

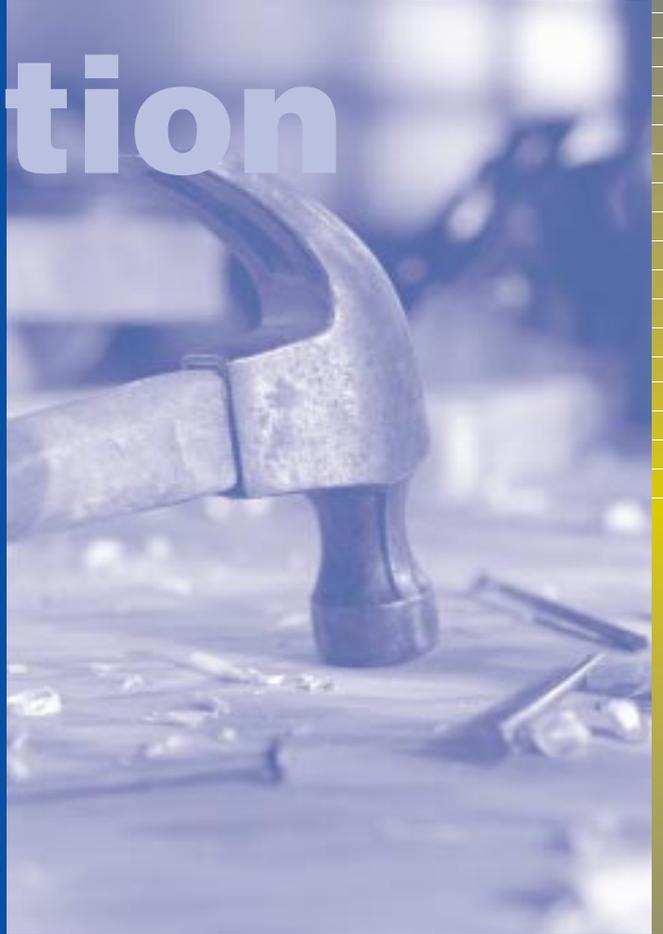
U.S. Census Bureau *the Official Statistics*

# Construction Statistics

Data Users'  
Conference

October 28, 1997

U.S. Department of Commerce  
Economics and Statistics Administration  
BUREAU OF THE CENSUS



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Conference

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**Robert L. Mallett**, Deputy Secretary

**Economics and Statistics Administration**  
**Robert J. Shapiro**, Under Secretary for Economic Affairs

**BUREAU OF THE CENSUS**  
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## Preface

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The Census Bureau's construction statistics program commenced more than 30 years ago. In the years since then, the Bureau has tried to keep the program's statistics sound and relevant by introducing specific improvements. Still, the program has not undergone an extensive review by a wide range of users during this whole period. The fall 1997 Construction Statistics Data Users' Conference represented the Bureau's attempt to remedy this oversight.

To conduct the review, the Bureau turned to data users for critique and guidance. After all, the proof of the pudding lies not in whether the cook thinks the recipe was followed scrupulously but in whether those served found the pudding suitable to their taste.

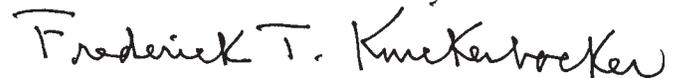
The format of the conference was perfectly straightforward. We asked a good sized group of highly knowledgeable and expert users of our construction statistics three questions:

- What are we doing right and what are we doing wrong?
- What data are we providing that you find useful and that you find of little use?
- What should we be doing differently?

The answers were many. Some were edged. Some were provocative. All were useful. They made plain that there is a large, active, insightful user community that recognizes the common interest in better and more complete construction industry statistics. Users' suggestions and the Bureau's responses occupy the pages that follow.

The views of the users define a work agenda that the Bureau will try to pursue over the coming years. I say, try to pursue because the abundance of worthwhile suggestions for improving construction statistics will almost certainly outrun the Bureau's resources to implement the suggestions. Even statistical agencies must make tradeoffs among opportunities, all of them good.

