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CHAPTER V

PUBLIC AND PRIVATE CONSTRUCTION

One striking feature of the American business situation since 1922 has been the persistence of an unusually high level of construction activity. From 1919 to 1928 total annual construction increased without interruption and was in the latest year more than twice as large as in 1919. The year 1927 witnessed a slight drop in construction, but in 1928 the total rose to a new level for all times. The first severe drop during the whole of this period came in 1929 when total construction was more than \$800,000,000 below the year before and had dropped below the level prevailing in 1925.

This condition of large construction expenditures has been the source of considerable discussion. It has by some been regarded as one of the principal causes of the revival during 1922 and of the business prosperity since. Certainly the association of high industrial production and heavy outlays on all types of construction is an economic fact of profound significance. Those who explain the post-war spurt in construction in terms of war deficiencies, arising out of government restriction and the diversion of capital to other uses, probably regard the present movement as near its close. The most satisfactory analysis of this situation, however, discloses a close relation between construction expansion and higher standards of living in the country, and leads to the conclusion that such recessions as are experienced will proceed from a higher level than was the case in the past.⁵²

Throughout the period since 1919, the largest single category of construction is that of residential building which in 1929 represented nearly one-third of the total. This group is followed in order of importance by the classes of public works and utilities, commercial buildings, and industrial buildings. The large drop in total construction in 1929 was almost wholly accounted for by the drop of

⁵² *Recent Economic Changes*, National Bureau of Economic Research, Volume I, Chapter I, p. 62.

more than \$900,000,000 in residential building, since all other groups either increased over 1928 or changed very slightly. The drop in residential building in 1929 is commonly explained as due to overbuilding in the preceding years and to the unusually tight

TABLE 34. — ESTIMATED TOTAL CONSTRUCTION CONTRACTS AWARDED IN THE UNITED STATES, 1919-1930 *

(In thousands)

TYPE	1919	1920	1921	1922	1923	1924
Commercial buildings.....	\$494,100	\$577,600	\$431,200	\$642,400	\$619,400	\$691,200
Educational buildings.....	145,600	224,200	313,600	391,500	381,600	429,500
Hospitals and institutions.....	47,700	65,700	91,300	112,100	93,300	131,200
Industrial buildings.....	624,700	766,300	225,700	421,000	541,300	412,800
Military, naval and public buildings.....	30,400	52,000	42,900	46,600	32,000	43,800
Public works and utilities.....	611,400	736,800	598,300	727,700	788,900	846,200
Religious and memorial buildings.....	45,700	53,900	78,600	111,400	106,400	139,200
Residential buildings.....	1,035,100	742,600	1,146,100	1,734,900	2,073,400	2,309,400
Social and recreational buildings.....	101,800	118,500	141,200	142,100	131,800	143,800
Total.....	\$3,142,500	\$3,337,600	\$3,068,900	\$4,329,700	\$4,768,100	\$5,237,100

TYPE	1925	1926	1927	1928	1929	1930 (ESTIMATE)
Commercial buildings.....	\$961,800	\$996,300	\$1,017,900	\$942,900	\$1,026,400	\$930,000
Educational buildings.....	470,100	412,200	407,200	425,300	413,200	440,000
Hospitals and institutions.....	122,200	144,000	135,700	175,600	166,700	175,000
Industrial buildings.....	541,200	727,500	542,900	677,200	786,500	750,000
Military, naval and public buildings.....	60,200	72,600	67,900	81,300	130,200	165,000
Public works and utilities.....	994,100	1,230,000	1,357,300	1,426,000	1,333,500	1,614,000
Religious and memorial buildings.....	168,800	161,000	203,600	136,400	114,700	130,000
Residential buildings.....	3,030,000	2,590,000	2,782,500	2,071,900	2,079,400	2,470,000
Social and recreational buildings.....	274,200	267,400	271,500	228,200	146,800	180,000
Total.....	\$6,622,600	\$6,901,000	\$6,786,600	\$7,064,800	\$6,197,400 ^b	\$6,854,000

Source: F. W. Dodge Corporation, Statistical Division.

* These figures exclude new construction and remodeling projects under \$5,000. In 1929 these low-cost projects were estimated as amounting to \$1,480,000,000; in 1930 to \$1,660,000,000.

^b Preliminary estimate, slightly larger than the final figure given in Table 35.

condition of the mortgage and money market during parts of 1928 and 1929.

The decline in construction during 1929 took place during each month of the year, except in April, when the volume was slightly above that of 1928, and in July when there was a considerable increase over the earlier year. The report of the F. W. Dodge Corporation shows that December total construction was 24 per cent below November and 28 per cent below that of December, 1928.

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New work reported in the contemplated stage in thirty-seven states amounted in November, 1929, to \$720,301,000. This total represents a loss of 10 per cent from the amount reported in the preceding month and a drop of 23 per cent from the amount reported in November, 1928. However, in December, 1929, work in the contemplated stage in thirty-seven states rose to \$864,230,600.

TABLE 35. — ESTIMATED TOTAL CONSTRUCTION CONTRACTS AWARDED IN THE UNITED STATES, 1928 AND 1929 ^a
(In thousands)

MONTH	1928	1929
January	\$457,890	\$441,970
February	499,090	392,890
March	637,600	532,020
April	681,380	684,980
May	704,720	631,970
June	700,470	563,020
July	619,730	683,610
August	550,520	517,690
September	614,460	472,850
October	635,600	475,850
November	499,480	415,650
December	463,840	334,500
Total for year	\$7,064,780	\$6,147,000

SOURCE: F. W. Dodge Corporation, Statistical Division.

^a These estimates are made on the basis of the construction contracts awarded in 37 states east of the Rockies. The part estimated is for the other 11 Western States. These figures, like other Dodge figures, do not include estimates for new buildings under \$5000 each, nor for remodeling and alteration under that minimum valuation.

