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II

PUBLIC WORKS IN THE UNITED STATES, 1919–1934: THEIR SCOPE, VOLUME, DISTRIBUTION AND FLUCTUATION

Criteria and Scope

The term public works is used in this study to cover all construction projects undertaken by governmental agencies, national or local, and financed from public funds. It thus includes construction work performed by autonomous bodies that are creatures of governmental agencies such as the Port of New York Authority, the British Central Electricity Board and the New York–New Jersey Tunnel Commission. Construction activities of state-owned even though independently-operated transportation systems, such as the railroads in Germany, are in the same category, but those of the railroads in the United States or Great Britain are excluded. Some types of buildings, notably schools, fall partly into one, partly into the other class. Similarly, public utility projects may be either private undertakings, as are the majority in the United States, or public projects, such as the Tennessee Valley development and municipal power plants.

It has been argued that the term construction should be restricted to operations that "produce a more or less fixed structure or alter the natural topography of the ground".[1] Where

[1] Corrington Gill, The Effectiveness of Public Works in Stabilizing the Construction Industry, *American Statistical Association Journal*, Supplement, March 1933, p. 196.

interest centers primarily in the physical aspects of construction work, this definition, which excludes the building of ships, movable machinery and rolling stock, is justifiable. Where the object of inquiry into public construction is primarily the possibility of its utilization as a stabilizing influence for business activity in general, this exclusion is not justified. In their effects upon employment, upon the demand for materials and in stimulating industry, the construction of a cruiser and of a shipyard do not differ fundamentally. In this study therefore, expenditures on the construction of floating equipment and the like are generally included, when available, in construction outlays.[2] For the same reason reconstruction, remodeling, repairs and other such 'maintenance' expenditures are also classified as construction, though their exclusion from estimates of public works made for other purposes might conceivably be necessary.[3] All 'operation' costs are excluded. Though the building and repair of a ferry boat or a subway might properly be considered as construction, their operation clearly could not be so regarded. Land acquisition costs have been excluded throughout, since they may represent no more than a transfer of funds, without necessarily affecting business activity or employment. In some instances decision as to what may and may not legitimately be reckoned as construction must be somewhat arbitrary.

The aggregate volume of public works has naturally increased through the ages with the material and technical advance of mankind, although discontinuously with the rise and fall of great civilizations, being clearly greater during eras of high material achievement than in earlier periods of growth and later ages of relapse or decay. Until perhaps

[2] It is of course often difficult in practice to decide which is construction and which the production and installation of movable equipment. *Statistics of Income* includes shipbuilding in construction.

[3] The criterion used in this study is the measure in which such expenditures may be regarded as constituting capital formation. They are partly in the nature of current and relatively perishable additions to the existing stocks of buildings and other structures, but in part they also represent substantial additions to these already existent stocks of durable goods.

the eighteenth century the amount of public construction in the western world could hardly have been of comparable magnitude with that of the Roman world in its prime. With the spread of the Industrial Revolution private and public construction alike must have rapidly expanded. Yet in the earlier stages of this process of economic transformation the *relative* volume of public works may well have declined as the economic functions of government were narrowly circumscribed under the influence of the dominant doctrine of 'laissez-faire'. With the decline of this economic philosophy, however, and with the state's progressive assumption of additional economic functions, this tendency has been reversed and the volume of public works has steadily grown both absolutely and relatively to private construction.

The scope of public works has been modified as several other factors have changed. Different civilizations and nations have spent and spend their public funds on dissimilar construction projects, as a result both of differences in scales of value and the obvious influence of geography. Although there is a surprising continuity in the fundamental character of many public works, the relative volume of expenditures on public buildings, religious edifices, the development of waterways and harbors, national defense systems, irrigation projects, communication and transportation facilities, and so forth, has varied greatly from place to place and one period to another.

The scope of governmental public works projects also varies as countries tend more or less to adopt the method of government ownership of public utilities and to assume other economic activities. In the United States and Great Britain railroads are privately owned. In Germany, Italy, Norway, Sweden, Poland and elsewhere they are almost entirely state owned; in Canada, Austria, Denmark, Japan and other countries, largely so. Telephone systems are pri-

vately owned in the United States, publicly in Great Britain. Again, in those countries where social legislation has been carried further than in America notable slum clearance and municipal housing schemes have been put into effect wholly or in part with public funds. In backward and newly developing countries the proportion of all construction undertaken by governments is likely, for obvious reasons, to be relatively larger than in advanced industrialized communities. In the U. S. S. R., with the elimination of private property in capital goods, the distinction vanishes and all construction becomes public. Because of these differences international comparisons of total public works expenditures would be extremely difficult; indeed, they become impossible by reason of the almost total lack of comprehensive and reliable estimates for most individual countries due to the notorious difficulty of extracting the figures required in each case from literally hundreds of frequently obscure official reports and private sources.

Volume and Growth

Inclusive estimates of the aggregate volume of all public works expenditures throughout the United States annually since 1923, classified by a variety of criteria, are presented in detail in the next chapter. These show that prior to the onset of the depression outlays increased rapidly. Aggregate annual expenditures for all public construction purposes rose steadily from perhaps a billion and a half dollars in 1919 to well over three and a half billion each year, 1927–30. The annual estimates, presented in detail in Tables 7, 11 and 12, in millions of dollars, since 1923 are as follows.

