

utilities, 64 percent compared with 50 percent. The average annual increases were 4.4 percent and 3.7 percent.

During 1967–78, both private and government output per employee grew more than twice as fast as that of the overall economy, which registered an increase of only 21 percent.

But the slowdown in productivity growth so often observed and discussed in the overall economy was also in evidence in the electric power industry. The private business sector posted a 1.1-percent rise in output per employee from 1967 through 1972 and 0.8 percent from 1973 through 1978. The deceleration was sharper for electric utilities, from 5.5 percent in 1967–72 to 2.4 percent in 1973–78 for private utilities and 6.7 percent to 2.8 percent for State and local government utilities. □

— FOOTNOTE —

¹ Includes States and local governments or political subdivisions that engage in the generation, transmission, or distribution of electric energy for sale. The industry is designated as SIC 4911 in the *Standard Industrial Classification Manual, 1972*. All average annual rates of change are based on the linear least squares trend of the logarithms of the index numbers.

APPENDIX: Measurement techniques

Indexes of output per employee measure changes in the relationship between the output of a function and the employment expended on the output. The index of output per employee is derived by dividing the index of output by the index of functional employment.

The preferred output for the electric power index would be the kilowatt hours sold to ultimate customers separated by class of service provided—residential, commercial and industrial, and other—each weighted by the number of employees required to produce one unit in the specified base period. Thus, those services which require more labor time to produce are given more importance in the index.

In the absence of the number of employees by class of service, unit revenues have been used as weights in calculating outputs for the private and large government utilities. Class of service is not available for total State and local government output so this index is not weighted by that factor.

Employment indexes were derived from Bureau of Census, Bureau of Labor Statistics, and individual utility data. Employees and employee hours are each considered homogenous and additive, and thus do not reflect changes in the qualitative aspects of labor such as skill and experience.

The indexes of output per employee do not measure any specific contribution, such as that of labor or capital. Rather, they reflect the joint effect of factors, for example, changes in technology, capital investment, capacity utilization, plant design and layout, skill and effort of the work force, managerial ability, and labor management relations.

Labor and material requirements for Federal building construction

JOHN G. OLSEN

Continuing a long-term trend, the number of employee hours required per constant dollar of expenditure for Federal building construction is declining. Each \$1,000 (in 1959 dollars) spent on Federal building projects in 1976 generated about 68 onsite employee hours, compared with 72 employee hours in 1973 and 97 hours in 1959 (table 1).¹ Assuming a continuation of this trend, an estimated 64 onsite employee hours per 1,000 (1959) dollars would have been generated in 1980.²

In terms of employment, each \$1 billion spent on Federal building construction during 1980 generated the equivalent of about 24,900 year-long, full-time jobs throughout the economy.³ About 11,000 of these would be in the construction industry, 9,700 onsite and 1,400 offsite.⁴ In addition, about 13,900 jobs would be in industries that produce, transport, and sell the materials, equipment, and supplies used in Federal building construction.⁵ In comparison, during 1980, for each \$1 billion expended for commercial office building construction about 21,900 jobs were generated, and about 23,200 jobs were generated per \$1 billion spent on elementary school and secondary school construction.⁶

These data are from a study of all Federal buildings completed in the continental United States in 1976 and 1977 under the auspices of the Public Buildings Service, General Services Administration.⁷ The study originally comprised 33 projects, but was reduced to 24 due to lack of cooperation by contractors and because some projects were judged to be out of the scope of this survey. Lack of cooperation in supplying data was particularly acute in the West.⁸ As a result, data for the West are not sufficiently reliable to permit publication of separate figures for that region. However, data for the West were adjusted for nonresponse and were included in national totals. Projects in the study included regular Federal and Social Security Administration office buildings, border stations, and other buildings included in the last two BLS studies on Federal building construction. Federal and Social Security Administration office buildings accounted for about 80 percent of all projects in 1973 and 1976. Although all three of these surveys are essentially studies of office buildings, several factors make comparisons among them difficult.

The average building size, for example, varies considerably among the studies. In 1959 (1962 study), the av-

John G. Olsen is an economist in the Office of Productivity and Technology, Bureau of Labor Statistics.