The estimate of the volume of construction in 1930 (Table 34) is made by the F. W. Dodge Corporation on the assumption of an increase in residential construction during 1930. The data in Table 35 also probably understate the total volume of construction in the country because they exclude expenditures on remodeling and alterations and contracts under \$5,000 each. A new estimate for thirty-seven states for the years 1928, 1929, and 1930, which takes account of these last items, has been made by the Statistical Division of the F. W. Dodge Corporation and is shown in Table 36. Inclusion of these items increases the total annual volume of construction by more than \$1,500,000,000. On the forecast for 1930 Mr. Thomas S. Holden, vice-president of the F. W. Dodge Cor-

TABLE 36. — DODGE ESTIMATES OF TOTAL CONSTRUCTION CONTRACTS AWARDED, INCLUDING NEW BUILDINGS UNDER \$5,000 AND REMODELLING AND ALTERATIONS, 1928, 1929 AND 1930

(In thousands)

GENERAL CLASS	37 STATES EAST OF THE ROCKY MOUNTAINS			11 WESTERN STATES
	1928	1929	1930 (ESTIMATES) ^a	1930 (ESTIMATES) ^a
Commercial.....	\$885,000	\$933,000	\$855,000	\$75,000
Industrial.....	635,000	756,000	700,000	50,000
Educational.....	399,000	382,000	407,000	33,000
Hospitals and institutions....	165,000	152,000	162,000	13,000
Public buildings.....	76,000	121,000	157,000	8,000
Religious and memorial.....	128,000	106,000	120,000	10,000
Social and recreational.....	214,000	140,000	165,000	15,000
Total non-residential.....	\$2,502,000	\$2,590,000	\$2,566,000	\$204,000
Total residential.....	2,788,000	1,916,000	2,266,000	204,000
Total building projects of \$5000 and up.....	\$5,290,000	\$4,506,000	\$4,832,000	\$408,000
Public works and utilities....	1,338,000	1,248,000	1,497,000	117,000
Total construction (\$5000 and up).....	\$6,628,000	\$5,754,000	\$6,329,000	\$525,000
Add:				
Estimates for 11 Western States.....	\$436,000	\$393,000	\$525,000	....
Estimates, new buildings under \$5000 each.....	871,000	740,000	775,000	....
Estimated remodelling and alterations.....	739,000	740,000	885,000	....
Estimated total construc- tion United States.....	\$8,674,000	\$7,627,000	\$8,514,000	....

SOURCE: F. W. Dodge Corporation, Statistical Division.

^a Estimates computed December 15, 1929.

poration, made the following statement: "These estimates are preliminary, tentative, and subject to possible revision before F. W. Dodge Corporation's final estimates are published; they do not at present include any figures to cover public buildings and public

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works that may be undertaken under proposed emergency appropriations made for the purpose of stabilizing business. . . . A moderate increase over 1929 is provided in the estimated figures for 1930, on the anticipation of a definite upturn in contract volume some time during the first half of 1930. Marked improvement early in the new year would be likely to produce a total volume greater than the figure estimated here."⁵³

Public Construction.—The estimates of the total volume of public construction in the United States, used in this chapter, are based in part on the statistics of contracts awarded, furnished by the F. W. Dodge Corporation and in part on data derived from other sources. Because of the character of the basic data, it is impossible to carry these estimates back of 1923 and beyond 1928. While it might be desirable to derive an estimate of the volume of public works from the reports of the expenditures of all governmental agencies of the country, such a procedure would involve a huge task of collecting data and problems of accounting that are at this time insoluble.

According to the following tabulation public construction increased from nearly \$2,000,000,000 in 1923 to more than \$3,500,000,000 in 1928. The years of the largest increases were 1924 and

Year	Estimated Volume of Public Construction in the United States ^a
1923	\$1,993,000,000
1924	2,500,000,000
1925	2,594,000,000
1926	2,847,000,000
1927	3,488,000,000
1928	3,599,000,000

^a The details of these estimates are given in Table 42, and pp. 123-125, below.

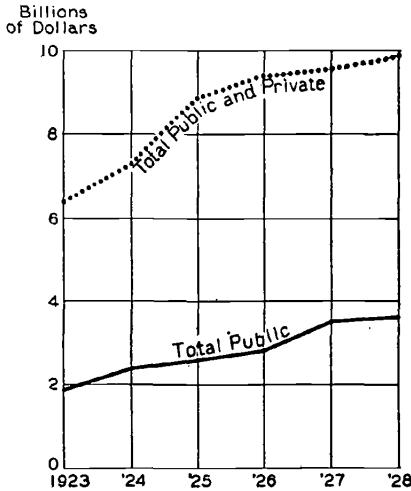
1927. From 1923 to 1928 public construction appears to have increased at a slightly more rapid rate than total construction. Moreover, for this period, the records of engineering construction, kept by the Engineering News-Record, indicate that the course of public construction follows substantially the same trend. The total of public construction in 1929 is very slightly below that for 1928.⁵⁴

⁵³ *New York Times*, December 16, 1929.

⁵⁴ See Table 39.

Data of the distribution of public construction among various types of public works are not available for the country as a whole. Some notion of the channels of public expenditures can be got from Tables 37 and 38, which give, from 1923 to 1929, a classification of public contracts awarded in 36 and in 27 states. These tables, like the data on state and city expenditure, show that the construction of public and educational buildings and the construction of roads,

CHART 15.—ESTIMATED TOTAL VOLUME OF PUBLIC AND PRIVATE CONSTRUCTION IN THE UNITED STATES, 1923-1928.



bridges and streets are the principal classes of expenditure on public permanent improvement.

Geographical Distribution of Public Works.—While there are notable exceptions to the rule, expenditure on public works varies roughly with the population of the area and with the number of large cities in it.⁶⁵ In all of the districts, also, expenditures are concentrated in much the same categories—educational and public buildings, and road, street and bridge construction.

The Numbers Directly Employed on Public Construction.—The statistics of the numbers employed on the various kinds of construction work in this country are notoriously inadequate. Construction work, both public and private, is in the main done by changing groups of contractors who keep their own payroll records

⁶⁵ For details, see Appendix H, Tables 1-8.