YEAR	PUBLIC CONSTRUCTION	TOTAL CONSTRUCTION	YEAR	PUBLIC CONSTRUCTION	TOTAL CONSTRUCTION
1923	$2,123	$ 9,587	*1929*	$3,555	$12,279
1924	2,652	10,769	*1930*	3,632	10,208
1925	2,812	12,295	*1931*	3,067	7,592
1926	2,974	12,578	*1932*	2,004	4,068
1927	3,706	12,924	*1933*	1,300	2,777
1928	3,631	13,019			

The amounts for public construction constitute on the average about 30 per cent of total construction, both public and private, during these years. The proportion has steadily risen, especially since 1929, reaching nearly one-half in 1932 and 1933. Public works expenditures constituted in 1928 between 25 and 30 per cent of the expenditures of all governmental agencies for all purposes.[4] In comparison with public works expenditures strictly defined, the estimated construction and maintenance expenditures of railroads and public utilities (electric power, telephone and electric railroad companies) grew from $2,657,000,000 in 1923 to $3,265,000,000 in 1929, declining thereafter to $1,332,000,000 in 1932 and $902,000,000 in 1933.

Planning and Procedure

Numerous and diverse elements enter into the determination to construct particular public works projects. Such factors as desirability, feasibility, the needs of particular localities or groups and the pressure exercised by sectional interests likely to be benefited by the improvement vary so greatly in weight according to place, time, financial considerations and other circumstances that no broad generaliza-

[4] Total orders given by public authorities in Germany in 1927 have been estimated at from six to six and a half billion marks; for reasons indicated above, however, no direct comparison would be valid. Partial figures for other countries also show in most instances a steeply rising trend until the beginning of the depression.

tions are possible. In many instances decisions have been influenced by 'logrolling' and 'pork barrel' legislation on the part of sections seeking to obtain advantages at the expense of the community as a whole. There are also good grounds for the widespread conviction that a substantial though indeterminable portion of the construction dollar, particularly of local governments, has often gone into political graft, and that decisions by local governmental units to engage in certain construction activities have been affected by the interests of corrupt politicians.

The traditional procedures employed by governmental agencies in undertaking permanent improvements show the most extreme differences both in fundamentals and details (see Ch. IV–VIII). Thus while a few cities, such as Cincinnati and Schenectady, attempt to plan their public projects some years in advance, under a long-term improvement program and capital budget, many more approximate the practice of New York City, which has neither but proceeds in a haphazard manner.[5] In the past the latter has authorized projects piecemeal without financial provision for carrying them through to completion, or serious consideration of their relative importance, so that obligations have been incurred for a volume of public works that could not be executed in a reasonable period, with consequent congestion, inefficiency, delay and waste. Cook County, Illinois, which includes the City of Chicago, has been an even worse example of chaos in local government. These may be extreme instances, but there is everywhere in the United States a multiplicity of authorities responsible for undertaking public works with varying degrees of financial autonomy.

[5] New York City's ordinary budget includes very few items for permanent improvements except roads, and capital outlays amounting to between one and two hundred million dollars annually have been almost entirely financed by borrowing; yet little attempt has been made to formulate a comprehensive budget or program for these expenditures (see Ch. VIII).

Allocation of Public Construction Expenditures by Purpose and Governmental Unit

By far the most important single object of construction expenditures in the United States in recent years has been the building and maintenance of roads, streets and bridges. During post-War years these expenditures have equaled or exceeded the aggregate amount spent throughout the country on all other types of public works. Between 1923 and 1930 their cost more than doubled (see Ch. IX). Annual expenditures were as follows, in millions of dollars, the figures in parentheses showing the percentage they constituted of total public construction outlays.

1923	$ 991	(47)	*1928*	$2,025	(56)
1924	1,346	(51)	*1929*	1,938	(55)
1925	1,331	(47)	*1930*	2,160	(59)
1926	1,553	(52)	*1931*	1,812	(59)
1927	2,123	(57)	*1932*	1,308	(65)

Of these annual sums, about two-thirds on the average was spent on rural roads and bridges. This very rapid growth of roadbuilding expenditures is mainly attributable to the development of the automobile. Total rural road and bridge disbursements of all kinds increased fourfold between 1904 and 1914, fivefold between 1914 and 1924, and almost doubled again between 1924 and 1930. In countries where the automobile is not so common, expenditures for roadbuilding constitute a smaller proportion of total construction expenditures than in the United States.[6]

[6] In Great Britain, for instance, at least one-third in recent years, and often more, of annual capital expenditures by central and local authorities has been for housing. Estimates of state-controlled new capital outlays, excluding those of semi-public organizations like the Port of London Authority, the British Broadcasting Company and the Metropolitan Water Board, but including those of the Central Electricity Board, and capital construction carried out by local authorities, which is undertaken almost entirely by means of borrowing with or without assistance from government grants, amounted to £121,400,000 in 1929–30, £146,800,000 in 1930–31, and £108,-

Next in importance to roads and bridges among public construction expenditures in the United States are educational buildings, amounting in recent normal years to about $400,000,000 annually, followed by hospitals and similar institutions (with outlays about two-fifths that amount), public buildings, waterfront developments, sewage systems and water supply facilities. Expenditures on public lighting systems, docks, piers and parks have ranged relatively low. The variation in the distribution of these expenditures by purpose as between different governmental units and different periods is, however, considerable. Thus New York City's largest item of capital outlays, subway construction, which from 1919 to 1929 constituted two-fifths of its total construction expenditures, is quite exceptional, as are outlays in the United States on municipally-owned power plants.

Prior to the depression nearly half of all public works in the United States was performed by municipalities. County authorities in the aggregate undertook about 25 per cent, the forty-eight state governments something over 15 per cent, and the Federal government the remaining 10 per cent. By 1933, however, this last percentage had risen to nearly 40, owing to greatly increased Federal outlays and the concurrent drastic decline in local expenditures, especially of cities and counties (Table 8).