Table 1. Employee hours required per \$1,000 of Federal building construction, by industry, 1959, 1973, 1976, and estimated 1980

Industry	Current dollars				Constant 1959 dollars		
	1959	1973	1976	1980 ¹	1973	1976	1980 ¹
All industries	235.7	(³)	81.5	47.4	(³)	187.4	172.8
Construction	107.9	47.7	34.5	20.1	80.2	79.3	73.3
Onsite	97.1	42.8	29.8	17.4	71.9	68.5	63.5
Offsite	10.8	4.9	4.7	2.7	8.2	10.8	9.8
Other industries ²	127.8	(³)	47.0	27.3	(³)	108.1	99.5
Manufacturing	79.2	(³)	26.0	14.7	(³)	59.8	53.6
Trade, transportation, and services	35.7	(³)	16.5	9.9	(³)	37.9	36.1
Mining and other	12.9	(³)	4.5	2.7	(³)	10.3	9.8

¹The 1980 employment estimates were developed from 1976 survey data adjusted for price and productivity changes from the midpoint of the 1976 survey.

²Indirect employment data were revised from the original 1959 survey results because of the reprocessing of materials data, through improved input-output tables.

³Data not available.

NOTE: Detail may not add to totals because of rounding.

erage size was about 94,000 square feet. This dropped to 67,000 in 1973 (1976 study) and rose to 266,000 in 1976. A further complication is introduced by the abolition of the Post Office Department, whose physical plant was under the control of the General Services Administration, as are most Federal office buildings. After the establishment of the new U.S. Postal Service, control of the buildings reverted to the new agency. Thus, Postal Service buildings are excluded from the 1973 and 1976 studies. In addition, a larger proportion of small Social Security Administration office buildings, those with 10,000 square feet of floor space or less, were included in the 1973 study and made up about 40 percent of all projects.

As a result of these factors, only the broadest comparisons can be made among these studies.

Onsite labor requirements

Onsite labor requirements accounted for the largest component of total labor requirements for new Federal building construction in 1976. Federal building projects averaged about 30 onsite employee hours per \$1,000 of contract cost, about 37 percent of all employee-hour requirements. Federal and Social Security Administration office building projects generated slightly lower onsite labor requirements than other Federal building projects, an average of about 29 hours, compared with 33.

Federal building projects during 1976 required an average of 378,000 onsite employee hours, or about 210 employee years of onsite labor, compared with 119,000 onsite hours in 1973 and 171,000 hours in 1959. On a square-foot basis, Federal building projects in 1976 generated an average of almost 142 onsite employee hours per 100 square feet, a decline from the approximately 177 onsite employee hours generated in 1973, and the 183 hours in 1959.

Onsite employee hours per \$1,000 (constant 1959) de-

creased at an average annual rate of 2.2 percent between 1959 and 1976.⁹ From 1959 to 1973, the annual rate declined an average of 2.3 percent. Between 1973 and 1976, it fell an average of 1.6 percent.

The change, over time, of onsite employee-hour requirements per unit of output reflects the introduction of new methods, equipment, and materials, and shifts in the composition and location of construction. Although changes in onsite employee-hour requirements reflect some differences in the type of structures built in the survey years, they provide a rough indication of productivity trends in this type of construction.

Onsite employee-hour requirements contributed by skilled trades workers increased from about 60 percent of total onsite employee hours in 1959 to more than 68 percent in 1976 (table 2). This rise paralleled significant increases in the proportion of onsite work performed by structural iron workers, elevator constructors, cement finishers, operating engineers, and electricians. These trends reflect greater use of structural steel and concrete as building materials, as well as a larger mix of multi-story office buildings with elevators. The percentage of semiskilled and unskilled workers fell during 1959-76, reflecting the increasing mechanization of construction laborers' tasks.