TABLE 37. — PUBLIC CONSTRUCTION CONTRACTS AWARDED IN 36 STATES, 1923-1929^a
(In thousands)

Purpose	1923	1924	1925	1926	1927	1928	1929
Educational buildings	\$273,263	\$294,654	\$308,705	\$367,059 ^b	\$368,803 ^b	\$384,591 ^b	\$369,527 ^b
Hospitals and institutions	78,057	112,195	108,502	130,644	158,788	162,034	149,030
Military and naval buildings	3,527	2,202	6,165	8,613	8,855	14,528	9,041
Public buildings	23,284	35,315	45,938	54,412	66,098	57,311	107,822
Waterfront developments	40,417	47,254	30,656	38,959	43,098	54,320	78,111
Bridges	65,539	74,855	92,050	123,098	175,059	166,636	122,168
Incinerators	2,603	2,908	1,933	2,902	6,766	3,789	2,361
Lighting systems	19,925	18,104	38,985	29,555	27,195	24,498	34,726
Docks and piers	15,617	10,362	18,158	^c	^c	^c	^c
Subways and tunnels	8,575	32,452	66,860	70,000 ^d	80,000 ^d	85,000 ^d	95,000 ^d
Sewage systems	54,689	55,735	99,232	94,857	137,067	110,493	105,828
Street paving and road construction	352,229	346,475	417,127	496,754	571,454	610,561	577,412
Water supply systems	42,261	58,074	49,798	70,662	65,160	102,237	48,849
Parks (public)	1,454	853	1,356	1,968 ^e	4,829 ^e	2,157 ^e	2,285 ^e
Total public construction	\$981,440	\$1,091,438	\$1,285,465	\$1,489,463	\$1,713,172	\$1,778,155	\$1,702,160
Total public construction (inclusive of private schools and exclusive of subways, tunnels, docks and piers)	\$1,003,272	\$1,121,409	\$1,304,946	\$1,419,463	\$1,633,172	\$1,693,155	\$1,607,160

Sources: F. W. Dodge Corporation, Statistical Division.

^a The 36 states included are the same as those covered by Table 38 of 27 northeastern states; and in addition: North Carolina, South Carolina, Georgia, Florida, Tennessee, Alabama, Mississippi, Arkansas and Louisiana.

^b Private schools, which were subtracted from the figures for educational buildings in earlier years, are included in these four years. In 1923 they amounted to \$46,023,600; in 1924 to \$72,785,300; and in 1925 to \$104,498,700.

^c Not reported in these four years.

^d Not reported in these four years.

^e Estimated as one-half total parks.

TABLE 38. — PUBLIC CONSTRUCTION CONTRACTS AWARDED IN 27 NORTHEASTERN STATES, 1919-1929*
(In thousands)

Purpose	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929
Educational buildings.....	\$108,902	\$157,041	\$217,441	\$252,825	\$234,199	\$250,447	\$273,963	\$321,125 ^b	\$323,780 ^b	\$345,267 ^b	\$342,738 ^b
Hospitals and institutions.....	39,192	50,543	70,095	86,629	61,967	98,041	97,634	120,835	148,981	153,725	140,782
Military and naval buildings.....	16,432	12,997	6,372	3,593	2,966	2,112	5,212	7,462	7,913	12,900	7,732
Public buildings.....	13,422	26,648	26,563	32,431	19,168	28,101	34,502	43,897	56,819	50,683	99,552
Waterfront developments.....	42,964	23,741	20,283	25,756	34,976	37,096	19,055	27,558	31,456	46,288	43,984
Bridges.....	39,551	56,642	45,846	40,434	51,754	62,353	75,059	100,077	154,103	129,366	103,660
Incinerators.....	539	477	471	611	2,332	2,529	1,429	5,972	3,088	3,088	2,075
Lighting systems.....	3,406	61,894	6,778	12,866	18,727	15,115	32,244	26,370	24,230	23,120	27,125
Docks and piers.....	15,791	37,592	7,750	18,836	10,999	7,242	15,410	c	80,000 ^d	85,000 ^d	95,000 ^d
Subways and tunnels.....	6,682	4,905	2,152	27,232	8,490	32,372	66,776	70,000 ^d	125,487	104,539	99,958
Sewage systems.....	57,713	41,944	48,772	50,907	51,359	51,077	89,416	85,641	80,000 ^d	85,000 ^d	95,000 ^d
Street paving and road construction.....	252,518	239,275	284,038	324,176	294,125	273,212	302,843	375,100	465,867	518,871	508,878
Water supply systems.....	18,615	47,074	34,015	34,099	35,794	48,211	40,889	59,675	57,607	95,782	45,105
Parks (public).....	710	1,583	433	2,000	1,324	604	700	1,814 ^e	4,723 ^e	1,834 ^e	2,118 ^e
Total public construction.....	\$616,437	\$762,356	\$771,009	\$912,395	\$828,180	\$903,512	\$1,055,132	\$1,242,037	\$1,486,938	\$1,570,463	\$1,518,707
Total public construction (inclusive of private schools and exclusive of subways, tunnels, docks and piers).....	\$604,577	\$735,216	\$784,378	\$915,774	\$845,771	\$930,598	\$1,068,473	\$1,172,037	\$1,406,938	\$1,485,463	\$1,423,707

SOURCE: F. W. Dodge Corporation, Statistical Division.

* The 27 states included are Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Maryland, Delaware, Virginia, West Virginia, Ohio, Kentucky, Illinois, Indiana, Iowa, Wisconsin, Michigan, Missouri, Kansas, Oklahoma, Nebraska, Minnesota, North Dakota and South Dakota; also the District of Columbia.

^b Private schools, which have been subtracted from the figures for educational buildings in earlier years are included in these four years. In 1919 they amounted to \$10,612,603; in 1920 to \$15,257,400; in 1921 to \$23,270,800; in 1922 to \$49,446,900; in 1923 to \$37,080,100; in 1924 to \$66,700,000; and in 1925 to \$95,527,200.