Still, the counsel of the data users will help the Bureau make wiser choices than we might otherwise make. The conference participants deserve our sincere thanks for that. We give special thanks to our lead discussants: Michael Carliner, Kermit Baker, Robert Parker, and Manuel Gutierrez. Each delivered a thoughtful and stimulating introduction to his session and provided an excellent jumping-off point for fruitful discussion.



*Frederick T. Knickerbocker,*  
Associate Director for Economic Programs

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## Introduction

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The construction industry is continually undergoing change and it is important that the Census Bureau provide users of construction statistics a forum to discuss our programs and their needs as well as an opportunity to offer suggestions for change. In this spirit, the Census Bureau sponsored a Construction Statistics Data Users' Conference, held on October 28, 1997, at the Embassy Suites Hotel in Washington, DC.

The goal of this conference was to generate suggestions for improving Census Bureau statistics on the construction sector of the economy. The participants included statisticians and economists representing trade associations, government offices with diverse data needs, academia, trade unions, and industry. Participants discussed a broad variety of perspectives and priorities, and topics included new data items to collect, alternative data products, methodology issues, and product delivery options.

The conference was organized into four sessions corresponding to the four major areas of Census Bureau construction statistics: New Residential Construction, Expenditures for Residential Improvements and Repairs, Value Put in Place Program, and the Economic Census: Construction Sector. For each session, a lead discussant introduced the topic, described various highlights of our program, and discussed unmet data needs and needed improvements in data we are currently providing. The presentation by lead discussants was followed by a floor discussion during which attendees had an opportunity to follow up on issues already raised and to introduce new topics. The conference agenda is included in Appendix A and a list of registered participants is included in Appendix B.

In the first section of this report, we provide summaries of each of the conference's four sessions, including a brief background on the subject, a summary of the lead discussant's presentation and floor discussion, and Census Bureau comments and responses.

In the second section, we present an overview of the Construction Statistics Programs at the Census Bureau, describing our major surveys and related data collection

activities, and we show the relationship between these activities. Of particular interest are the flowcharts which help trace out these relationships. Even though the overview was prepared for this conference, it can serve as an independent document providing an integrated description of our programs.

For those wishing more detail on any of the surveys discussed in the overview, we recommend the technical appendixes in the reports for each of the individual programs. They provide detailed information on methodology, definitions, data limitations, and a wealth of other survey specific features. In Appendix C, we provide the name, telephone number, and E-mail address of a contact person for each program as a source of more information.

We are gratified by the interest in our programs and the participation in each session. Many issues raised during the individual sessions were addressed by Census staff during the floor discussions. In the sections entitled Census Bureau Comments and Responses, we attempt to address important issues not adequately covered in the discussions. We appreciate the many comments and recommendations offered and we apologize if any relevant remarks have been omitted from our summaries.

One recommendation that arose in each session focused on the need for more cooperation among government agencies and between government agencies and the private sector. We heartily agree and in the individual sessions have indicated some of the cooperative work now under way. We are seeking more cooperative efforts with the private sector and other agencies to take advantage of external expertise and to increase consistency of our programs.

We are interested in hearing your needs and suggestions. Please use the Census Bureau contacts in Appendix C to provide feedback on our programs and products. Our Internet site, [www.census.gov/conconf97](http://www.census.gov/conconf97), contains this document and paper copies are available from the Forms, Publications, and Customer Services Branch at 301-457-4769 or at [mendel.d.gayle@census.gov](mailto:mendel.d.gayle@census.gov).

# Section 1

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Summary of Sessions



# New Residential Construction

## LEAD DISCUSSANT

**Mr. Michael S. Carliner**  
**Staff Vice President**  
**National Association of Home Builders**  
**1201 15th Street, N.W.**  
**Washington, DC 20005-2800**

## BACKGROUND

The Building Permits Survey (BPS) collects information on building permits issued for private residential construction. Information is collected from permit-issuing jurisdictions on number of permits issued, permit value, and number of units in new construction. Data are collected monthly from a sample of permit-issuing places and annually from the remaining permit-issuing places. Monthly estimates of Housing Units Authorized for the U.S. is a leading economic indicator. The Survey of Construction (SOC), which is sponsored in part by the Department of Housing and Urban Development, collects and releases information on residential units started, sold, and completed each month. Every month field interviewers collect information directly from permit offices and builders. In addition to the monthly information, a variety of housing characteristics, such as unit price, number of bathrooms in unit, and size of unit, are released quarterly and annually.