Table 2. Onsite employee hours required per \$1,000 of Federal building construction cost, by occupation, 1959 and 1976

Occupation	Onsite employee hours		Percent distribution	
	1959	1976	1959	1976
All occupations	97.1	29.8	100.0	100.0
Skilled trades	58.2	20.4	59.9	68.3
Bricklayers	5.0	.8	5.2	2.7
Carpenters	12.2	4.1	12.6	13.9
Cement finishers	2.0	1.0	2.1	3.3
Electricians	8.8	3.4	9.1	11.5
Elevator constructors .....	.7	.4	.8	1.4
Glaziers .....	.4	.1	.4	.5
Insulation workers	2.1	.4	2.1	1.4
Iron workers, ornamental .....	.8	.3	.8	.9
Iron workers, reinforcing	2.1	.4	2.2	1.2
Iron workers, structural	1.2	1.7	1.2	5.8
Lathers	1.8	.3	1.8	1.1
Operating engineers	2.3	1.1	2.4	3.6
Painters	2.0	.5	2.1	1.6
Plasterers	2.0	.3	2.0	1.1
Plumbers and pipefitters	8.5	2.4	8.7	7.9
Plumbers	(¹)	1.3	(¹)	4.5
Pipefitters	(¹)	1.1	(¹)	3.4
Roofers .....	.7	.3	.7	1.0
Sheet-metal workers	4.9	1.3	5.0	4.5
Soft floor layers .....	.2	(²)	.2	.1
Terrazzo workers and tile setters .....	.5	.2	.5	.6
Other skilled workers	(¹)	1.2	(¹)	4.2
Laborers and other	33.0	7.0	34.0	23.6
Laborers, helpers, and tenders	31.5	6.4	32.5	21.4
Truckdrivers .....	.9	.2	.9	.8
Other .....	.6	.4	.6	1.4
Professional, technical, and clerical workers	2.2	.8	2.3	2.8
Superintendents and blue-collar supervisors	3.6	1.6	3.7	5.3

¹Data not available.

²Less than .05 employee hours.

NOTE: Detail may not add to totals because of rounding.

Table 3. Onsite employee-hour requirements in Federal building construction, by type of contractor, 1959, 1973, and 1976

Type of contractor ¹	Employee hours required per \$1,000			Percent distribution		
	1959	1973	1976	1959	1973	1976
Total	97.1	42.8	29.8	100.0	100.0	100.0
General contractors	38.5	16.1	9.1	39.6	37.6	30.5
Plumbing, heating, ventilating, and air-conditioning	19.5	8.5	4.9	20.1	19.9	16.6
Heating, ventilating, and air-conditioning	(²)	5.9	4.0	(²)	13.7	13.6
Plumbing	(²)	2.6	.9	(²)	6.1	3.0
Electrical	9.5	4.2	3.3	9.8	9.8	11.2
Plastering and lathing	4.7	2.7	.5	4.8	6.4	1.6
Structural and ornamental iron work	3.4	1.7	1.8	3.5	3.9	6.0
Structural steel erection	(²)	1.4	1.7	(²)	3.3	5.8
Ornamental iron work	(²)	.2	.1	(²)	.6	.2
Elevator and other equipment installation	1.5	1.6	.8	1.5	3.8	2.8
Elevators	(²)	.4	(²)	(²)	1.0	(²)
Mechanical and equipment installation	(²)	1.2	(²)	(²)	2.8	(²)
Masonry and stonework	7.7	1.2	1.5	7.9	2.9	5.2
Site preparation, excavation, and grading	2.0	.9	1.4	2.1	2.2	4.7
Roofing and sheet metal work	1.2	1.0	.5	1.2	2.3	1.6
Roofing and gutter work	(²)	.9	.4	(²)	2.1	1.3
Sheet metal work (except heating)	(²)	.1	.1	(²)	.2	.3
Painting and paper hanging	2.0	.5	.5	2.1	1.2	1.5
Ceramic tile, terrazzo, and marble	1.4	.5	.3	1.4	1.2	1.0
Other	5.7	3.7	3.0	5.9	8.7	17.1
Concrete work	(²)	.8	1.8	(²)	1.8	6.0
Carpentry	(²)	.8	.3	(²)	1.8	1.2
Acoustics	(²)	.2	.5	(²)	.5	1.8
Wallboard	(²)	(²)	.9	(²)	.1	2.9

¹ Because many contractors perform more than one operation, contractors are classified according to the major cost component of their work.

² Data not available.

³ Less than .05 employee hours.

NOTE: Detail may not add to totals because of rounding.

