

# Value of Construction Put in Place: June 2002

Issued September 2002

C30/02-6

This issue includes a special supplement on the annual value of privately owned nonresidential building construction put in place by geographic area and detailed types of construction: 1995 - 2001.

## Current Construction Reports

### Monthly Value of Construction Put in Place

Seasonally adjusted annual rate in billions of dollars

— Current dollars  
— 1996 dollars

#### Total Construction



#### Private Residential Construction



#### Private Nonresidential Construction



#### Public Construction



Source: U.S. Census Bureau, Value of Construction Put in Place.

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## VALUE OF CONSTRUCTION PUT IN PLACE

Construction put in place during June 2002 was estimated at a seasonally adjusted annual rate of \$820.8 billion, 2.2 ( $\pm 4.7$ ) percent below the revised May estimate of \$839.0 billion. The June figure is 3.7 ( $\pm 4.6$ ) percent below June 2001.

During the first 6 months of this year \$394.8 billion of construction was put in place, unchanged ( $\pm 3.2$  percent) from for the same period in 2001.

In constant (1996) dollars, the June annual rate was \$671.5 billion, 2.6 ( $\pm 4.7$ ) percent below the revised estimate of \$689.4 billion for May.

Spending on new residential housing units was at a seasonally adjusted annual rate of \$293.5 billion in June, 0.5 ( $\pm 1.6$ ) percent below the revised May estimate of \$295.1 billion. Nonresidential building construction was at a rate of \$165.4 billion, 3.4 percent below the revised May estimate of \$171.2 billion.

In June, the estimated seasonally adjusted annual rate of public construction put in place was \$197.5 billion, 3.1 ( $\pm 4.7$ ) percent below the revised May estimate of \$203.8 billion.

The "value of construction put in place" is a measure of the value of construction installed or erected at the site during a given period. For an individual project, this includes—

1. Cost of materials installed or erected.
2. Cost of labor (both by contractors and force account) and a proportionate share of the cost of construction equipment rental.
3. Contractor's profit.
4. Project owner's overhead and office costs.
5. Cost of architectural and engineering work.
6. Miscellaneous costs chargeable to the project on the owner's books.
7. Interest and taxes paid during construction.

The total value-in-place for a given period is the sum of the value of work done on all projects underway during this period, regardless of when work on each individual project was started or when payment was made to the contractors. For some categories, estimates are derived by distributing the total construction cost of the project by means of historic construction progress patterns.

## ADDITIONAL DATA

Additional data related to the value of construction put in place can be found in the following publications:

- Current Construction Reports, *Value of Construction Put in Place: May 2002*, C30/02-5, U.S. Department of Commerce, U.S. Census Bureau, Washington, DC, 2002; contains annual data for 1997 to 2001 and monthly data for 1998 to 2001.
- Current Construction Reports, *Value of New Construction Put in Place: October 1992*, C30/92-10, U.S. Department of Commerce, U.S. Census Bureau, Washington, DC, 1992; contains total time and monthly progress from start to completion for private nonresidential buildings and for state and local construction.
- Current Construction Reports, *Value of New Construction Put in Place in the United States, 1964 to 1980*, C30-80 supplement, U.S. Department of Commerce, U.S. Census Bureau, Washington, DC, 1981; contains annual data for 1915 to 1963.
- Current Construction Reports Special Study, *Expenditures for Nonresidential Improvements and Repairs: 1992*, U.S. Department of Commerce, U.S. Census Bureau, Washington, DC, 1994.



**Table 2. Annual Value of Public Construction Put in Place: 1997-2001**

[Millions of dollars]