During the post-War decade municipal outlays on capital improvements increased rapidly as a fast-growing urban population with mounting standards of living demanded more adequate communication and transportation facilities, better sanitary and lighting systems, larger educational structures better adapted to the purpose for which they were

800,000 in 1931–32 (*Monetary Policy and the Depression,* Royal Institute of International Affairs, London, 1933, pp. 65, 90–2). In Italy, among expenditures on public works undertaken directly by the state, railways and roads have held foremost place in recent years, and roads among those undertaken by local authorities (*Unemployment and Public Works,* pp. 146–57).

built, hospitals, public buildings and so forth. Throughout this period schoolbuilding expenditures constitute the largest single item, averaging about 30 per cent of the total in a representative sample of fourteen selected cities. Not much less was spent on roads and bridges. Subway construction, which in many years constitutes a larger percentage, is accounted for almost entirely by New York City. Hospital buildings constitute a substantial portion throughout, followed in order of importance by sewage systems, public buildings, lighting systems, water supply construction, dock improvements, waterfront developments and park buildings (Table 43).

The expenditures of state and county governments on public works are in general much less varied than those of cities and are largely for roadbuilding (see Ch. VI). Total public works expenditures of the State government of Michigan, 1925–30, ranged from 25 to 37 per cent of total disbursements for all governmental purposes; 90 per cent of these construction outlays were for roads and bridges. Similarly in California, Illinois, Ohio and many other states road- and bridgebuilding expenditures of the State government greatly outstrip all others. Even New York State, whose expenditures are more diversified, averaged 65 per cent of total construction outlays for this purpose from 1919 to 1929.

Federal construction expenditures (see Ch. IV and V) are both much larger and much more diversified than those of any other single governmental unit in the United States. Apart from the building of warships and aircraft these funds, which are disbursed throughout the entire country by numerous departments, bureaus, boards and other agencies, are expended for a great variety of purposes: inland waterways, great irrigation projects and harbor works, roadbuilding and the construction of army posts, veterans' hos-

pitals, Federal penitentiaries, customs houses, post offices, Indian schools, immigration stations and many other objects. But since the War a great change has occurred in their relative importance. In 1919, of total outlays on all construction, including floating equipment, amounting to $788,000,000, over a half was used by the Navy Department and more than a quarter by the Quartermaster Corps of the Army, while the Bureau of Public Roads spent less than $4,000,000 on roadbuilding. This last-mentioned item has grown steadily in importance and come to occupy the leading place among Federal public works expenditures, constituting on the average nearly one-third of its total annual construction outlays since 1924. Roadbuilding expenditures were between $80,000,000 and $90,000,000 a year from 1924 to 1930, and over twice that amount in 1931, 1932 and 1933. Total Federal expenditures, in millions of dollars, for new construction, repairs and alterations for fiscal years ending June 30 since 1920, exclusive of floating equipment and aircraft, have been as follows (see Table 15).

1920	$207	*1925*	$270	*1930*	$339
1921	240	*1926*	249	*1931*	490
1922	211	*1927*	249	*1932*	556
1923	190	*1928*	268	*1933*	553
1924	224	*1929*	307		

All public works are not performed entirely by individual governments, central or local; some are undertaken jointly by two or more governmental units, by an autonomous public body created especially for that purpose, and by governmental agencies in conjunction with private concerns upon a basis of cost division; in advanced countries an elaborate system has also been developed of grants-in-aid and other types of assistance from central to local governments to facilitate the financing of those public works for which responsibility is felt to be divided. For example, the con-

struction of the Holland Tunnel was financed by both New York and New Jersey. The development of international waterways is an instance of similar cooperation between sovereign powers. Public works undertaken by autonomous public bodies find illustration in the bridges and freight terminal facilities erected by the Port of New York Authority, a New York–New Jersey Interstate Commission empowered to contract loans on its own credit, and the Lake Champlain bridge, a New York–Vermont project. In Great Britain the construction work performed by the Port of London Authority, the British Broadcasting Company and the Central Electricity Board has much the same character. Occasionally, apart from the subsidies granted by central governments to private industries such as shipping and aviation to foster their development, public construction work is also undertaken jointly by governmental agencies and private interests. Thus the cost of railroad grade crossing elimination is usually shared by the state government and the railroad involved, with or without contribution from the county or city concerned.

The system of grants-in-aid from central to local governments for the encouragement of certain types of public works is widely used in one form or another. Since 1921 the Federal government has made appropriations to the several states for cooperative highway construction, amounting from 1925 to the depression, when it was virtually doubled by various acts, to $75,000,000 annually. Similar in character are the grants made by the state governments to local subdivisions, chiefly for roadbuilding. Similarly in Great Britain the central government directly contributes from the Road Fund 50 to 75 per cent of the capital costs of Class I and II roads, and also grants substantial subsidies for housing and schoolbuilding in the form of contributions to the loan charges.

Employment

Most public works in the United States are constructed under a system of contracts awarded by public competitive bidding, but governmental agencies generally also maintain a labor force of their own for construction, or more usually maintenance purposes, especially of roads. In the execution of public contracts attempts have often been made to set up minimum requirements with respect to such matters as wages and hours, but it has frequently been found difficult to enforce them. Figures of construction employment in the United States are notoriously inadequate, and no accurate calculation of the number engaged directly or indirectly on public construction is possible. Estimates vary markedly, but from counts and series of incomplete coverage it would appear that perhaps 800,000 were employed directly on all public construction during 1927–30. In addition it has been variously computed that for each worker employed directly on public construction from one to two more are given employment indirectly in the manufacture and transportation of building materials and equipment. Moreover, still further employment is created as a result of the demand exercised by these workers for consumers' goods. The 'secondary' employment thus created by public works during depressions has been calculated as being perhaps roughly as large again, in appropriate circumstances, as the 'primary' employment given directly and indirectly by construction expenditures. These ratios are discussed in Chapters XIII and XIV.

