a certain time, and still another to those who ignored both requests.

A considerable number of contractors returned the report blanks unfilled, with the statement that they had already furnished the information to a census enumerator. Inasmuch, however, as none of the enumerators had at that time been provided with Form 25, it was evident that reference to some other form was made. Such contractors were requested by letter to fill out the construction form because the information furnished on any other schedule was not satisfactory for our requirements.

For a considerable period, the returns were received in ever increasing numbers. The prompt cooperation of thousands of members of the construction industry throughout the country gave every promise of the successful accomplishment of the project. Since, however, the returns were almost completed for other branches of the decennial census, which had been gathered in person by enumerators, and the early closing of the local Census offices was expected, it was decided in cities having a population of 100,000 or over, to turn over to the field force for quick completion the names of those who had not submitted their

reports for the construction census. In all smaller places the mail canvass was still continued. Some confusion arose from this change of method in the midst of an already complicated program, but the difficulties were gradually adjusted at a minimum loss of time and effort, with the result that a total of 144,396 satisfactory reports were received from as many construction establishments throughout the land. Of these reports, 30,597 were from establishments which reported having handled a business of over \$25,000 during the year, and 113,799 from those whose reported business was less than that amount.

COMPILATION OF STATISTICS

In its final form the construction schedule constituted a more or less complete analysis of the individual business. Because of this fact, it was possible to make a detailed audit of each report. Apparent discrepancies were thus discovered and corrections made or obtained through correspondence before any results were tabulated. Thus, the introduction of errors into the final summaries and reports was reduced to a minimum. In fact, in the compilation of these statistics every step of the process was checked and verified in order that the results might represent as true a picture as possible of the construction industry in the United States during the year 1929.

Complete reports were required only from establishments which had a business of over \$25,000 during 1929, and these were, of course, the basis of the more detailed analyses in the published construction reports. A schedule was considered acceptable for tabulation only if the five principal items appeared in reasonable balance and relationship to one another. On the one side of this balance were placed the value of construction business handled under general contract or directly for the owner, and the value of work handled under subcontract, the sum of the two representing the total value of construction business during the year. On the other side were the three principal items of expenditure, designated as the value of subcontract work let, wages paid, and cost of materials delivered on the job. A report might be incomplete in any number of other items called for in the schedule, but in these five it had to be complete.

The tabulation of these principal items has been presented in Table 1 of the respective reports of the construction census. For the United States 30,597 complete reports were tabulated. Of this number, 28,381 reported the principal breakdown by class of ownership (Table 2), 29,799 the location of construction business (Tables 3 and 4), 29,699 the number and salaries of proprietors, firm members, and salaried employees (Table 5), 26,718 the value of construction equipment purchased during the year and the inventory value of such equipment at the end of the year (Table 6), 27,102 the number of workmen employed

(Table 7), 26,671 the complete distribution of expenditures (Table 8), and 21,980 the itemized cost of materials (Tables 9, 10, and 11).

Methods of business.—Data were furnished by contracting establishments operating under various methods of doing business. As a rule, the larger new construction work is handled by a general contractor under contract with the owner or his agent. The general contractor may sublet certain parts of the work to various subcontractors, or he may do all the work with his own force. An outstanding exception to this usual practice, however, is the case in which the owner or his agent, frequently the architect, retains general supervision of the job without employing a general contractor. He purchases the materials, employs the necessary labor, and sublets whatever part of the work he may see fit. In such a case, the owner, or his agent, stands in lieu of the general contractor, although he would not be technically considered a contractor.

The two principal methods of fixing contract cost are the "lump-sum" and "cost-plus" methods. In the first the price is fixed at a certain sum, and the contractor undertakes to deliver the structure at that price and assumes the risk of gain or loss according to the accuracy of his estimate. Under the second method, the owner agrees to pay the actual cost of labor and materials plus a specified percentage of that cost, to cover other items of expense and a reasonable profit for the contractor. In the latter case the owner takes the risk of gain or loss according to the rise or fall in the cost of labor and materials, and other variable conditions, while the contractor is sure of his fixed margin. Still other methods in use are the "unit price" and "force account" systems. Some contractors operated under one form of contract and some under another, but it was not infrequent to find the same individual using more than one method.

All discrepancies arising from a difference in method of business, type of contract, or accounting system were adjusted by means of correspondence with the reporting establishment. Thus, balanced and comparable schedules were secured, notwithstanding the great variety of methods existing throughout the industry.