Type of construction	Current dollars					Constant (1996) dollars				
	1997	1998	1999	2000	2001	1997	1998	1999	2000	2001
<b>Total public construction . . . . .</b>	<b>150,695</b>	<b>154,302</b>	<b>169,545</b>	<b>178,561</b>	<b>192,509</b>	<b>145,483</b>	<b>145,297</b>	<b>153,904</b>	<b>154,902</b>	<b>161,965</b>
<b>State and local construction . . . . .</b>	<b>136,608</b>	<b>139,984</b>	<b>155,519</b>	<b>164,396</b>	<b>177,527</b>	<b>131,891</b>	<b>131,792</b>	<b>141,107</b>	<b>142,484</b>	<b>149,147</b>
Total buildings . . . . .	63,752	66,392	74,948	83,408	91,852	61,508	61,894	67,031	71,356	76,044
Housing and redevelopment . . . . .	4,622	4,649	4,229	3,926	4,330	4,492	4,403	3,834	3,395	3,591
Educational. . . . .	33,533	34,986	42,411	49,785	55,718	32,322	32,575	37,890	42,563	46,119
Hospital. . . . .	3,725	2,914	3,175	3,413	3,389	3,596	2,715	2,838	2,920	2,805
Other <sup>1</sup> . . . . .	21,872	23,844	25,133	26,284	28,415	21,099	22,200	22,469	22,478	23,528
Highways and streets . . . . .	42,347	44,419	48,600	48,925	53,743	40,847	42,006	44,330	42,471	45,177
Conservation and development . . . . .	2,256	1,930	2,053	2,003	2,427	2,178	1,849	1,916	1,815	2,172
Sewer systems. . . . .	10,515	9,943	9,864	8,807	8,751	10,152	9,526	9,214	7,982	7,828
Water supply facilities. . . . .	6,493	6,678	6,541	5,993	7,152	6,347	6,405	6,147	5,327	6,138
Miscellaneous nonbuilding <sup>2</sup> . . . . .	11,245	10,622	13,513	15,260	13,602	10,859	10,112	12,469	13,534	11,788
<b>Federal construction . . . . .</b>	<b>14,087</b>	<b>14,318</b>	<b>14,025</b>	<b>14,165</b>	<b>14,981</b>	<b>13,592</b>	<b>13,505</b>	<b>12,796</b>	<b>12,418</b>	<b>12,818</b>
Total buildings . . . . .	6,107	6,026	5,469	5,158	5,115	5,892	5,624	4,896	4,416	4,236
Housing. . . . .	677	538	424	382	421	658	510	384	331	349
Industrial . . . . .	999	1,010	925	1,157	1,556	965	941	827	990	1,288
Educational. . . . .	19	15	15	29	35	19	14	14	25	29
Hospital. . . . .	1,251	1,009	850	722	664	1,206	941	762	618	550
Other <sup>3</sup> . . . . .	3,161	3,454	3,255	2,867	2,440	3,045	3,217	2,909	2,452	2,021
Highways and streets . . . . .	255	257	251	337	283	246	243	229	292	238
Military facilities . . . . .	2,556	2,530	2,125	2,441	2,843	2,466	2,377	1,922	2,105	2,372
Conservation and development . . . . .	3,368	3,536	4,035	4,061	4,695	3,252	3,387	3,766	3,679	4,200
Miscellaneous public <sup>4</sup> . . . . .	1,800	1,969	2,145	2,169	2,046	1,735	1,873	1,983	1,925	1,773

<sup>1</sup>Includes general administrative buildings, prisons, police and fire stations, courthouses, passenger terminals, civic centers, etc.

<sup>2</sup>Includes open amusement and recreational facilities, power generating facilities, transit systems, airfields, open parking facilities, etc.

<sup>3</sup>Includes federal office buildings, prisons, courthouses, space facilities, postal facilities, etc.

<sup>4</sup>Includes federal airport facilities, fish and wildlife preservation facilities, VA cemeteries, etc.





























# Appendix A.

## Reliability of the Estimates

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The statistics on the value of construction put in place result from direct measurement and indirect estimation. A series results from direct measurement when it is based on reports of the actual value of construction progress or construction expenditures obtained from a complete census or sample survey. All other series are developed by indirect estimation using related construction statistics.

On an annual basis, the estimates for series directly measured monthly, quarterly, or annually accounted for about 70 percent of total construction in 2001 (private multi-family residential, private residential improvements, private nonresidential buildings, farm nonresidential construction, public utility construction, all other private construction, and virtually all of public construction). On a monthly basis, directly measured data are available for about 51 percent of the value-in-place estimates.

Some of the directly measured monthly construction value-in-place estimates are based on samples. Estimates from these samples may differ from statistics which would have been obtained from a complete census using the same schedules and procedures. An estimate based on a sample survey is subject to both sampling error and nonsampling error. The accuracy of a survey result is determined by the joint effects of these errors.