## LEAD DISCUSSANT

Mr. Carliner began by speaking very highly of the construction data series released by the Census Bureau and he had special praise for the new home authorizations series which he referred to as a premier data series in terms of precision, timeliness, geographic detail, and relevance. He also commented on the cooperativeness and responsiveness of Census staff working on construction programs.

He described the National Association of Home Builders (NAHB) as a retailer of construction data, supplying information to its members and to other interested parties. This information is often based on statistics produced by the Census Bureau. He observed that NAHB members use Census data in business planning to decide on product mix, evaluate inventory, determine places to open new sales offices, and address a variety of other business issues. He acknowledged the importance of this data to

government planners and to Federal offices, but cautioned that we should not lose sight of the broad utility of our data and should not focus our attention only on other government users. He observed that we should be more sensitive to the needs of state and local government users in designing our data products.

He discussed general areas in which he saw the need for more attention on the part of the Bureau. He sees the need for greater comparability in data released: comparability in time, over geographic areas and with other series. He also remarked that the Bureau can make better use of data already collected to make our products more valuable. For example, if the Bureau would develop local models for time between permit and start, then users could better use permit data to model starts from permits at the local level. If the Bureau were to collect permit value in SOC, then one could model a relationship between permit value and sales price which users could utilize with the extensive geographic detail of the permit series. He also suggested we do more to reconcile information between the SOC and the census of construction industries.

He asked that we provide more information about the methods we employ and their impact on our estimates. For example, he observed that in the SOC we occasionally reclassify housing units to be different from their classification in the BPS. When we do so, we typically reclassify multifamily houses (from BPS) to single family (in SOC). Accordingly, we produce higher estimates of new single-family construction in SOC than in the BPS. He feels that a more extensive discussion of this process should be readily available.

Mr. Carliner also recommended that we prepare annual revisions to our published monthly estimates when more complete information is available and he further suggested that we release more of our data on the Internet and make it available in spreadsheet format so that it could be downloaded directly.

Mr. Carliner ended his remarks with a list of specific requests. He suggested that we:

- Collect and publish housing characteristics at time of start
- Obtain better information about type of financing
- Provide housing characteristics broken out by type of financing
- Estimate starts on a state and/or metropolitan area basis

- Publish county estimates for permits
- Publish manufactured (mobile) homes information by metropolitan/nonmetropolitan
- Record and utilize information about canceled sales

## FLOOR DISCUSSION

There was wide agreement that data from the Building Permits Survey (BPS) are of excellent quality, detail, and timeliness. There were requests to resume collecting permit information on nonresidential construction and on improvements. These data were recently dropped from the survey as a cost-saving measure. One user commented that the BPS sample might be cut in order to direct more resources elsewhere. Others were opposed to this suggestion because they did not want to reduce the very high quality of BPS estimates.

There was a lengthy discussion on the usefulness of the completions data. Some users did not find it useful while others did. One user suggested that we reduce the number of single-family housing units in the SOC sample followed to completion. Others did not agree. It was noted that we collect more complete information about characteristics after completion than at any earlier stage and reducing the number of cases followed to completion would have an adverse effect on characteristic estimates.

There was also a suggestion to reduce the number of cases followed to completion for multifamily units. It was noted that doing so will have an adverse effect on multifamily absorption estimates produced from the Survey of Market Absorption. There were requests for more detailed information on multifamily housing, such as number of units constructed for senior housing, as well as information about other specialized uses of multifamily structures.

There were requests for more detailed geographic information from SOC. Several users said that regional estimates were not very useful and suggested that they be discontinued. It was observed that housing and demographic statistics from other programs are released by region and by having regional information for construction statistics allowed for analysis and comparability across programs. There was a consensus that regional information should not be discontinued unless they were replaced with estimates at a lower level, such as Census division or state.