General contractors accounted for 31 percent of onsite employee-hour requirements in 1976. Compared with the two earlier studies, this represents a continuing decline in the proportion of onsite hours worked by general contractors (table 3). The major subcontracting groups employed in Federal building construction are: heating, ventilating, and air-conditioning; electrical; concrete; and structural steel. Along with the general contractors, these groups accounted for more than two-thirds of all onsite hours in 1976.

Offsite labor requirements

Offsite labor requirements represent builders' administrative, estimating, and warehousing activities, and the labor to produce and distribute materials, equipment, and supplies used in the construction process. Expenditures for Federal building construction during 1976 generated an estimated 52 offsite employee hours per \$1,000.

Estimates of contractors' offsite employment requirements, based on BLS employment data, indicate that the proportion of total labor requirements contributed by offsite construction employees increased from 4.6 percent in 1959 to 5.8 percent in 1976. This trend reflects the increasing complexity of many construction projects requiring more planning, coordination, and offsite work.

Offsite employment requirements for industries other than construction accounted for about 58 percent of total labor requirements in 1976, a slight increase from 1959. The distribution of employment among various industries showed increasing variation from 1959 to 1976. Trade, transportation, and services increased from about 15 percent of total labor requirements in 1959 to about 20 percent in 1976, due largely to substantial growth in the employment share contributed by retail trade and services. In both studies, mining and other industries accounted for about the same proportion of total labor requirements, between 5 and 6 percent. The manufacturing sector declined slightly from about 34 percent in 1959 to about 32 percent in 1976. The trend towards an increasing proportion of total labor requirements represented by offsite employment is expected to continue, as the growing use of prefabricated components gradually shifts some onsite construction jobs to other industries.

Distribution of costs

Onsite wages and salaries made up about 26 percent of total contract costs for new Federal building construction projects in 1976. In each survey, materials, built-in equipment, and supplies composed the largest share of total costs. The following tabulation shows the percentage distribution of costs for the three surveys:¹⁰

	1959	1973	1976
Onsite wages and salaries	29.0	34.0	25.8
Materials, built-in equipment, and supplies	51.3	50.0	42.5
Contractors' equipment	1.9		2.9
Overhead and profit	17.7		16.0	28.8

The cost distribution in the tabulation suggests that a significant change occurred between 1959 and 1976 in the relative cost shares for Federal building construction. The proportion of costs represented by materials fell from about 51 percent in 1959 to below 43 percent in 1976. The proportion contributed by onsite wages also declined slightly, while contractors' equipment showed a slight rise. Overhead and profit costs, which include salaries of offsite workers, supplemental benefits, performance bonds, contractors' profits, and expenses for interest, office, and miscellaneous items increased from 18 percent in 1959 to almost 29 percent in 1976. Factors contributing to this large rise included increases in the proportion of total labor requirements contributed by offsite construction employees; a rise in interest rates for contractor loans; and increases in employer contributions for supplemental benefits such as paid holidays and vacations, health insurance, and retirement plans.

Materials, supplies, and equipment costs for Federal building construction amounted to about \$454 per

Table 4. Materials, equipment, and supplies used in Federal building construction, 1959 and 1976

Type of material	Value per \$1,000 of contract cost		Percent distribution	
	1959 ¹	1976	1959	1976
All materials, equipment, and supplies	532.50	446.35	100.00	100.00
Materials, built-in equipment, and related supplies	513.40	417.27	96.41	93.48
Agricultural products	(²)	1.03	(²)	23
Mining and quarrying nonmetallic minerals, except fuels	2.20	2.18	.41	.49
Textile mill products	(²)	7.43	(²)	1.66
Apparel and other finished products made from fabrics and other similar materials	(²)	.30	(²)	.07
Lumber and wood products, except furniture	17.60	10.29	3.31	2.31
Furniture and fixtures	1.80	1.83	.34	.41
Paper and allied products	(²)	2.02	(²)	.45
Chemicals and allied products	5.50	4.90	1.03	1.10
Petroleum refining and related products	4.70	4.95	.88	1.11
Rubber and miscellaneous plastic products	(²)	2.99	(²)	.67
Stone, clay, glass, and concrete products	115.00	100.93	21.60	22.61
Primary metal products	57.60	92.93	10.82	20.82
Fabricated metal products, except ordnance, machinery, and transportation equipment	122.70	86.27	23.04	19.33
Machinery, except electrical	79.10	47.52	14.85	10.65
Electrical machinery, equipment, and related supplies	89.00	45.13	16.71	10.11
Instruments and related products	15.40	4.54	2.89	1.02
Miscellaneous manufacturing products	2.80	2.04	.53	.46
Total contractors' construction equipment	19.10	29.08	3.59	6.52

¹ Because detailed data have been regrouped for 1976, group totals may vary slightly from those presented in earlier publications of the survey data.