### MEASURE OF SAMPLING ERRORS

Sampling error reflects the fact that only a particular sample was surveyed rather than the entire population. Each sample selected for the monthly value-in-place survey is one of a large number of similar probability samples that, by chance, might have been selected under the same specifications. Estimates derived from the different samples would differ from one another. The standard error, or sampling error, of a survey estimate is a measure of the variation among the estimates from all possible samples and, thus, is a measure of the precision with which an estimate from a particular sample approximates the average from all possible samples.

Estimates of the standard errors for the monthly, year-to-date and annual estimates were computed from the sample data for selected statistics in this report. They

are presented in the form of relative standard errors in the following table. The relative standard error equals the standard error divided by the estimated value to which it refers.

The sample estimate and an estimate of its standard error allow us to construct interval estimates with prescribed confidence that the interval includes the average result of all possible samples with the same size and design. A 90-percent confidence interval is defined to be from 1.6 standard errors below the estimate to 1.6 standard errors above the estimate. If all possible samples were selected and surveyed under essentially the same conditions and all the respective 90-percent confidence intervals were generated, then approximately nine-tenths of the intervals would include the average value of all sample estimates and approximately one-tenth would not include this estimate. For example, suppose Table 3 of this report showed that the monthly VIP estimate for "total private nonresidential buildings" was \$10.0 billion in a particular month. According to the following table, the relative standard error of this estimate is 2 percent. Multiplying \$10.0 billion by .02, we obtain \$200 million as the standard error. To obtain a 90-percent confidence interval, multiply \$200 million by 1.6 and add and subtract the result from \$10.0 billion, yielding limits of \$9.68 billion and \$10.32 billion. The average value of the monthly VIP estimate for "total private nonresidential buildings" may or may not be contained in this computed interval, but one can say that the average is included in the constructed interval with a specified confidence of 90 percent.

The following table also presents coefficients necessary to compute standard errors for the month-to-month and year-to-date changes. To derive a specific standard error of a change, look up an appropriate coefficient ( $k_1$  or  $k_2$ ) for the change and apply the following formula:

$$\text{Standard error of a change} = k (100 + \text{(percent change shown in Tables 3 through 6)})$$

Once the standard error is available, one can construct a 90-percent confidence interval of the change by multiplying the standard error by 1.6.

No standard errors are shown for farm nonresidential or public utilities because the estimates are based on a complete enumeration.

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## **NONSAMPLING ERRORS**

As calculated for this report, the coefficient of variation estimates sampling variation but does not measure all nonsampling error in the data. Nonsampling error consists of both a variance component and a bias component. Bias is the difference, averaged over all possible samples of the same size and design, between the estimate and the true value being estimated. Nonsampling errors are usually attributed to many possible sources: (1) coverage error—failure to accurately represent all population units in the sample, (2) inability to obtain information about all sample cases, (3) response errors, possibly due to definitional difficulties or misreporting, (4) mistakes in recording or coding the data obtained, and (5) other errors of coverage, collection and nonresponse, response, processing, or imputing for missing or inconsistent data. These nonsampling errors also occur in complete censuses. Although no direct measures of these errors have been obtained, precautionary steps were taken in all phases of the collection, processing, and tabulation of the data to minimize their influence.

A major source of nonsampling error in the published estimates is due to the need to impute data for nonrespondents and for late and inconsistent reports. For preliminary value-in-place estimates, the average imputation rates for major components are as follows: private nonresidential construction, 49 percent; state and locally owned public construction, 33 percent; private residential construction of 2 units or more, 42 percent; and private residential improvements, 15 percent. Each of these imputation rates is not an explicit indication of the potential error in statistics, but the degree of uncertainty regarding the accuracy of the statistics increases as the percentage of imputation increases.

Other potential sources of bias are the upward adjustment of 25 percent made to the private nonresidential construction and the adjustment of the state and local owned public construction to the construction outlays from the Annual Survey of Government Finances in order to account for construction projects not included in their respective sampling frames. The adjustment for the nonresidential construction results from a coverage evaluation sample; hence, the estimated percentage adjustment is subject to sampling error and nonsampling errors associated with the evaluation study. In addition, the percentage was estimated from data collected during a limited time period; therefore, these adjustments do not reflect any recent changes in the proportion of projects not included in the frame.