Another topic discussed was the utility of the house value as recorded on the building permit. The permit value of a house may not reflect what the house would sell for and is not comparably reported across geographic areas. One user observed that even though there is little utility across areas, for specific geographic areas the permit value of a house is useful for tracking change over time. A suggestion was made to add the permit value of a house to all single-family houses in the SOC and to publish this

information. Doing so would enable data users to model sales price from the permit value of a house and thus be able to estimate sales price at the levels of geography in the BPS.

The Census Bureau raised the issue of delaying the publication of preliminary sales estimates. Noting that a sale under SOC is a contract signing rather than a closing, we discussed the problem in deriving preliminary estimates because of contract signings prior to the issuance of a permit. Sales estimates sometimes have large revisions, due in part to sales before a permit is issued. Census staff expressed the concern that releasing early estimates (which are subject to significant revisions) may not be a service to the user community. There was strong opposition to delaying preliminary sales estimates. Attendees noted that they understand that preliminary estimates are revised and they urged us to continue providing statistical information that indicates the precision of the estimates and the limitations of the data.

The Bureau raised the issue of unauthorized construction in permit-issuing jurisdictions. The Census Bureau currently inflates estimates of single-family starts, sales and completions by 3.3 percent to account for unauthorized (illegal) new home construction in permit-issuing areas. We believe that unauthorized building in permit-issuing areas is at a much lower level and we propose eliminating the 3.3 percent adjustment factor.

Attendees agreed that there was little unauthorized new home construction in permit-issuing areas and that the 3.3 percent factor is not warranted. There was concern that in removing the factor from our estimates we would introduce a discontinuity in our series. Attendees requested that any actions to remove the 3.3 percent factor be done in a manner to minimize the discontinuity in the starts, sales, and completions series. In particular, they suggested that reductions in that adjustment factor be introduced gradually over time or that adjustments be carried back as a revision to avoid sudden breaks in series.

## CENSUS BUREAU COMMENTS AND RESPONSES

We would like to take this opportunity to describe recent and ongoing activities for the SOC. One of the recent major improvements has been the introduction of data collection using laptop computers. The conversion to Computer Assisted Personal Interviews (CAPI) has given us greater control on the data collection activities and the ability to process data more quickly. Along with the introduction of CAPI, we have instituted a recheck operation (verification of a sample of interviewer data) as a quality control activity. We will move to a new processing system in the year 2000 and are using the opportunity to introduce changes in survey processing and products. We have revamped the monthly and quarterly report series to make the format more consistent across reports and to make them easier to

use. We are investigating a proposal to eliminate the C21 report—*New Residential Construction in Selected Metropolitan Areas*—because we believe the utility of this report does not justify the resources to produce it. We will be eliminating the 3.3 percent upward adjustment to estimates of starts, sales, and completions which compensated for unauthorized new home construction in permit-issuing areas in the past. There is very little evidence of significant unauthorized new home construction in permit-issuing areas at present. We plan to introduce annual revisions to all data series starting with data year 1999. Based on more accurate information, we will revise all monthly estimates for the year 2000 in May of 2001.

We agree with Mr. Carliner's comments on the need for greater comparability in estimates and improved data accessibility. We added a question on the 1997 Economic Census, Construction Sector about residential starts in an effort to investigate comparability in data collection between these programs. We are conducting an analysis of data collected in the Value Put in Place (VIP) program with data collected in the Census Bureau's Annual Capital Expenditure Survey (ACES). (In fact, we use ACES data to benchmark VIP estimates of new industrial construction.) This past summer we conducted an extensive comparison of C50 estimates of residential improvements and repair expenditures with remodeling estimates from the American Housing Survey.

We currently release a large amount of data in electronic format. Historic data for building permits, housing starts, new home completions, new home sales, and housing characteristics are all available on the Internet in spreadsheet format. In addition, the press releases for the above series are also in spreadsheet format. Our more detailed statistics, such as building permits by state, MSA, and individual permit office are available in ASCII comma delimited files for purchase. These can be imported to spreadsheets or databases.

We provide microdata files from the SOC which include all information we collect for new single-family houses in our sample. Household records are coded to Census Division which will allow smaller area estimation than our published estimates. This file can be employed to obtain cross-classified detail breakouts beyond estimates released by the Census.