Financing

In most countries public works are financed in different proportions both from current revenue and by borrowing. In the United States practice in this matter varies greatly

with the governmental units involved. The Federal government has hitherto paid for its construction work entirely from general funds, Federal securities being floated as funds become depleted. In recent years frequent proposals have been made for setting up a separate capital budget. Taken as a whole the states, counties and cities have derived their construction revenues perhaps roughly three-fifths from general funds and two-fifths from bond issues floated usually for specific capital improvements (see Ch. VI–VIII). While some cities, such as New York, customarily finance their outlays almost entirely from the proceeds of bond sales, others, like Boston, have inclined towards a pay-as-you-go policy. The situation is similar with respect to states. For roadbuilding, about half the total funds for state highway and bridge work are derived from motor vehicle fees and gasoline tax receipts; those for local highways and bridges are derived largely from local road tax levies (Ch. IX).[7] Many local improvements are paid for by means of special assessments. Still another method of financing is through the imposition of charges or tolls for the use of the facilities constructed, as was done, for example, in the case of the Holland Tunnel and the bridges built by the Port of New York Authority. In contrast to the financing of public works proper, railroad and public utility construction is financed from surplus and operating revenues as well as from bond flotations.

Construction Costs

All figures and comparisons of building operations throughout this book are based on dollar valuations of con-

[7] In Great Britain the Road Fund is self-supporting, by far the greater portion being derived from the annual proceeds of the horsepower tax; most other capital construction is financed by borrowing, with or without assistance of grants from the central government to local authorities.

tracts awarded or of work executed without correction for cost variations. For years prior to the depression the neglect of this factor does not introduce on the whole such a degree of error that adjustment for changes in construction costs was, even if feasible, worth making. Cumulative changes over a long period of years have probably been considerable, but year-to-year changes have usually not been great. The decline in the cost of construction that occurred during the depression raises a more serious problem, because the change was both more marked and effected more rapidly than in previous years.

Unfortunately it is just at this point that all available indexes of building costs lose most of such value as they possess for earlier periods. Adjustment of the dollar volume of expenditures and contract awards by these unreliable measures can yield only untrustworthy and inaccurate results, apart from a defect, for the specific purposes of the present study, to which all building cost indexes are subject throughout the entire period they cover. For existent indexes are either composite series, which purport to show the course of construction costs as a whole, or, as in the case of the Aberthaw index of the cost of erecting a standard factory, show costs in specific types of building other than public works, which cannot be assumed to reflect accurately the course of construction costs in the latter category.

The reason for the inaccuracy of these series, particularly in periods of boom and depression, is that in most instances they combine, with appropriate weights, separate index numbers of building material prices and of wage rates for the principal classes of building labor. Tolerably trustworthy data are available for the former. The construction of a labor cost, or even a reliable wage, index, however, presents serious difficulties. For first, published figures of wages usually cover union scales only, while the actual rates paid are often greater in times of prosper-

ity and less during depressions (the latter frequently masked by surreptitious wage reductions). Second, actual labor costs are determined not only by wages but also by efficiency, a factor which is still less subject to statistical measurement. Periods of unusual activity are generally characterized by decreased productive efficiency, and conversely, men tend to work harder in times of depression through fear of losing their jobs. Indexes based on published wage rates therefore are defective for depression periods in failing to allow properly for two important factors: increased labor efficiency and unofficial reduction of wages from established scales. A third factor is the willingness of contractors at such times to accept a lower margin of profit in order to maintain their organizations.[8]

The deficiencies of the 'synthetic' indexes are revealed when they are compared with the Federal Bureau of Public Roads index of the cost of highway construction. Based on bid prices received by highway officials from contractors, this index does not have to be derived from wage rates and material prices; moreover, it also covers other costs. Between 1923 and 1929 the unit price index for a composite mile of highway, assuming a fixed weighted quantity of excavation, pavement, gravel surfacing, bridges, culverts, etc., declines 22 per cent; between 1923 and the third quarter of 1932 the decline is no less than 50 per cent.[9] Between approximately the same two pair of dates two private synthetic indexes based on wage rates and material prices showed changes as follows: *Engineering News-Record* index (heavy construction), —3 and —29 per cent; Associated

[8] A special study of fluctuations of building costs of public projects in Philadelphia showed that the City received more favorable bids for its contracts during depressions than in periods of business prosperity (W. N. Loucks, *The Stabilization of Employment in Philadelphia,* University of Pennsylvania, 1931, pp. 210–19). But it could not be determined in what measure this was attributable to the acceptance of narrower profit margins by contractors, to lower material costs, to reduced wage rates, and to the increased efficiency of labor.

[9] The materials and figures of this paragraph are derived from an article, Construction Cost Statistics, by James S. Taylor in the *American Statistical Association Journal,* Supplement, March 1934, pp. 38–42; see also an article by J. L. Harrison in *Public Roads,* July 1933.

General Contractors index (all types of construction), +1 and —21 per cent. The disparity is not explained entirely by the differences in types of work included in the indexes; it is also due to the omission of factors other than wages and materials in the synthetic indexes. Thus "the great lowering of the average price for excavation by 1929 is attributed to the more general use of power machinery; to improvements in the machinery itself; to the use of larger units of machinery; to better management; and to the development of greater skill on the part of working crews." [10] These factors are not reflected in the synthetic indexes. Furthermore, "by 1932, the bid prices probably represented in part competitive conditions under which many contractors made a subnormal allowance for wear and tear on equipment and other items of expense which, over a period of years, must be met". Finally, no allowance is made for differences in the quality of the structure. These considerations suggest that in showing very little change between 1923 and 1929 the synthetic indexes may be subject to a considerable margin of error, and *a fortiori* for the period since then.