² Data not available.

Note: Detail may not add to totals because of rounding.

\$1,000 of construction costs in 1976 (table 4). This represents a decline of about \$78 per \$1,000 from the 1959 survey, about 15 percent. In both 1959 and 1976, of the total costs for materials, supplies, and equipment, only 7 percent was allocated to contractor construction equipment (capital equipment used in the construction process). The remaining 93 percent was for materials, supplies, and equipment that became part of the buildings, such as heating and air-conditioning units.

Materials, supplies, and built-in equipment accounted for more than two-fifths of construction costs in 1976. Three major product groups made up more than three-

fifths of the costs of all materials. Stone, clay, glass, and concrete products constituted the largest material grouping, representing almost \$101 per \$1,000 of total project costs. Most important within this group were ready-mix concrete and concrete products. Primary metal products were the next largest group of materials—about \$93 per \$1,000 of total cost. Structural steel products, which contributed almost \$80 per \$1,000, represented the largest single cost category in the primary metals group. Fabricated metal products (except ordnance, machinery, and transportation equipment), the third largest group, accounted for more than \$86 per \$1,000 of contract cost. Within this group the important products were metal reinforcing bars and expanded metal lath, and fabricated sheet metal products.

Federal building projects completed during 1976 and 1977 consisted primarily of steel-framed, multistory office buildings. Most projects had a built-in roof with a concrete roof base, an acoustical tile ceiling, drywall interiors, a concrete floor base with carpet covering, and a basement. A majority of the buildings had forced-air heating, central air-conditioning, and outdoor parking areas. All structures of more than two stories contained elevators.

Project characteristics varied somewhat by region. Hourly earnings for all construction averaged \$8.66, ranging from \$7.64 in the South to \$9.93 in the North Central. Wages as a percentage of contract costs varied from about 24 percent in the South to about 28 percent in the North Central.

The Northeast led all regions in average cost per project and per square foot, reflecting several factors. A higher proportion of projects in the Northeast had more than two stories, and thus, required elevators. In addition, average hourly earnings of onsite workers in the Northeast were higher than in the South and West, and the proportion of contract costs allocated to overhead and profits was the highest of any region.

A final report on this survey, with detailed analysis of regional differences, material costs, and occupational requirements, is in preparation. □

— FOOTNOTES —

¹ These survey findings are from a series of studies, conducted by the Bureau of Labor Statistics, on construction labor requirements. The data from this series are used to assess the impact of construction expenditures on employment, to make budgetary decisions, to aid in developing countercyclical employment and expenditure policies, to evaluate training needs, to anticipate occupational shortages and bottlenecks in skilled trades, and to provide indicators of productivity changes in construction.

The survey on which this report is based was designed primarily to determine the number of employee hours per \$1,000 of new Federal building construction. Employee hours include both onsite and offsite construction employment, and that required to deliver the needed materials. No attempt was made to measure the labor required for planning, design work, and public utilities installation. The employment

generated from the spending and respending of wages and profits—the multiplier effect—also fell outside the scope of the survey.

This is the third BLS study of Federal building construction. See John G. Olsen, "Decline noted in hours required to erect Federal office buildings," *Monthly Labor Review*, October 1976, pp. 18-22, Roland V. Murray, "Labor requirements for Federal office building construction," *Monthly Labor Review*, August 1962, pp. 889-93, and *Labor Requirements for Federal Office Building Construction* (BLS Bulletin 1331), 1962.

The 1973 survey of Federal building construction was one of a group of abbreviated studies of construction labor requirements. To allow more frequent measurement of the labor requirements of different types of construction as well as to reduce survey costs, the abbreviated studies omitted the collection of onsite occupational and

material data. Material and equipment cost information is used to generate indirect employment estimates for the industries which mine, manufacture, and transport construction materials. As a result, detailed data on occupational requirements, material usage, and indirect employment impact are not available for the 1973 survey.