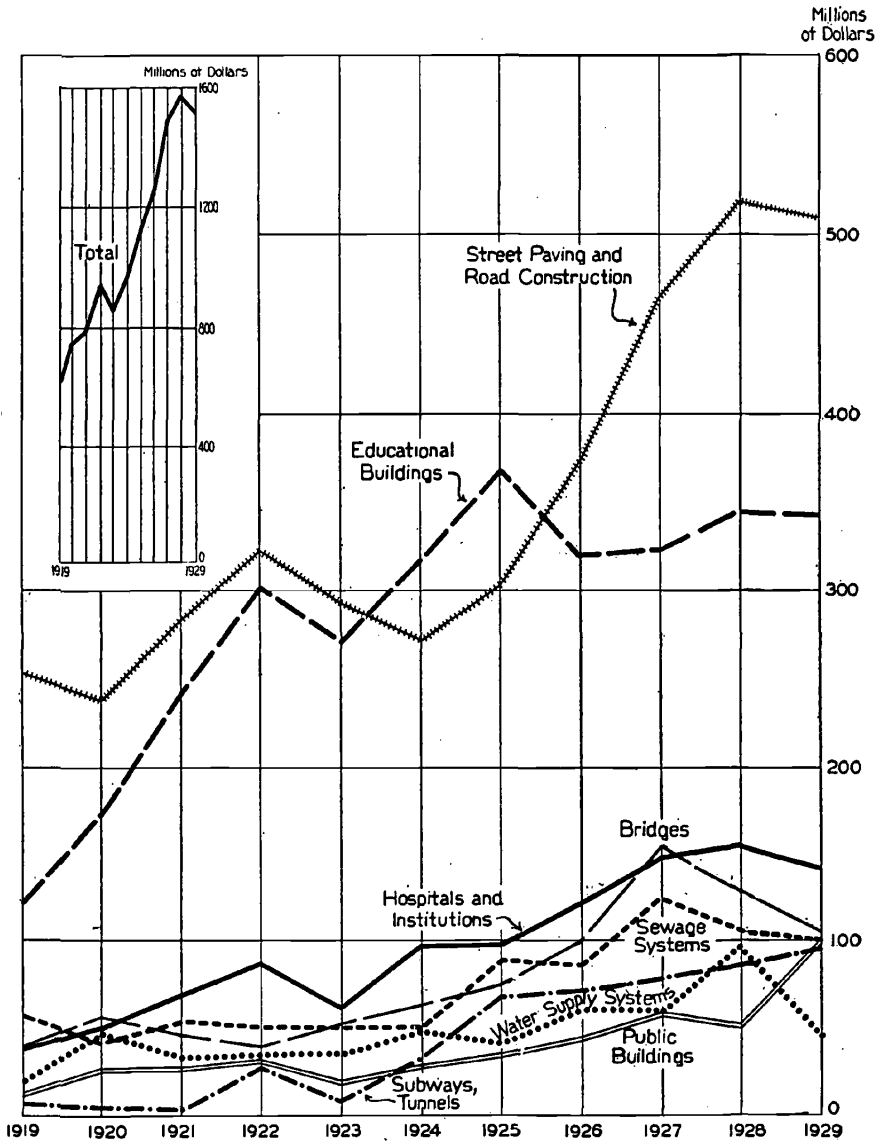
^c Not reported in these four years.

^d Not reported in these four years.

^e Estimated as one-half total parks.

These figures represent mainly estimates of subway construction in New York City.

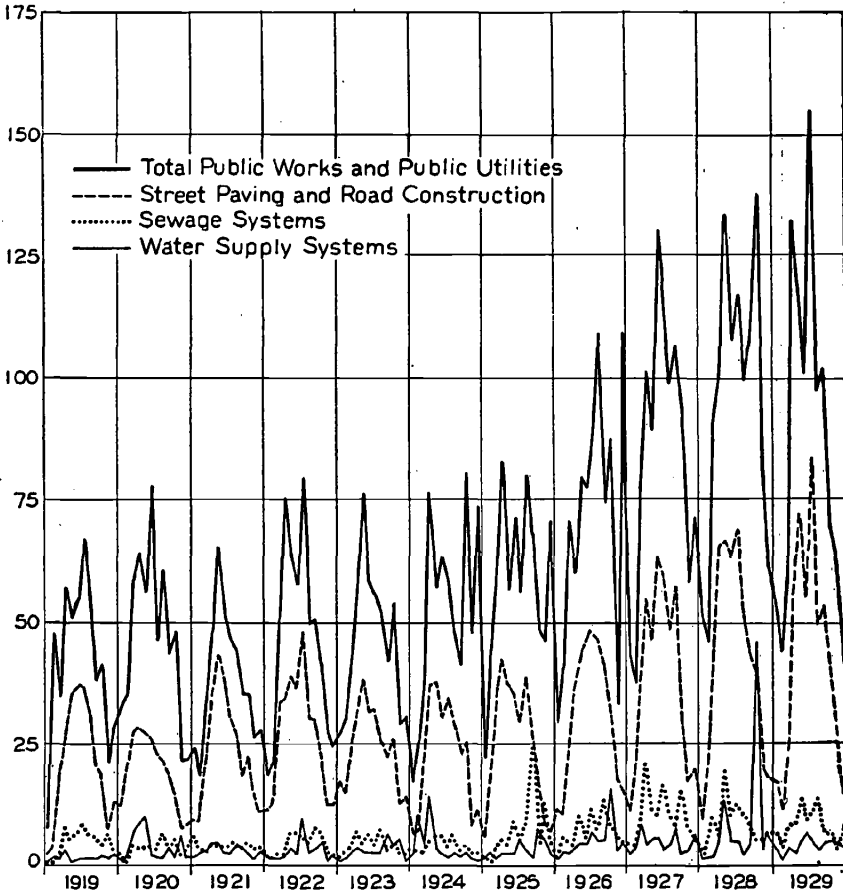
CHART 16.—PUBLIC CONSTRUCTION CONTRACTS AWARDED IN 27 STATES BY MAJOR CLASSES, 1919-1929.



but who, as a rule, do not deposit them in any central bureau. For this reason, there is not for the construction industry in this country any satisfactory index, as suitable as those available for

CHART 17.—FLUCTUATIONS OF SELECTED TYPES OF CONSTRUCTION CONTRACTS AWARDED IN 27 STATES, MONTHLY, 1919-1929.