Table 1 presents the index of construction costs of the New York Federal Reserve Bank, and the two component series which it combines, building materials and wages. For purposes of comparison, two other synthetic indexes constructed on the same broad principles are also given. The movements of the three composite indexes are similar in general, but differ in many particulars. Thus in 1933 while one index rises seven points and another two, the third drops four points. The dissimilarity in the movements of the two component indexes—materials and wages respectively—is, however, much more striking. Between 1925 and 1929 the former declines gradually, and after 1929 very rapidly; but wage rates rise steadily until 1930 and drop thereafter relatively little. The real extent of the fall was clearly much greater than the figures reveal.

Thus in so far as the figures of this study of dollar valuations of contracts awarded or construction expenditures are

[10] Taylor, *loc. cit.*, p. 39.

TABLE 1

INDEXES OF CONSTRUCTION COSTS
(1926: 100)

YEAR	N. Y. FEDERAL RESERVE BANK [1] TOTAL	BUILDING MATERIALS	WAGE RATES	ENGINEERING NEWS-RECORD [2]	ASSOCIATED GENERAL CONTRACTORS [2]
1919	93	116	65	95	101
1920	120	150	83	121	125
1921	91	97	83	97	102
1922	90	97	81	84	93
1923	100	109	89	103	102
1924	99	102	95	103	103
1925	99	102	97	99	101
1926	100	100	100	100	100
1927	98	95	102	99	102
1928	98	94	102	99	101
1929	100	95	105	99	103
1930	98	90	108	96	102
1931	91	79	104	87	99
1932	82	72	94	75	87
1933	84	77	92	82	83
1934	89	86	92	95	90

[1] The index of the cost of building is the weighted average of the index of the cost of building materials (weight: 55) and the index of wage rates (weight: 45). The index of the cost of building materials was prepared by the N. Y. Federal Reserve Bank, for 1919–25, from *U. S. Department of Labor Bul. 473* (Wholesale Prices, 1913–27), about 50 building materials being used; for years since 1926, from Revision of Wholesale Price Index, about 80 building materials being used. The index of wage rates was prepared by the N. Y. Federal Reserve Bank, for 1919–21, from the *Monthly Labor Review*, Union Rate of Wages in Building Trades; 1922–30, *The American Contractor*, Wage Scale in the Building Trades (compiled by the National Association of Building Exchanges and combined by the N. Y. Federal Reserve Bank); since 1931, from the wage index of the F. W. Dodge Corporation.

[2] *Survey of Current Business*. The index numbers have been recomputed to a 1926 base.

regarded as a measure of fluctuations of the physical volume of construction, they unquestionably give a somewhat exaggerated impression of the magnitude of the decline during the depression. That decline, however, was so severe that the conclusions drawn in the text from analysis of the uncorrected figures remain unaffected. Furthermore, only a spurious appearance of accuracy would be given by application, as a correction factor, of indexes of construction costs that would be subject to a large margin of error even when used for construction as a whole, to which they relate, not

for public works. Finally, for purposes of this study, where interest centers in the possible utilization of public construction as a stabilizing influence, there is an advantage in talking in terms of dollar valuations inasmuch as it facilitates comparison with most other series relating to economic activity.

Public and Private Construction

TREND AND FLUCTUATION

A rapid expansion of construction expenditures, both public and private, was associated, whether as cause or consequence, or both, with the high level of business activity in the United States from 1922 to 1929. An analysis of the relation between these two trends lies outside the scope of this study. Attention may, however, pertinently be directed to the dissimilarity in the movements of public and private construction during the post-War decade and a half.

Both categories disclose a steeply-rising trend until the depression, but in its short-period movements private construction shows a much closer correspondence with cyclical fluctuations in general business conditions. This is not unexpected. Since public works are financed by governmental agencies, and not undertaken for profit, they are less sensitive to business cycles than is privately-financed building. Moreover, they are usually planned, and provision for meeting their cost is usually made, a considerably longer time before the initiation of the project than is the case with private construction. Thus such effects as the business cycle has on public works make themselves felt only indirectly through public treasuries and, if not obscured by other influences, after a somewhat prolonged interval. In contrast, the movements of private construction tend to precede general business fluctuations.

TABLE 2

TOTAL CONSTRUCTION CONTRACTS AWARDED, 1919–1934 [1]
(in thousands)

YEAR	27 STATES [2]	37 STATES [3]	ENTIRE U. S. (ESTIMATE) [4]
1919	$2,579,881	. . .	. . .
1920	2,564,522	. . .	$3,337,600
1921	2,356,244	. . .	3,068,900
1922	3,343,822	. . .	4,329,700
1923	3,503,726	. . .	4,768,100
1924	3,873,052	$4,603,287	5,237,100
1925	5,041,937	6,006,426	6,723,900
1926	5,418,186	6,380,915	7,062,400
1927	5,473,161	6,303,055	7,021,500
1928	5,835,952	6,628,286	7,294,600
1929	4,999,031	5,750,791	6,421,400
1930	[5]	4,335,802 [6]	4,837,600 [7]
1931	[5]	3,063,212 [6]	3,522,700 [7]
1932	[5]	1,348,070 [6]	1,550,300 [7]
1933	[5]	1,252,320 [6]	1,440,200 [7]
1934	[5]	1,539,114 [6]	. . .

Source: F. W. Dodge Corporation, Statistical Division

[1] All figures in this table omit new construction and remodeling projects under $5,000 valuation through 1929, under $2,000 in 1930 and 1931, under $1,000 in 1932, and under $500 in 1933 and 1934.