The 1980 employment estimates for Federal building construction were developed from 1973 and 1976 survey data adjusted for price and productivity changes. The deflator used to adjust survey data for price change is the Bureau of the Census' cost index for "non-residential building" construction. This consists of: an unweighted average of the Bureau of the Census single-family housing price index, excluding value of lot; the Turner Construction Company cost index; and the Federal Highway Administration structures price index. The nonresidential building construction price deflator, derived from an unweighted average of the three indexes on a 1972=100 base, equaled 217 in 1980, 136.8 at the midpoint of the 1976 survey, and 109.3 at the midpoint of the 1973 survey.

The estimate used to adjust the survey data for productivity change is the inverse of the change in onsite employee hours per \$1,000, after adjustment for price variations, between the 1973 and 1976 surveys. The annual rate of change averaged 1.6 percent during this period.

Estimates of the number of full-time jobs per \$1 billion spent in 1980 were derived using 1,800 hours per employee year for onsite construction; 2,000 hours for offsite construction; 2,089 for manufacturing; 1,795 for trade, transportation, and services; and 2,041 for mining and all other.

Because of part-time workers, transients, and the seasonal nature of employment in the construction industry, more workers would be employed than indicated by the full-time jobs estimates.

Offsite construction labor requirements were estimated from the ratio of nonconstruction workers to total workers for the special trade contractor (Standard Industrial Classification 17) segment of the contract construction industry as shown in *Employment and Earnings*, March issues of the years covered.

Indirect labor requirements were developed by aggregating the material, supply, and equipment cost data by product group. After calculating the average amount required per \$1,000 of contract cost for each product group, this bill of materials was deflated to the 1972 price level by the appropriate Producer Price Index. These constant dollar values of materials, equipment, and supplies were then processed by the Office of Economic Growth, Bureau of Labor Statistics, using the 1972 Interindustry Study of the Bureau of Economic Analysis of the U.S. Department of Commerce, to generate estimates of final demand. Sector productivity factors were then applied to derive employee hours for the manufacturing sector; the trade, transportation, and services sector; and the mining and all other industries sector. Karen J. Horowitz of the Office of Economic Growth assisted in the development of these offsite employee-hour estimates.

These 1980 employment estimates were developed from earlier BLS survey data adjusted for price and productivity changes. For re-

ports on the earlier studies see Barbara Bingham, "Labor and material requirements for commercial office building projects," *Monthly Labor Review*, May 1981, pp. 41-48, and John G. Olsen, "Labor and material requirements for new school construction," *Monthly Labor Review*, April 1979, pp. 38-41.

Although the study was based on project completions, most of the value put in place occurred between 1973 and 1977, with peak activity in 1976.

The length of time between the data year and the year of publication results from several factors. A considerable amount of time is needed to define and refine the universe and collect, compile, and verify the data. Actual data collection does not begin until at least a year after construction is completed, and surveyed projects require many personal visits to contractors and subcontractors, with numerous follow-up visits. Additional time is required for preparation and publication of the results. Nevertheless, data presented indicate trends in labor and material requirements and are useful in analyzing changes in these factors over periods of time. Data also serve as benchmarks for developing current estimates of employment generating effects on construction expenditures.

Data from the study were provided for the continental United States and four broad geographic regions. The States included in each region were: Northeast—Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont; North Central—Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin; South—Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia; and West—Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

For reasons discussed in the text of this article, no separate data are presented for the West region, but those for the other regions and for the Nation as a whole are believed to be accurate. The detailed data, however, have a wider margin of sampling error and may be subject to other limitations. But, except for the data estimated by the contractors, there are no known sources of probable nonsampling error. Sampling variances are being developed by the Bureau of Labor Statistics.

Average annual rates of change in the article were calculated between the midpoints of the various surveys. The midpoint of a survey is based on estimates of the value of surveyed construction put in place by year of construction time. For the 1976 survey, most of the value put in place occurred between 1973 and 1977 with the midpoint falling in 1975. For the 1973 survey, most of the value put in place was erected between 1971 and 1973 with the midpoint occurring in 1972.

For 1973, general contractors' costs were obtained directly, but some subcontractors' costs were estimated by general contractors.