Mr. Carliner observed that we should not neglect the needs of the private sector in designing our data releases. We are very mindful that our data are valuable well beyond the government sector and we continue to work with a wide range of users in trade associations, businesses, and economic planners to meet their needs. To the extent that our basic programs are funded by government agencies to meet their data needs, these needs will continue to be a primary program responsibility.

He also urged that we take care to provide information on our methods and procedures. We do provide a considerable amount of information about our methods, assumptions, and data quality as technical notes in our publication. These address the needs of most users. For those who want more information on specific topics, we gladly provide internal memorandum or other documentation and willingly meet with them to detail our activities.

Mr. Carliner listed about ten areas in which he would like to see us produce estimates and conduct more analysis. We appreciate his suggestions and do see how the analysis and models he is suggesting will provide more information from the data we already collect and process. In evaluating the merits of his proposals, we will consider the expected quality of estimates and how widely they will be used in determining whether resources and opportunity costs in producing them justify the benefits.

There was a suggestion during the floor discussion for cutting the BPS sample as a money-saving measure, however, there was a strong consensus against doing so. The BPS estimates are among the finest produced by the Census and we are not eager to reduce their quality. Not only do permit estimates have very low relative standard errors, they provide small area information monthly and we conduct an annual census of all permit-issuing areas in the Nation. Since building permit information is based on public documents, there are no confidentiality limitations on making this information broadly available.

In addition to the wide public use of permit information, data from BPS also are used in other construction statistics programs. We ratio adjust information collected in SOC to permit estimates to obtain more precise estimates of starts, sales, and completions and since new home starts and sales information is used in the VIP program, the permit estimates have an impact for that program as well. Furthermore, permit information is used by the Census Bureau's demographic area to develop intercensal household estimates and to augment samples for ongoing survey programs.

In response to a question raised by Census staff as to the utility of estimates of permit value for new single-family construction in the BPS, attendees noted that estimates of house value from permits are of value, especially for measuring change over time. Based on these comments, we will continue to collect and publish permit value. Census staff also raised the question as to whether we should eliminate preliminary estimates because they are often subject to large revisions, especially new home sales. Attendees expressed the opinion that preliminary estimates are valuable to them, even though they are later revised, and suggested there be no changes in policy. Based on these comments, we will continue to release preliminary estimates.

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# Expenditures for Residential Improvements and Repairs

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## LEAD DISCUSSANT

**Dr. Kermit Baker**  
**Director, Remodeling Futures Program**  
**Joint Center for Housing Studies**  
**Harvard University**  
**79 John F. Kennedy Street**  
**Cambridge, MA 02138**

## BACKGROUND

An important component of the Census Bureau's Construction Value Put in Place (VIP) program are the estimates for expenditures for residential improvements and repairs. These estimates are released in the C50 report—*Expenditures for Residential Improvements and Repairs*—and are based on the sample selected for the Consumer Expenditure Survey (CES). We derive estimates for owner-occupied units directly from information collected quarterly on the CES. Owners of vacant units, rental units and vacation homes in the CES sample are mailed a questionnaire from the Survey of Residential Alterations and Repairs (SORAR), through which we collect improvement and repair information corresponding to information from the CES.

Information on residential improvements and repairs also is collected in the American Housing Survey (AHS). The AHS is conducted by the Census Bureau every 2 years and is sponsored by the Department of Housing and Urban Development (HUD). Prior to 1996, Census collected information on residential improvements in the Building Permits Survey, however, that data collection ceased in 1996 because of budget constraints.

## LEAD DISCUSSANT

Dr. Baker began his discussion by observing that expenditures for improvements and repairs represent a major component of all construction spending and are a significant contributor to the gross domestic product. As such, there should be better coverage of activities in this area and expenditures should be measured more completely and in greater detail than is currently the case. He is concerned that C50 estimates of residential expenditures for improvements and repairs may be low and that belief is supported by observing that C50 estimates are lower than those derived from the AHS. Taking a broad view, Dr. Baker

proceeded to discuss five areas in which there needs to be more work to improve our estimates and data utility, which he characterized as benchmarking, composition, tracking, geography, and seasonality.