[2] 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.

[3] The 10 additional states included in the group of 37 are: North Carolina, South Carolina, Georgia, Florida, Tennessee, Alabama, Mississippi, Arkansas, Louisiana and Texas.

[4] Estimates made on the basis of construction contracts awarded in 37, 36, or 27 states. Note that these figures cover only work performed under contract. This partly explains why they are so much smaller than those given above. A large volume of force-account work (and also of low-cost contract work) is omitted. For details see Ch. III.

[5] Series discontinued by the F. W. Dodge Corporation.

[6] Pipe lines excluded to make figures comparable with previous years.

[7] Estimates made for this study on basis of construction contracts awarded in 37 states.

After 1928 construction throughout the country declined very rapidly. But public works fell less sharply than private and continued at a high level in 1930 and 1931. Between 1928 and 1932 total public construction declined about 45 per cent, but total private construction almost 80 per cent. The percentage change from the level of the preceding year was as follows for the two categories.

YEAR	PUBLIC	PRIVATE
1929	— 2	— 7
1930	+ 2	—25
1931	—16	—31
1932	—35	—54
1933	—34	—28

The total value of contracts awarded, shown in Table 2, declined sharply in 1921, then rose steadily to a peak of activity in 1928. Thereafter a sharp drop is recorded each year. In 1933 the amount is less than half that of 1920 or 1921. The figures represent the total dollar volume of contracts awarded in the different areas indicated, but exclude small new construction projects and most remodeling and alteration. The first two columns, covering 27 and 37 states respectively, show actually reported figures of contracts awarded. Since the coverage of the original series has twice been extended and the narrower series have recently been discontinued, two series have been presented to show the course of awards back to 1919. The figures in the last column show estimates of the total value of contracts awarded throughout the entire United States made on the basis of the figures given in the other two columns.[11]

The severe decline in the aggregate dollar volume of con-

[11] Throughout this Chapter, in analyzing the course of public construction, statistics of contracts awarded are used as the basic source of information, because such figures alone are reliable, comprehensive and convenient. They also make possible direct comparison of the volume of public and private building, which no other data do. Even in preparing estimates of the total volume of public works alone, the other source of information employed in later chapters of this book in discussing the public works activities of individual cities and states cannot be utilized. To attempt to derive estimates for the entire country from the official reports of the expenditures of various governments on permanent improvements would involve the examination of countless reports of a host of national, state and local public agencies and give rise to a variety of problems of interpretation and reclassification for purposes of comparability. For an examination of other sources of construction statistics reference may be made to *Planning and Control of Public Works*, Leo Wolman (National Bureau of Economic Research, 1930), pp. 116–22.

TABLE 3

TOTAL CONSTRUCTION CONTRACTS AWARDED IN 37 STATES, 1925–1934[1]

(in thousands)

CLASS	*1925*	*1926*	*1927*	*1928*	*1929*	*1930*	*1931*	*1932*	*1933*	*1934*
Commercial	$872,444	$920,891	$932,911	$884,610	$929,188	$616,320	$311,106	$122,718	$99,371	$150,596
Industrial	326,613	471,250	375,910	508,840	545,862	256,633	116,157	43,491	127,517	116,079
Educational	426,386	381,078	379,796	398,997	381,908	376,051	228,777	82,308	39,950	117,503
Hospitals and institutions	111,050	133,102	162,475	164,728	152,204	163,121	121,193	48,353	37,252	37,309
Public buildings	54,520	67,220	79,468	76,245	120,778	139,815	181,267	117,983	50,908	55,665
Religious and memorial	153,074	148,780	156,491	127,947	106,111	92,837	53,100	27,255	17,669	18,299
Social and recreational	248,664	247,122	260,714	214,121	140,019	113,298	98,747	38,683	31,056	47,574
Residential	2,747,730	2,671,120	2,573,317	2,788,317	1,915,728	1,101,313	811,389	280,068	249,262	248,840
Public works and utilities	1,065,947	1,340,352	1,381,974	1,464,481	1,458,993	1,463,926[2]	1,141,477[2]	587,213[2]	599,334[2]	747,249[2]
Total	$6,006,426	$6,380,915	$6,303,055	$6,628,286	$5,750,791	$4,335,802[2]	$3,063,212[2]	$1,348,070[2]	$1,252,320[2]	$1,539,114[2]

Source: F. W. Dodge Corporation, Statistical Division

[1] Contracts below the following minimum valuations omitted: 1925–29, $5,000; 1930 and 1931, $2,000; 1932, $1,000; 1933 and 1934, $500–100.

[2] Pipe lines excluded to make figures comparable with the preceding years (amounts were as follows: 1930, $187,312,200; 1931, $29,638,000; 1932, $3,088,600; 1933, $3,388,200; 1934, $3,986,900).

struction after 1928, shown in Table 3, is very unevenly distributed among the various items that go to make up the total. Until late in the depression the drop in the classes of strictly private construction is much sharper than in those which are composites of both public and private construction, such as public works and utilities,[12] or mainly represent public construction, such as educational buildings, hospitals and institutions and public buildings. Between 1929 and 1931 commercial buildings declined by two-thirds, industrial by almost four-fifths, and residential, (which already had shown a sharp decline in 1929) by nearly three-fifths, but public works and utilities declined by less than one-fifth, educational buildings by about two-fifths, hospitals and institutions by a fifth, while public buildings actually increased sharply. In other words, during the first two years of the depression the classes of construction comprising projects undertaken entirely or in large measure by governmental agencies and financed from public funds held up much better than did privately-financed building. During the succeeding two years, however, the two categories declined in not dissimilar degree. If a depression is sufficiently protracted public construction would appear to be eventually affected almost as severely as private.