Audit of individual reports.—The first step in the process of discovering and correcting errors consisted in the inspection and careful audit of each individual report. The clerks engaged in this work followed detailed written instructions. The various items of expenditure were added and this total was checked against the total amount of business reported for the year. If this comparison indicated an excessive profit or loss on the year's business, the report was subjected to careful scrutiny to determine, if possible, the item which might be in error. It was easy to locate more or less obvious errors of omission or duplication in the amounts reported for various items. In

such cases the report could be corrected and, if there were no other inconsistencies, at once passed on for verification. But when it was impossible to locate and correct an error, a letter was sent to the individual from whom the report was received. This letter pointed out the apparent discrepancy, suggested the possible misunderstanding, or gave additional explanation of the intended meaning of the item in question, and asked that it be reconsidered and the necessary correction made.

Typical errors.—Errors in filling out the reports seemed to fall into four general classes, depending in part on the complexity of the report itself, and in part on the ability or willingness of the individual to furnish the required information. Briefly, the causes were, (1) misunderstanding of the class of establishments which should report, or the part of a combined business which should be reported, (2) failure to grasp the meaning of the various items of the schedule as related parts of a complete whole, (3) general lack of understanding or ability to make a consistent report, and (4) carelessness or indifference. Of the four, the second was encountered the most frequently.

Many establishments not engaged primarily in construction work, identified themselves only with the major part of their business and failed to report as contractors in response to the first request. In some instances manufacturing, fabricating, or mercantile establishments, which engaged in subcontracting for the installation of their products or materials, made reports covering their entire business without indicating the amount of work done in connection with construction. In such cases the entire report was in error and it was necessary to obtain a new one on the basis of actual construction work done. Others of this same class reported amounts covering their combined activities for certain items and the details of a small construction business for others. This type of error which was apparent on the face of the unbalanced report could be noted for correction much more readily than many others.

As already stated, it was the intention of those who outlined the schedule to have it present a balanced account of the construction business on which the work was actually done during the calendar year 1929, or during the nearest fiscal year, if an establishment kept its records on that basis. In either case, the various items of expenditure were expected to relate to the amount of business reported on the schedule. In some reports, however, it was found that the total value of contracts on which work was in progress during the year was reported, instead of the value of construction actually performed during the year. In such cases the amount of business was usually greatly in excess of the amount of expenditures. The value of contracts completed during the year, which is the basis for making income tax returns.

for construction establishments, was also frequently reported instead of the year's actual construction work. This resulted sometimes in an apparent high profit if the value of contracts completed was less than that of actual work done, or in an apparent loss if the relationship was the reverse. In some reports the bare cost of labor and materials was reported as the value of business instead of the usual contract value which should include a reasonable allowance for other business expenses, overhead, and profit. In still other cases the value of subcontract work let to others was not included as part of the year's business, which it obviously is, since the actual work was done on original contracts handled by the reporting establishment. A considerable percentage of errors requiring correspondence for correction were of one or another of these types relating to the value of the year's business.

The further analyses of the value of construction business requiring the distribution of the total value of all business by class of work done under subcontract, by type of construction done under general contract, by class of ownership (private, quasi-public, or public), and by geographic location (in the home city, in the home State, or elsewhere), were frequently omitted.

There was also noted in the reports a marked tendency to confuse the item representing work done by the reporting establishment under subcontract, with subcontract work let to others by the reporting establishment. Exactly the same amount was frequently reported for both items. Such a duplication was usually an error, although it is possible that it might be correct if the contractor took a job under subcontract and then himself sublet it to someone else.

A large number of establishments failed to report the number of skilled and unskilled workmen employed on the 15th of each month, or nearest normal working-day. Through correspondence, however, the number reporting on this item was finally brought up to 88 per cent of the total number of establishments.

A great many errors, including the omission of the item entirely where it was obviously required to make a balanced report, occurred in the item "All other overhead expenses." This item was defined in the schedule itself, and in the instructions on the reverse of the letter of transmittal. (See definition on p. 7.) It was found that the item of depreciation on machinery and equipment was frequently omitted, because it is frequently not included with overhead in accounting practice. It was so included in the construction report, however, because it does constitute a legitimate charge against the year's business. It is, accordingly, included in figures for this item wherever they are shown.

Many errors were also found in the section designed to obtain the cost of materials delivered on the job.