Millions
of Dollars

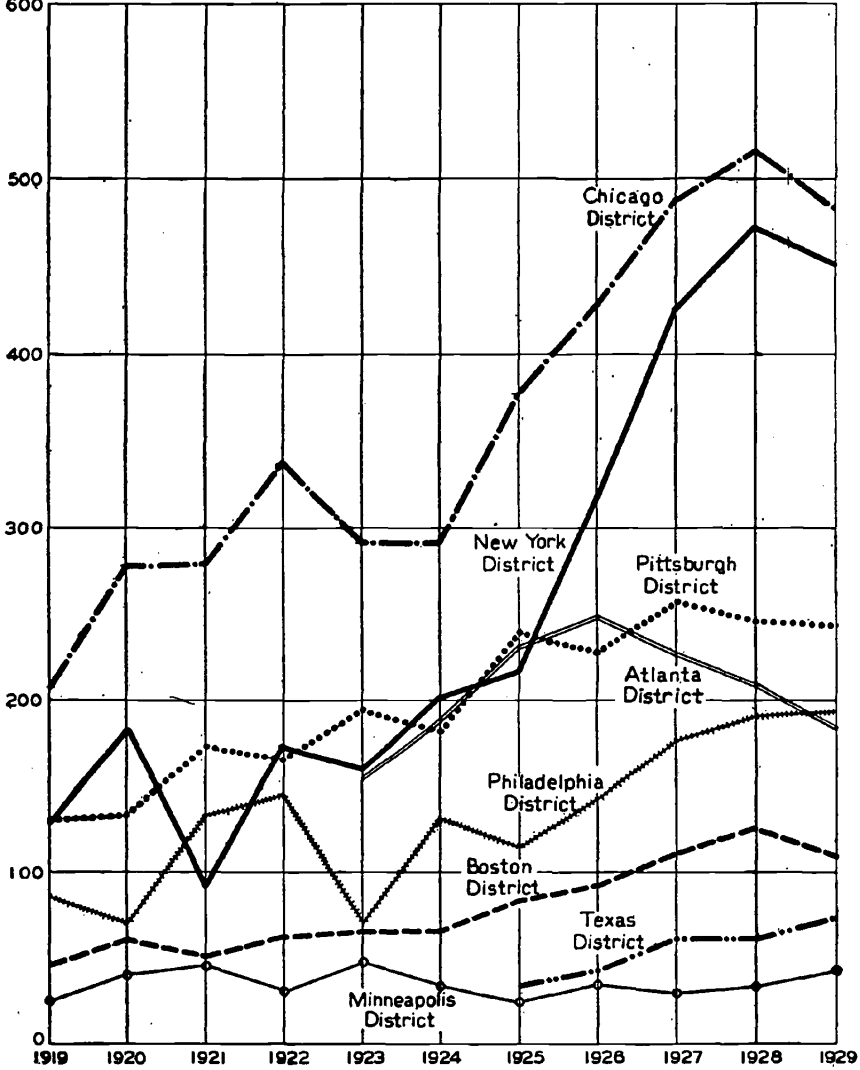


Source: F. W. Dodge Corporation, Statistical Division.

the manufacturing and rail transportation industries, of monthly and annual fluctuations in employment. Even the elaborate Census of Occupations of 1920 is defective in this respect in that it is difficult, because of the nature of the occupational classifications, to

CHART 18.—TOTAL PUBLIC CONSTRUCTION CONTRACTS AWARDED IN SELECTED DISTRICTS OF THE UNITED STATES, 1919-1929.

Millions of Dollars
600



derive a satisfactory total of the numbers employed in all branches of the construction industry.

For estimating the numbers employed in public construction, then, recourse may be had to a number of alternative methods, each equally logical or reasonable. From an examination of many sources, it would appear that the average wage and salary bill in construction enterprises of all kinds runs about 40 per cent of the value of output. For the state of Ohio very elaborate annual returns from construction industries yield the average annual earnings of employees in these industries. Dividing the total wage bill on public construction by these figures of annual earnings gives the results shown in the following tabulation:

Year	Estimated Volume of Public Construction United States (In thousands)	Estimated Total Wages Paid in Public Construction United States (In thousands)	Average Annual Earnings in All Construction in Ohio	Estimated Number Employed on Public Construction United States (In thousands)
1923	\$1,993,000	\$ 797	\$1,544	516
1924	2,500,000	1,000	1,637	611
1925	2,594,000	1,038	1,651	629
1926	2,847,000	1,139	1,611	707
1927	3,488,000	1,395	1,618	862
1928	3,599,000	1,440	1,624	887

Comparing, again, the number employed on public works in New York City with the expenditures on public construction in that city and applying this ratio to the total expenditures on public works throughout the country gives the number so employed in 1928 as slightly in excess of one million. Other estimates, made by a variety of methods, yield totals as low as 500,000 and as high as 630,000. In the absence of comprehensive continuous payroll statistics for the many divisions of the construction industry, it is impossible to reconcile these divergent estimates; but inspection of the data would appear to lead to the conclusion that somewhat more than 800,000 persons were in 1928 employed in this country in public construction.

The Methods of Estimating the Total Volume of Public Works.

—In measuring the expenditures on public works, the best sources of information are unquestionably the financial reports of the governmental agencies that do the spending. As has been pointed out before, however, the use of such sources in arriving at the

total expenditure in the country is a task requiring considerable time and money. Under the circumstances, then, it is necessary to fall back on certain standard sources, which are themselves incomplete and inadequate but which can be employed as the basis for further estimate. The best known sources for this purpose are *Financial Statistics of States and Cities*, the record of building permits, published by the Bureau of Labor Statistics of the United States Department of Labor, the figures on contracts awarded published by the Engineering News-Record and the statistics of contracts awarded published by the F. W. Dodge Corporation. Each of these sources has its virtues and defects and it is, on the whole, quite impossible for a great variety of reasons; entirely to reconcile estimates derived from each.

1. The Financial Statistics of States and Cities.—It is almost impossible to make a reliable estimate of the aggregate volume of public construction on the basis of the figures presented in these two series of financial reports. The conclusion seems warranted that the result would be subject to so wide a margin of error as to render it almost useless or highly misleading, and of practically no value for purposes of comparison with estimates obtained by other methods. The figures of these reports are subject to the following defects:

a. They are for states and cities only, i.e. expenditures of the federal government are not included. This in itself would not be a serious shortcoming.

b. The statistics of states give figures only for each state as a governmental unit; expenditures for the counties, special districts, etc., are not ordinarily included. In other directions the counties may not spend much on public works, but in the matter of road construction at least their activities and expenditures are far from negligible.

c. The statistics of cities are only for cities of 30,000 and over. In 1927 these numbered 250 and their combined population amounted to 36 per cent of the entire population of the country. The per capita expenditure on public works in cities of less than 30,000, in towns and in villages is likely to be less than in larger cities. But undoubtedly the omission of all cities under 30,000 would seriously affect the value of the totals so obtained, and it is difficult to estimate for these cities.

d. In every case the cost of land is included along with the expenditures on construction. The Bureau of the Census in reply to inquiry in this matter indicated that it would not be possible to eliminate this element from their figures.

e. The method of tabulation employed obscures and confuses some expenditures on construction work. The greater part of the latter are to be found in the tables of "outlays on permanent improvements" (which include the cost of land in any case), but some part also, it would appear, goes into the columns for government-cost payments, though the greater part of these government-cost payments are undoubtedly for maintenance and operation rather than for construction. But because the figures of *Financial Statistics* represent "outlays" on permanent improvements, they exclude many construction expenditures not regarded as outlays. For this reason they omit a large part of what appears in the tables under the classification of highway and road expenditures—reconstruction, repairs, state-aid, resurfacing and repaving, etc., expenditures which, though they are, strictly speaking, largely for maintenance, none the less properly represent construction work. This is one of the reasons why the figures of *Financial Statistics*, which might prima facie be expected to be larger, are instead found to be consistently lower than the figures extracted from the Comptroller's reports, though the latter exclude land acquisition costs.