COURSE OF PUBLIC CONSTRUCTION DURING THE DEPRESSION

The aggregate amounts of contracts awarded in the areas

[12] The Dodge class 'Public Works and Utilities' does not comprise all the types of building regarded as public works in this study, and conversely includes certain types, such as utility and railroad construction, that are excluded from our classification because they are financed privately and not by governmental agencies. 'Public Works and Utilities' omits the following classes comprehended in our interpretation of what constitutes public works: educational buildings, hospitals and institutions; military, naval and public buildings; subway construction; and parks. It includes railroad construction and railroad buildings, and power plants, excluded from our classification of public works.

TABLE 4

PUBLIC CONSTRUCTION CONTRACTS AWARDED IN 27 NORTHEASTERN STATES, 1919–1929[1]

(in thousands)

PURPOSE	*1919*	*1920*	*1921*	*1922*	*1923*	*1924*	*1925*	*1926*	*1927*	*1928*	*1929*
Educational buildings[2]	$108,902	$157,041	$217,441	$252,825	$234,199	$250,447	$273,963	$321,125[2]	$323,780[2]	$345,267[2]	$342,738[2]
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	32,096	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	2,483	5,972	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	[3]	[3]	[3]	[3]
Subways and tunnels	6,682	4,905	2,152	27,232	8,490	32,372	66,776	54,702[4]	77,943[4]	86,603[4]	91,342[4]
Sewage systems	57,713	41,944	48,772	50,907	51,359	51,077	89,416	85,641	125,487	104,539	99,958
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[5]	4,723[5]	1,834[5]	2,118[5]
Total	$616,437	$762,356	$771,009	$912,395	$828,180	$903,512	$1,055,132	$1,226,739	$1,484,881	$1,572,066	$1,515,049

Source: F. W. Dodge Corporation, Statistical Division

[1] The 27 states included are those listed in Table 2, note 2.

[2] Private schools, which have been subtracted from the figures for educational buildings in earlier years, are included since 1926. In 1919 they amounted to $10,612,603; 1920, $15,257,400; 1921, $23,270,800; 1922, $49,446,900; 1923, $37,080,100; 1924, $66,700,000; 1925, $95,527,200.

[3] Not reported separately in these years.

[4] New York City Board of Transportation figures of contracts awarded for subway construction in New York City.

[5] Estimated as one-half of total parks.

TABLE 5

PUBLIC CONSTRUCTION CONTRACTS AWARDED IN 37 STATES, 1926–1934

(in thousands)

PURPOSE	*1926*	*1927*	*1928*	*1929*	*1930*	*1931*	*1932*	*1933*	*1934*
Educational buildings [1]	$381,080	$379,797	$398,998	$381,908	$376,050	$228,776	$82,309	$39,950	$117,503
Hospitals and institutions	133,103	162,475	164,728	152,205	164,197	121,193	48,353	37,252	37,309
Military and naval buildings	8,659	9,475	15,177	9,342	21,451	16,119	2,929	8,298	12,643
Public buildings	58,504	69,991	61,072	111,438	118,366	165,149	115,054	42,611	43,022
Waterfront developments [2]	40,069	44,049	57,479	90,439	75,748	121,193	75,032	123,927	86,274
Bridges	124,019	176,575	167,907	124,950	166,455	102,016	57,898	60,799	75,978
Incinerators	3,052	6,779	3,867	2,629	2,113	2,960	6,494	973	1,311
Lighting systems	29,692	33,350	24,984	35,683	31,913	14,335	29,223	24,555	29,185
Subways [3]	54,702	77,943	86,603	91,342	78,453	28,426	6,452	479	10,825
Sewage systems	101,195	140,577	114,519	107,959	96,204	88,330	30,911	35,341	78,193
Street paving and road construction	507,306	594,185	636,194	608,470	623,676	560,949	344,364	278,436	325,246
Water supply systems	73,500	71,357	106,469	51,104	56,115	44,830	16,517	34,369	50,566
Parks (public) [4]	1,992	5,375	2,170	2,844	3,393	2,721	3,198	2,472	3,262
Total	$1,516,873	$1,771,928	$1,840,267	$1,770,313	$1,814,134	$1,496,997	$818,734	$689,463	$871,317

Source: F. W. Dodge Corporation, Statistical Division

[1] Private schools included.
[2] Docks and piers included.
[3] New York City Board of Transportation figures of contracts awarded for subway construction.
[4] Estimated as one-half of total parks.

covered by Tables 4 and 5 represent between 80 and 90 per cent of the estimated total awards throughout the United States. The main channels of public works expenditures are seen to have been the construction of roads, bridges, schools, hospitals and other public buildings. Though the true aggregate dollar volume of street and road construction is much underrepresented by Dodge statistics of contracts awarded, owing to the omission of low-cost projects and force-account work, the great importance of this category is very clearly apparent. Its sharp rise in relative importance during the depression is significant (see Ch. IX).

Total public works contracts showed an almost unbroken rise from 1919 to 1928, a slight decline in 1929, a slight increase in 1930 and thereafter a sharp fall in each of the following three years. Even the depression year 1920 was characterized by a substantial increase. Monthly figures show from the middle of 1930 substantially smaller amounts almost each month than the corresponding month of the preceding year. This failure of public construction contracts awarded to expand in 1930 argues a scant degree of success in the efforts which it was claimed at the time were being exerted to increase the volume of public construction. Indeed, the decline in total public construction during the depression would have been even greater had it not been for the two elements that do reflect some degree of deliberate acceleration—the expanded program of the Federal government itself and the increase in roadbuilding activity made possible largely by the augmented contributions of the Federal government to the states for this purpose.[13] Deducting Federal expenditures, including Federal-aid, from total public construction expenditures throughout the

[13] The success of the Federal government in expediting its construction program is reflected in the figures of expenditures given above (for detailed analysis, see Ch. IV and V). The results of the increased appropriations for Federal-aid highway construction are presented in Ch. IX.

country, the course of non-Federal outlays is shown to have been as follows (in millions of dollars): 1929, 3,250; 1930, 3,242; 1931, 2,557; 1932, 1,424.