For state and locally owned construction, construction outlays from the Survey of Government Finances are available only through Fiscal Year 1999. (Outlays are

included if a government agency's fiscal year ending date falls within July 1998 to June 1999 inclusive, and for three state agencies with fiscal years ending in August or September 1999.) As a result, the adjustment to the construction outlay levels of this survey must be projected ahead for 4 years from 1999 through April 2003. The relationship between the state and locally owned value-in-place and the capital outlays estimate changes from year to year so that revisions of 4 to 5 percent are expected in state and local construction and substantially larger revisions can be expected in the individual types of construction. In addition, because of the definition of fiscal year for the Survey of Government Finances, the reported capital outlays do not correspond to any 12 month period but result from capital outlays made over a 26 month period. There are also definitional and timing differences between the concepts of capital outlays and value put in place.

Consequently, even though the private nonresidential and state and local owned construction adjustments are designed to reduce the bias due to the failure to include projects in the sampling frames, for the above stated reasons, these adjustment procedures, themselves, may introduce a bias in the current estimates of value-in-place.

Furthermore, additional nonsampling errors may be introduced into the estimates because the procedures such as phasing, extrapolating, and forecasting used to develop the indirectly measured series are subject to the validity of the underlying assumptions made and mathematical models used. No explicit measures of the effects of these procedures are available.

## **MONTHLY REVISIONS TO ESTIMATES**

Statistics for the current month are preliminary estimates. These estimates are released to provide government and private data users with early measures of construction activity. A necessary part of the process of issuing these early data involves the issuance of subsequent revisions. The revisions to monthly construction put in place estimates are primarily the result of the replacement of imputed data with data which are reported in subsequent months.

For total construction, the range of the difference between the last 12 preliminary and second revision estimates for the same months was from -1.5 percent to 1.0 percent with a median of -0.1 percent. The range of the difference between first revision and second revision was from -1.2 to 0.8 percent, with a median of 0.1 percent.

## Relative Standard Errors and Coefficients for Standard Errors of Changes

Type of construction	Relative standard error (percent)			Coefficient for changes	
	Monthly estimate	Year-to-date estimate	Annual estimate	Month-to-month change (k1)	Year-to-date change (k2)
<b>Total construction .....</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>.03</b>	<b>.02</b>
Private construction .....	3	2	1	.04	.03
Residential buildings .....	5	3	2	.06	.04
New housing units .....	2	2	1	.01	.02
1 unit .....	2	2	2	.01	.02
2 units or more .....	4	4	3	.03	.04
Nonresidential buildings .....	2	1	1	.02	.01
Industrial .....	3	2	2	.04	.03
Office .....	4	3	2	.05	.04
Hotels, motels .....	7	6	5	.09	.08
Other commercial .....	5	3	2	.06	.04
Religious .....	9	8	5	.12	.11
Educational .....	7	5	5	.10	.07
Hospital and institutional .....	6	5	5	.07	.07
Miscellaneous buildings .....	7	5	4	.09	.07
Public construction .....	2	1	1	.03	.01
Housing and redevelopment .....	8	5	4	.11	.07
Industrial .....	(NA)	(NA)	(NA)	(NA)	(NA)
Educational .....	3	2	2	.04	.03
Hospital .....	6	5	4	.08	.07
Other public buildings .....	3	2	2	.04	.03
Highways and streets .....	4	2	2	.05	.03
Military facilities .....	(NA)	(NA)	(NA)	(NA)	(NA)
Conservation and development .....	4	2	2	.06	.03
Sewer systems .....	6	3	3	.08	.04
Water supply facilities .....	8	4	3	.11	.06
Miscellaneous public .....	8	5	4	.11	.07
State and local construction .....	2	1	1	.03	.01
Housing and redevelopment .....	8	5	5	.11	.07
Educational .....	3	2	2	.04	.03
Hospital .....	8	7	5	.11	.10
Other public buildings .....	4	3	2	.05	.04
Highways and streets .....	4	2	2	.05	.03
Conservation and development .....	16	10	9	.23	.14
Sewer systems .....	6	3	3	.08	.04
Water supply facilities .....	8	4	3	.11	.06
Miscellaneous public .....	9	5	4	.12	.07
Federal construction .....	(NA)	(NA)	(NA)	(NA)	(NA)

NA Not available.