f. It is sometimes doubtful whether *Financial Statistics* figures for outlays include all expenditures financed from bond sales. If this doubt is justified, this might introduce a serious defect into the figures for cities such as New York, whose practice it is to finance their public works almost entirely in this manner.

g. It would appear that various state and city expenditures on construction are sometimes omitted from the *Financial Statistics* tables of outlays for no better reason than the absence in the standardized classification employed of any column into which they might properly be inserted. Thus, to cite one example, in the case of New York City, the huge expenditures on subway construction appear nowhere in the *Financial Statistics* tables. Though this is probably a quite exceptional omission, not likely to occur in the case of other cities—this type of expenditure being peculiar almost to New York City alone—it has the effect in this instance of reduc-

ing the true total for construction in recent years roughly one-third.⁵⁶

2. Building Permits.—The defects in statistics of building permits as a measure of the total volume of construction, public or private or both, may be stated as follows:

a. The specified and actual costs of the proposed project may diverge considerably.

b. Work planned may wait long for construction, and in some cases may never be executed at all.

c. Some construction work undertaken is done without any permit being obtained, though it is required.

d. For public works of certain types no building permits are customarily required.

e. The figures cover only selected cities; construction activity in these cities, as indicated by the permits to build, may or may not be good samples of the trend throughout the entire country.

f. Construction projects of the federal government are not included in the series.

g. Street paving, and some types of engineering projects, are likewise omitted.

h. The total figures are itemized according to types of construction work, but public construction is not distinguished from private.

3. Data of the Engineering News-Record.—This series, unlike the Dodge figures, covers the entire area of the United States, in-

⁵⁶ The Bureau of the Census made the following comments in answer to inquiry on these points:

"The amounts shown in Table 17 of the report on financial statistics of cities, 'payments for outlays by principal divisions of governmental service,' include all payments for outlays or betterments, as defined by the Bureau of the Census, whether met from general revenue or from bond issues. Our definition of an outlay does not recognize a replacement as an outlay unless the equipment or article replaced is better than the old was when it was new. In cases of that kind, we recognize the difference between the value of the old article when new and the replaced article, and report as an outlay, the remainder to be reported as an expense. This is the definition under which all of our representatives work, and I am at a loss to explain the apparent omission or discrepancy on the part of New York City. . . . In reporting the transactions of either a state or city, we include all transactions that pass through or are under the jurisdiction or control of the state government or of the city government, and for cities, we include the transactions of independent districts, such as school, sanitary and park districts if they are practically co-extensive with a city." (L. A. Carruthers, Chief of Division, Statistics of States and Cities, in correspondence.)

TABLE 39. — ENGINEERING CONSTRUCTION CONTRACTS AWARDED FOR PUBLIC WORKS IN THE UNITED STATES, 1919-1929.
(In thousands)

Purpose	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929
Federal Government.....	\$72,375	\$36,562	\$28,604	\$43,556	\$47,940	\$38,885	\$34,272	\$50,262	\$50,763	\$69,815	\$103,901
Waterworks.....	19,762	22,141	38,330	36,221	62,698	61,445	69,368	61,647	53,189	99,437	48,617
Sewers.....	38,506	37,418	38,805	43,584	66,905	74,553	84,577	103,741	118,032	100,732	87,674
Streets and roads.....	225,655	262,641	313,303	334,694	361,837	415,216	421,039	484,898	525,069	615,279	539,352
Bridges (public) ^a.....	.....	.....	.....	.....	.....	.....	62,936	74,865	120,915	96,781	97,992
Excavations (public) ^b.....	.....	.....	.....	.....	.....	.....	18,256	22,466	34,677	37,734	81,670
Buildings (public) ^c.....	.....	.....	.....	.....	.....	.....	198,130	209,245	234,032	263,260	305,702
Unclassified (public) ^d.....	.....	.....	.....	.....	.....	.....	148,674	82,031	118,563	137,058	131,685
Total public engineering construction.....	\$470,355 ^e	\$609,230 ^e	\$477,405 ^e	\$622,637 ^e	\$761,616 ^e	\$799,716 ^e	\$1,037,252	\$1,089,155	\$1,255,240	\$1,420,096	\$1,346,493
Total engineering construction.....	\$1,175,868	\$1,525,075	\$1,193,512	\$1,556,592	\$1,904,040	\$1,999,290	\$2,559,443	\$2,853,842	\$3,255,766	\$3,578,530	\$3,950,315

Source: Engineering News-Record.

^a Excludes contracts below the following values: \$15,000 for waterworks and excavations, \$25,000 for other public works, \$40,000 for industrial buildings, \$150,000 for other buildings.

^b Not separately reported in 1919-1924.

^c Estimated as 40% of total engineering construction. Public construction was 40.5% of total in 1925; 38.2% in 1926; 38.6% in 1927; 39.7% in 1928; and 34.1% in 1929.

cluding the work undertaken by the federal government. Total public and private construction are, furthermore, separated from April, 1923 onwards. For the purposes of this study, however, the series has this shortcoming, that contracts below the following minimum costs are excluded:—for water works and excavation, \$15,000; other public works, \$25,000; industrial buildings, \$40,000; other buildings, \$150,000.

In view of these omissions, it is impossible to arrive at a reliable estimate of the aggregate volume of public construction of all sorts throughout the country on the basis of this series.

The figures published by the Engineering News-Record, however, show trends not unlike those disclosed by the figures used in this study. Thus there is found in the statistics of the Engineering News-Record, summarized in Table 39, a rise in public engineering construction, from 1923 to 1928, of roughly 100 per cent.

4. Statistics of Contracts Awarded of the F. W. Dodge Corporation.—The Dodge series do not strictly represent the volume of construction work executed in any given month or year. They are not measures of current operations but rather of activity just about to be initiated. For this reason, in view of the markedly upward trend of the volume of construction in recent years, it is not surprising that the Dodge figures, representing prospective expenditures, are on the whole larger than the corresponding figures extracted from financial reports, which indicate the actual expenditures made over any given time interval. Something of the nature of the relation between the Dodge data and those taken from Comptroller's reports, as well as those from *Financial Statistics of States and Cities*, is shown in Table 40.