This item was intended to include the itemized cost of each kind of material, purchased or furnished by the reporting contractor, which was actually put into work done by him on construction projects during the year. Instead, an analysis of the total value of the business reported on the schedule was sometimes given. In other instances, the cost of materials plus the cost of labor employed to install them was shown. In the case of a combined business comprising retail sales as well as actual installation of materials on construction jobs, materials sold at retail but not installed were frequently included along with materials sold and actually installed. It was also sometimes found that stocks of materials which were purchased during the year but had not been installed on jobs at the end of the year were included. When an appreciable amount of error was involved, this item appeared out of proportion to other parts of the schedule and, unless the correction could be made from other information on the report itself, a copy with suggestions was forthwith returned to the sender for correction.

More than 14,000 letters were written to obtain corrections where errors were suspected. Between 75 and 80 per cent of those letters were answered either with a balancing correction or with a satisfactory explanation of the apparent discrepancy. In view of this additional information obtained through correspondence regarding certain types of errors, it was possible to make compensating adjustments in similar cases for which no corrections were received. Thus, only a negligible percentage of schedules which might have been usable had to be omitted from the final tabulation.

Tabulation.—The method of tabulation used in compiling the returns for the Fifteenth Census of the United States has received adequate publicity through newspapers and other periodicals as well as through the presentation of a working demonstration in motion pictures. It is, therefore, unnecessary to do more than state the fact that the card system of mechanical tabulation was used in compiling the information contained in the returns for the construction census. The mechanical process, however, represented but a small part of the actual labor involved in auditing and coding the schedules in preparation for tabulation, and in verifying and correcting the result slips which came from the machines, before final tables could be made for publication. As in all human processes, so in all mechanical processes in which the human factor is involved, there is an unavoidable possibility of error. But there are few errors which can not be picked up by a careful review of the results and an adequate system of cross checks among the corresponding items in various tabulations. In outlining the method for tabulating the construction data, care was taken to provide a series of cross checks among the different tabulations so as to insure the accurate comparability of the various sets of results obtained. These cross

checks served as the clue to innumerable errors which were corrected before the final tables were compiled for publication. Thus, there is a definite sense of assurance that the figures presented in the census reports of the construction industry are as nearly correct as it was possible to make them.

EXPLANATION OF TERMS

In order to define the specific meaning ascribed to the various terms used throughout the construction reports, the following explanations are presented:

Establishment.—This term is used to designate an individual, partnership, corporation, or independent branch office which submitted a construction report.

Contractor.—For purposes of the census, this term embraces all individuals or establishments handling for others, any type of new construction work, or repairing, remodeling, and jobbing, regardless of whether the work is done under contract or otherwise.

General contractor.—This term designates one who contracts for the entire work on a given construction project directly with the owner, or his agent, is responsible for the execution of the whole, and usually does some portion of the actual work with his own constructing forces.

Operative builder.—An operative builder is himself both owner and builder, selling a finished structure to a purchaser, or operating it himself for a profit. Technically, of course, he is not a general contractor, but he may be considered as working directly for the owner, who is himself. Hence, the operations of this class may be and are, in certain instances, added to those of general contractors without involving statistical duplication. Speculative builder, owner builder, and operative builder are commonly accepted as synonymous.

Subcontractor.—Any establishment engaged in a specialized line of work which is ordinarily done under subcontract for the general contractor, is classed as a subcontractor. The work of such establishments, however, may be done either under subcontract or directly for the owner.

Manufacturer, fabricator, or dealer contractor.—Manufacturers and fabricators of construction materials or equipment, who contract for the erection or installation of their materials on the job, were required to report for this census, as were also dealers in building materials who engage in actual construction. Many establishments of the former type maintain separate construction departments for handling their erection or installation work, while others merely agree to deliver their products erected or installed, and sublet the actual erection or installation labor. Among those included in this group are fabricators of structural steel and manufacturers of heating equipment, prepared roofing, cut stone, plate and ornamental glass, and concrete pipe. In the dealer contractor group,

the following lines of work are outstanding: Electrical, plumbing, heating and piping, painting and decorating, and other similar lines. In order to make the reports of such establishments conform with the schedule for regular contractors, only that part of wages, salaries, and other overhead expenses entering into the actual construction work was reported as such on the schedule. The amounts reported by such establishments as the cost of materials delivered on the job represent the actual selling price from the point of view of those erecting or installing their own materials.

Salaries.—Salaries reported are those paid on an annual or monthly basis and not on the customary hourly wage rate for construction labor.

Wages.—Annual wages paid represent the aggregate of all pay rolls for actual construction labor throughout the year. Owing to the fact that the number of workmen employed was reported as of the 15th of each month, the average of the number of wage earners presented in these statistics may not be exactly comparable with the amount of wages paid.