COURSE OF PUBLIC AND PRIVATE CONSTRUCTION IN 1933 AND 1934

In each of the years 1932–34 over half of the total for all classes of contracts awarded were undertaken by public agencies—Federal, state, county and municipal. Although for the full year 1933 total construction awards were about 7 per cent less than for the preceding year, building activity revived markedly during the second half of 1933, substantial gains being recorded each month until the end of the year. Table 6 and Chart I supply the explanation: the rapid rise in total awards is due entirely to the sharply increasing volume of public contracts. While the curve for privately-financed work continues to sag during the latter half of the year, the public works curve shoots upward each month, in contrast to the normal seasonal tendency (see Ch. XII). The effects of the Government's expanded construction program, after its initial delays, are clearly revealed. Total contracts for December are larger than for any month since October 1931, and more than two and a half times as large as for December 1932. Over three-quarters of this December 1933 total is composed of publicly-financed contracts, which are almost nine times as large as in April, their low point. For the first half of 1933, when public contracts were running lower in volume than private, total awards were about a third less than for the corresponding period of 1932. The considerable increase in total awards during the second half of the year is thus attributable entirely to the very rapid rise in public contracts. Naturally the volume of actual construction work lagged behind the mounting volume of

TABLE 6

CONSTRUCTION CONTRACTS AWARDED IN 37 STATES, MONTHLY, 1932–1934, SHOWING DISTRIBUTION BETWEEN PRIVATELY- AND PUBLICLY-FINANCED WORK OF ALL TYPES

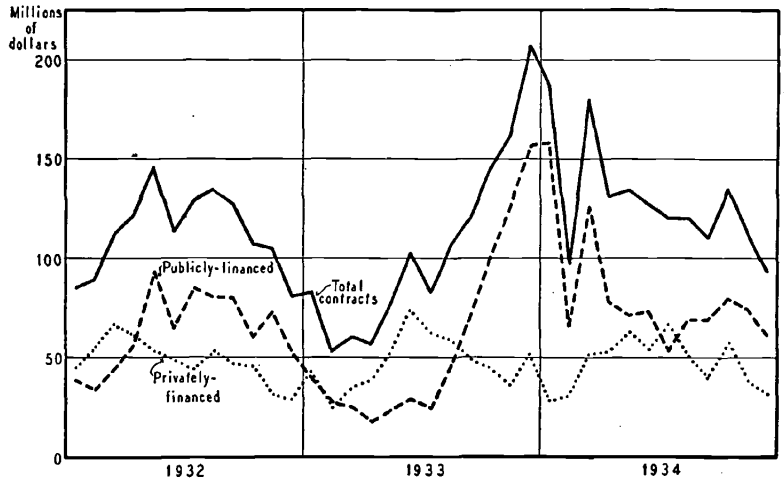
(in thousands)

	1932			1933			1934		
MONTH	PUBLICLY-FINANCED	PRIVATELY-FINANCED	TOTAL CONTRACTS	PUBLICLY-FINANCED	PRIVATELY-FINANCED	TOTAL CONTRACTS	PUBLICLY-FINANCED	PRIVATELY-FINANCED	TOTAL CONTRACTS
January	$39,344	$45,454	$84,798	$39,480	$43,876	$83,356	$157,477	$28,987	$186,464
February	33,673	55,373	89,046	26,637	26,076	52,712	65,409	31,307	96,716
March	44,812	67,422	112,235	25,206	34,752	59,959	125,940	52,406	178,346
April	60,530	61,175	121,705	17,639	38,934	56,573	77,834	53,323	131,157
May	92,548	53,673	146,221	23,684	53,488	77,172	71,797	62,566	134,364
June	64,268	48,807	113,075	28,804	73,538	102,342	73,239	53,770	127,010
July	85,264	43,505	128,769	19,946	62,608	82,554	52,498	67,165	119,662
August	81,102	52,886	133,988	47,186	58,803	105,989	68,635	50,957	119,592
September	80,101	47,426	127,527	71,355	48,779	120,134	69,275	40,876	110,151
October	60,926	46,348	107,274	100,496	44,871	145,367	78,550	56,675	135,225
November	73,087	32,215	105,302	126,402	35,939	162,341	73,753	37,938	111,692
December	52,012	29,207	81,219	155,863	51,347	207,210	60,977	31,746	92,724
Annual total	$767,667	$583,491	$1,351,159	$682,699	$573,010	$1,255,708	$975,385	$567,716	$1,543,101

Source: F. W. Dodge Corporation, Statistical Division

awards, and these in turn behind emergency allotments. Thus total allotments made up to the end of 1933 by the PWA for Federal projects amounted to $1,370,988,000 but contracts awarded amounted only to $546,778,000, actual expenditures being still smaller.

CHART I
CONSTRUCTION CONTRACTS AWARDED IN 37 STATES
MONTHLY, 1932-1934



In 1934 public contracts receded sharply during the early months from the high level of the last quarter of 1933, but for the year as a whole they were over 40 per cent more than in 1933. Privately-financed work, in contrast, was slightly less in 1934 than in 1933. Over two-thirds of all contracts in 1934 are composed of public contracts.