A time lag of unknown duration, probably varying from year to year, and certainly different in different types of work, clearly exists between the two series. Over a period of years, where averages of the two series can be directly compared, contracts awarded and actual expenditures tend to come reassuringly close. For individual years, however, the two figures are, for the reasons just explained, not comparable. Furthermore, figures for contracts let, if assumed to represent work executed, give an exaggerated impression of the amplitude of the fluctuations of the actual volume of construction work done; they tend to bunch actual expenditures if taken as an indication of them. Contracts are likely to be awarded in unusual volume during periods of brisk business ac-

tivity, and conversely to fall off steeply during times of relative stagnation. But work initiated during rising activity is generally carried forward till completion, even after business has begun to decline; so that construction work executed tends to be subject to less violent deviations from the norm than the figures for contracts awarded would suggest.

TABLE 40. — COMPARISONS OF DIFFERENT ESTIMATES OF EXPENDITURES ON PUBLIC CONSTRUCTION BY NEW YORK STATE AND NEW YORK CITY

1919-1928

(In thousands)

YEAR	NEW YORK STATE AREA ^a		NEW YORK STATE GOVERNMENT ^b		NEW YORK CITY ^c		
	COMP-TROLLER'S REPORTS	F. W. DODGE CORPORATION ^c	COMP-TROLLER'S REPORTS	FINANCIAL STATISTICS OF STATES	COMP-TROLLER'S REPORTS	FINANCIAL STATISTICS OF CITIES	F. W. DODGE CORPORATION
1919	....	\$87,198	\$22,492	\$17,210	\$29,774	\$25,491	\$35,514
1920	....	112,597	22,886	^d	39,208	^d	79,520
1921	....	71,858	27,133	^e	71,467	46,597	32,913
1922	....	144,890	35,925	28,282	56,635	54,592	74,252
1923	....	130,854	35,748	23,261	75,769	74,828	56,989
1924	....	165,020	43,999	31,247	120,944	124,698	68,878
1925	\$297,969	178,843	51,746	35,606	132,871	137,356	106,297
1926	312,269	252,611	54,774	37,468	131,394	97,636	148,621
1927	337,915	343,134	52,619	47,007	143,545	120,429	190,387
1928	334,263	389,385	69,374	^f	132,721	^f	225,876

^a For Financial Statistics figures and Comptroller's Reports figures, see discussion in text, pp. 116-122.

^b See discussion in text, Chapter III pp. 64-66, and Chapter V pp. 116-122.

^c Includes educational and public buildings, hospitals and institutions, and public works and utilities (excluding railroad buildings and construction and including subways).

^d No report published for 1920.

^e Figure not given for 1921.

^f Report for 1928 not yet published.

Over a long period of years, however, contracts awarded and actual expenditures ought to come very close together, the former being only a fraction the larger of the two, to allow for average time-lag. This is exactly what is found to happen in the case of New York City in the ten year period 1919-1928, the totals being respectively \$979,069,000 and \$934,328,000. (This fact may be re-

garded as a strong confirmation of the correctness of the Dodge figures as an index of expenditures over a period of years.) It should also be observed that there have been included in the Dodge totals for public construction contracts computed for this study some private items of a semi-public character—e.g. private hospitals—which do not figure in the Comptroller's reports.

In every case where more than one series of figures is given for state or city expenditures, the figures extracted from the Comptroller's reports are to be preferred by reason of the care and thoroughness with which they were compiled for the specific purpose in view.

Dodge figures are collected with commendable thoroughness by the field agents of the corporation, and are assembled, classified and interpreted in its statistical division. Detailed information, regularly obtained from reliable sources—public officials, contractors and above all architects, is published weekly. Since these data are compiled for profit, great care is taken that they are both accurate and up-to-date.

Dodge figures give, for the area they cover, a more comprehensive total of construction volume than any other series for building operations. Unlike the figures compiled by the Engineering News-Record, contracts below a certain minimum value are not officially excluded. They do, however, as a result of the difficulty of covering the very small items, omit most new buildings and practically all remodeling and alteration work under \$5,000 each, especially in rural districts. For the same reason they fail to include the small reconstruction and maintenance expenditures on roads, streets and highways, which in the aggregate amount to a very considerable total. Dodge figures for this class of public works thus greatly underestimate the total volume of all the varieties of work done on highways and streets.

A continuous series of contracts awarded runs back to 1919. Till 1923, however, this series covered only 27 northeastern states. In that year 9 states were added, and more recently Texas has also been included. The Pacific Coast and the Rocky Mountain states, however, are not yet covered. Estimates are made each year by the Dodge Corporation of the total volume of construction activity in the United States, but these estimates do not separate public from private construction. On the basis, however, of these figures and of other relevant data obtained from different sources, esti-

TABLE 41. — TOTAL CONSTRUCTION CONTRACTS AWARDED, 1919-1929
(In thousands)

YEAR	27 STATES ^a	36 STATES ^b	37 STATES ^c
1919.....	\$2,579,881	.....	.....
1920.....	2,564,522	.....	.....
1921.....	2,356,244	.....	.....
1922.....	3,343,822	.....	.....
1923.....	3,503,726	\$3,990,483	.....
1924.....	3,873,052	4,479,307	\$4,603,287
1925.....	5,041,937	5,821,068	6,006,426
1926.....	5,418,186	6,148,503	6,380,915
1927.....	5,473,161	6,083,950	6,303,055
1928.....	5,835,952	6,396,877	6,628,286
1929.....	4,999,031	5,536,490	5,754,290

SOURCE: F. W. Dodge Corporation, Statistical Division.

^a The 27 states included are: Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Maryland, Delaware, Virginia, West Virginia, Ohio, Kentucky, Illinois, Indiana, Iowa, Wisconsin, Michigan, Missouri, Kansas, Oklahoma, Nebraska, Minnesota, North Dakota and South Dakota; also the District of Columbia.

^b The 9 additional states included in the group of 36 are: North Carolina, South Carolina, Georgia, Florida, Tennessee, Alabama, Mississippi, Arkansas and Louisiana.

^c Covers the 36 states listed above and Texas.

mates have been made for this study of the annual aggregate volume of all types of public construction throughout the country over the period 1923-1928.