Note: All statistics are based upon 2001 data. The coefficient (k1) for the month-to-month change is applicable to change from the previous month and change from the same month a year ago.

# Supplement. Value of Construction Put in Place for Private Nonresidential Buildings, by Geographic Area and Type of Construction

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The following tables present data on the value of construction put in place for private nonresidential buildings by geographic area and type of construction.

Table S-1 shows annual value put in place by major construction types in the four census regions and nine geographic divisions. Table S-2 shows annual value put in place in the four regions for specified types of construction.

## SOURCE OF INFORMATION

These statistics are estimated from the sample of projects used to collect monthly value of private nonresidential building construction put in place. In the private nonresidential survey, owners are asked to report the amount of work done on their projects each month until completion. This survey is described in Current Construction Reports, C30/02-5, Value of Construction Put in Place: May 2002.

## DEFINITIONS

Annual value of construction put in place is the cumulative value of work done on projects active during the year. This estimate corresponds with the value put in place estimates for private nonresidential buildings published monthly in this report. Private nonresidential building construction categories are the same as those used in the monthly survey, and are defined in Current Construction Reports, C30/02-5. For this supplement, estimates have been made for specified types of construction within some of the major categories. These types of construction are defined as follows:

### Private Nonresidential Buildings

#### Industrial Buildings

*Manufacturing plants*—Includes buildings or complexes involved in the direct manufacturing of products.

*Other*—Includes office buildings, industrial warehouses, and other buildings at industrial sites.

#### Hospitals and Institutional Buildings

*Hospitals, clinics, and infirmaries*—Includes surgical or outpatient clinics. Buildings which are used primarily for doctors' offices, but include some testing facilities, are classified as office buildings even though they may be known as clinics.

*Nursing homes, rest homes, and other related buildings*—Includes sanatoria, convalescent homes, homes for the aged, orphanages, and similar establishments for prolonged institutional care.

#### Other Commercial Buildings

*Retail and service establishments*—Includes shopping centers, malls, retail stores, restaurants, service stations, freight and truck terminals, and other projects of a retail nature. This group is divided into projects of \$1 million or more and projects costing less than \$1 million.

*Commercial warehouses*—Includes warehouses and storage buildings, cold storage plants, grain elevators, and silos not located at industrial establishments.

*Miscellaneous*—Includes parking garages, one-story bank buildings, commercial laboratories, and buildings not classified elsewhere.

## LIMITATIONS OF THE DATA

The statistics in this supplement are obtained from a sample survey and are subject to sampling variability as well as errors of response and nonreporting. The standard error is a measure of the sampling variability. As calculated for this report, it also partially measures the effect of certain nonsampling errors, but does not measure any systematic biases in the data. Sampling errors shown in the tables are in the form of relative standard errors—the standard error of the estimate divided by the value being estimated.

The sample estimate and an estimate of its standard error allow us to construct interval estimates with prescribed confidence that the interval includes the average result of all possible samples with the same size and design. A 90-percent confidence interval is defined to be from 1.6 standard errors below the estimate to 1.6 standard errors above the estimate. If all possible samples were selected and surveyed under essentially the same conditions and all the respective 90-percent confidence intervals were generated, then approximately nine-tenths of the intervals would include the average value of all sample estimates and approximately one-tenth would not include this estimate. For example, the value of construction put in place for all nonresidential building projects in the Northeast in

2001 was estimated to be \$35.6 billion with a relative standard error of 3 percent. Multiplying \$35.6 billion by .03, we obtain \$1.1 billion as the standard error. To obtain a 90-percent confidence interval, multiply \$1.1 billion by 1.6; add and subtract the result from \$35.6 billion, yielding limits of \$33.9 billion and \$37.3 billion.

The average value of construction put in place for all nonresidential building projects in the Northeast in 2001 may or may not be contained in this computed interval, but one can say that the average is included in the constructed interval with a specified confidence of 90 percent.