Contract bond premiums.—The contractor who takes charge of a large project, particularly if the work is done for Federal, State, or local governments, is usually required to post a guaranty bond for its completion. The amount of such bond varies considerably, but the usual practice is to require a bond of approximately 50 per cent of the face value of the contract.

Compensation and liability insurance.—Contractors are required by law, in many States, to carry workmen's compensation insurance for the protection of employees who may be injured in line of duty. Liability insurance is also frequently carried by contractors as a protection in case of injury to persons who are not in their employ.

All other overhead expenses.—For the purpose of this census, this item was designed to carry the balance of expenditures for construction work, including taxes; fire insurance; maintenance; stationery and supplies; light, heat and power; traveling expenses; office expenses, except wages and clerical salaries; depreciation on machinery and equipment; and all other items of expense not elsewhere enumerated in the report. In the reports of some establishments, particularly when no regular salaries of proprietors or officers were reported, this item appeared to include dividends or other division of profits in lieu thereof. It does not include capital expenditures for land, buildings, or fixtures.

Subcontract work let.—As distinguished from subcontract business handled or subcontract work done, subcontract work let indicates that part of the reporting establishment's business given to subcontractors to perform which was actually done by the latter during 1929. Such subcontract work let might con-

sist of both labor and materials furnished by the subcontractor who did the actual work; or only of labor furnished by him for installation of materials furnished by the general contractor. This phrase has been subject to a variety of interpretations. Although every effort was made in the preparation of the reports for tabulation to bring these to a uniform standard representing the value of subcontract work done for the reporting establishments by subcontractors during the year, some instances of misinterpretation may have escaped detection.

Materials.—The construction industry uses a great variety of materials. After careful consideration, 34 of the principal kinds or groups most commonly used by the industry were listed on the schedule. Many contractors made notations of numerous other materials in the miscellaneous group. It was possible to classify most of these in one or another of nine additional groups, which are shown in the listing of materials wherever they occurred. The total value reported for these additional items, however, should not be given too much weight, since their listing may have been more or less a matter of chance with some contractors, while others who used considerable amounts of the same materials may have reported them under the miscellaneous group without specific designation. Of the materials listed in Tables 9, 10, and 11, "Bituminous paving materials, tar, asphalt, and oil" is the last of the original list. Any that come thereafter belong to the nine additional groups.

Construction business.—This term is used to designate the aggregate volume of construction handled by reporting establishments and therefore, as explained below, indicates a duplication. The total value of construction business is divided into two classes, viz.; (1) that taken under general contract or directly for owners, and (2) that taken under subcontract.

It should be noted that total construction business handled does not represent the actual volume of construction work done by reporting establishments which must be derived as explained under "Construction work done."

Construction work done.—This term designates the volume of work actually performed by the reporting establishments' own construction forces. For any class of establishments this may be derived by subtracting the value of subcontract work let from the

total value of construction business handled. Since the value of subcontract work let tends to balance the value of business handled under subcontract, the value of construction business handled under general contract or directly for the owner may be taken as representing approximately the volume of construction work done. For greater accuracy, however, the former method is preferable.

In connection with any table in which the value of subcontract work let is not shown for the group of establishments comprised in that analysis, the actual value of construction work done may be obtained by applying to the value of construction business reported by establishments covered by the table under consideration, the percentage which subcontract work let is of total construction business (as shown in Table 1).

Classification of establishments.—Each reporting establishment was classified in accordance with the type of business engaged in during 1929. If several types of work were reported, the kind which showed the greatest amount of business during the year was adopted as the classification of that establishment for this census. Upon such a basis of classification, the principal line of work of a given establishment might vary from year to year. These groupings must, therefore, be considered only as a flexible standard indicated by the type of construction activity which prevailed in 1929.

To avoid disclosing individual operations, in certain tabulations it was necessary to combine the figures for various individual classes of establishments. An effort was made, wherever possible, to make such combinations between similar or closely related groups, throwing into a general miscellaneous group only such cases as could not be so combined. This method has been employed in all tables in which the classification of establishments is shown.

Principal cities.—Statistics are presented in as great detail as possible without disclosing individual operations, for all cities having a population of 100,000 or more in 1930.

Allocation of reports.—The inclusion of the report of any establishment in a given locality was determined by the post-office address from which the report was received. Special note should be taken of the fact that part of the work of many establishments was done outside the home city or State.