Estimate of the Total Volume of Public Construction.—These estimates are made on the basis of the Dodge figures of reported contracts awarded, which afford the most inclusive and, for the purpose in view, the most satisfactory data available. These reported construction statistics have been corrected to cover the entire country, to include items omitted and to give proper weight to highway and bridge construction and maintenance expenditures, clearly under-represented in the Dodge figures for this class of work. The steps taken in reaching the final estimate shown in Table 42 are as follows:

Line 1 presents the most inclusive Dodge series of recorded figures for construction contracts awarded.

Line 2 gives the estimate for the whole country made by the Dodge Corporation, on the basis largely of the figures, in line 1, for 37 states.

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- Line 3 calculated from the detailed, classified tabulations of the figures of line 1, by the exclusion of all private construction items.
- Line 4 figures in this column are arrived at by raising figures of line 3 by the percentage that figures of line 2 are of figures of line 1. In other words, line 4 is to line 3 as line 2 is to line 1; the assumption made being that public construction in the 11 unreported states is roughly the same proportion of total construction as it is in the 37 states covered by the Dodge figures.
- Line 5 As all figures in lines 1 to 4 omit most new buildings under \$5,000 each and practically all remodeling and alteration work in rural districts, an estimate for these items is made in line 5, for the years 1923-1927, by the same method used by the Dodge Corporation in making its estimate for the year 1928.
- Line 6 This column would give a satisfactory total public construction estimate were it not for the fact that the Dodge figures greatly undervalue total road and bridge expenditures by the omission of maintenance work, and the huge volume, in the aggregate, of minor repair, reconstruction and construction items in this class.
- Line 7 This gives the estimated amounts which represented this type of work in the totals of line 6.
- Line 8 In this line the road and bridge items (estimated on the basis of Dodge figures) are taken out of the totals for public construction of line 6 (similarly estimated on the basis of Dodge figures). For it is substituted the more comprehensive figures for this class of expenditure, presented in the next two lines.
- Line 9 The Bureau of Public Roads figures for construction and maintenance of rural roads and bridges.
- Line 10 Estimates of the expenditures on construction and maintenance of city streets and bridges throughout the country, made on the basis of the sample of such expenditures by 14 representative cities covered by the Dodge records. (The estimates allow for maintenance, repair and reconstruction work.)
- Line 11 represents the sum of lines 8-10 and should give a truer estimate of the aggregate volume of public construction of

all types throughout the country than has been made hitherto. It is not possible to carry these estimates back before 1923, since the Bureau of Public Roads figures are not available for earlier years, and because only 27 states are covered by the Dodge figures prior to 1923.

TABLE 42. — ESTIMATED TOTAL PUBLIC CONSTRUCTION IN UNITED STATES, 1923-1928

(In millions)

TYPE	1923	1924	1925	1926	1927	1928
1. Total construction 37 states ^a . . .	\$3,990	\$4,479	\$6,006	\$6,381	\$6,303	\$6,628
2. Total construction, United States ^b	4,768	5,237	6,623	6,901	6,787	7,065
3. Public construction 37 states ^a . . .	1,002	1,121	1,335	1,460	1,689	1,751
4. Public construction contracts of \$5000 and over, United States ^b . . .	1,192	1,312	1,469	1,577	1,824	1,874
5. Public construction contracts less than \$5000 plus reconstruction and remodeling, United States ^c	288	314	347	394	456	463
6. Total public construction, United States ^d	\$1,480	\$1,626	\$1,816	\$1,971	\$2,280	\$2,337
7. Streets, roads and bridges, United States ^b	481	472	564	682	833	860
8. Total public construction, minus streets, roads and bridges	999	1,154	1,252	1,289	1,447	1,477
9. Rural roads and bridges, construction and maintenance ^e . . .	784	934	968	956	1,066	1,237
10. City streets and bridges, construction and maintenance ^f . . .	210	412	374	602	975	885
11. Estimate of total public construction, United States ^g	\$1,993	\$2,500	\$2,594	\$2,847	\$3,488	\$3,599

^a The figures are taken from the F. W. Dodge Corporation. In 1923 and 1924 the figures cover 36 states.

^b Estimated on basis of F. W. Dodge Corporation figures.

^c Estimated on basis of 1928 F. W. Dodge Corporation figures.

^d Sum of items 4 and 5.

^e Figures taken from United States Department of Agriculture, Bureau of Public Roads.

^f Estimated on basis of F. W. Dodge Corporation figures for 14 cities.

^g Sum of items 8, 9 and 10. Bureau of Public Roads' figures for rural roads and bridges, construction and maintenance have been substituted for the Dodge figures of streets, roads and bridges because they are more inclusive.

Estimate of Total Volume of Public and Private Construction.

—It is of interest to have an idea of the proportion public construction has been of all construction in the country in recent years. In Table 43 an estimate has been made of the total volume of combined public and private construction of all kinds from 1923 to 1928, and compared with the volume of public construction alone during this period. This estimate was arrived at by the same procedure as that used in estimating the total value of

TABLE 43. — ESTIMATED TOTAL PUBLIC AND PRIVATE CONSTRUCTION IN UNITED STATES, 1923-1928

(In millions)

YEAR	DODGE FIGURES OF TOTAL CONSTRUCTION 37 STATES ^a	DODGE ESTIMATE OF TOTAL CONSTRUCTION UNITED STATES	ESTIMATED TOTAL PUBLIC AND PRIVATE CONSTRUCTION UNITED STATES	ESTIMATED TOTAL PUBLIC CONSTRUCTION UNITED STATES	PER CENT PUBLIC IS OF TOTAL CONSTRUCTION UNITED STATES
1923	\$3,990	\$4,768	\$6,368	\$1,993	31.3
1924	4,479	5,237	7,305	2,500	34.2
1925	6,006	6,623	8,911	2,594	29.1
1926	6,381	6,901	9,350	2,847	30.4
1927	6,303	6,787	9,542	3,488	36.6
1928	6,628	7,065	9,936	3,599	36.2

^a In 1923 and 1924 the amounts given are for 36 states.

public construction. Column 1 presents, as in Table 42, the most inclusive Dodge series of recorded figures for construction contracts awarded; Column 2 gives the estimates for the whole country made by the Dodge Corporation on the basis largely of the figures of Column 1. Both these columns omit most new buildings under \$5,000 each and much remodeling and alteration work; they also greatly undervalue total road and bridge expenditures, as explained above. These omissions have been fully rectified by the same means as were used in making the public construction estimates, in computing the figures of Column 3.