Dr. Baker observed that he believes we underestimate the level of activity in the C50, in part, because we systematically miss some sources of expenditures for residential improvements and repairs. In particular, he observed that we are missing expense information on buildings that convert from nonresidential to residential use.

He observed that because the sample for the CES is fairly small and not designed specifically for improvements and repairs information, we have large weights which add variability to our estimates. In addition, the Bureau introduces a downward bias in estimates because large expenditures when combined with large weights are viewed as outlier observations, and their contribution to estimates is systematically diminished by reducing the weights.

He observed that the AHS recently started asking for more project detail and when homeowners are prodded for detail, the level of expenditures increases. He suggested that pressing for details improves homeowners' recall and recommended that we do more to prompt respondents for more complete information on the CES.

Dr. Baker would like to see more detailed breakouts of information in our reports. For example, large projects, such as totally remodeling a kitchen, are in the same categories as small projects, such as installing a new faucet in a sink. (Both are under kitchen improvements in the C50.) In addition, different types of households are grouped together. He would like to see information broken out by type of household.

Dr. Baker discussed the need to place an expenditure in the actual month in which it occurred. He also observed that estimates are often not available until 6 or 9 months after the reference period. Improvements in monthly allocations and timeliness will allow users to better measure trends and detect changes in improvement and repair activity. Given the way in which we collect the information for our improvement and repair estimates, he did not see a solution to this problem.

Dr. Baker observed that data users would like more detailed geography. He feels it is difficult to do meaningful analysis with just data from the four Census regions and

noted that information on improvements from the Buildings Permits Survey was valuable because it was timely and had small area information which could be used to track local trends.

Dr. Baker said that the current estimates of improvement and repair activity do a poor job tracking seasonality. One problem is that the variability of our quarterly estimates obscures seasonality. Contractors would like to have a better understanding of the seasonality of improvement and repair activity so they can better plan for labor demands.

After raising these issues, Dr. Baker asked where we go from here. He observed that completeness and detail are hard to achieve along with rapid data collection and dissemination. He raised the question of whether a single-data collection instrument can meet all current needs.

Dr. Baker discussed the potential of more cooperative efforts among Federal agencies as well as between Federal agencies and the private sector. In particular, he noted the interest in improvement and repair statistics on the part of HUD and asked if HUD and Census can better coordinate efforts to produce estimates of residential improvements and repairs. He also mentioned the monthly homeowner study conducted by the National Association of Home Builders (NAHB) and asked whether a joint effort between Census and the NAHB could be profitable. He noted that the Joint Center for Housing Studies at Harvard is working with members of the remodeling industry in efforts to estimate improvement and repair activity and they too would be glad to cooperate with Census in a joint effort.

Dr. Baker concluded his remarks by asking if Census could make more microdata files on residential improvements and repairs available to the public.

## FLOOR DISCUSSION

The Census Bureau recently stopped collecting information on authorizations for residential improvements on the Building Permits Survey (BPS). It was observed that estimates for residential improvements from permits were quite different from estimates in the C50. For one thing, many individuals (and contractors as well) often do not get permits for remodeling jobs. In addition, there is little comparability in permit information across geographic areas. It was observed that within a single permit-issuing jurisdiction, monthly information on permit value for remodeling was an indicator of movement in the industry and the local information was valuable.

A number of attendees expressed the belief that estimates in the C50 are low. Several made the observation that the CES was not designed to collect information on residential improvements and repairs and that is a source of many of the problems.

It was observed that the SORAR and CES have small sample sizes (for the purpose of estimating improvement and repair expenditures), which results in high variability for estimates of value, as well as for estimates of period to

period change. One attendee observed that difficulties notwithstanding, it is important to attempt to measure trends and to develop seasonal information. Large sampling weights also lead to large outliers which, when removed from our quarterly estimates, cause a downward bias. One person recommended we do an annual adjustment to add back the total value removed.

Estimates of residential improvements and repairs derived from the AHS are higher than those published in the C50 and there was a suggestion that we compare programs and try to understand why there are differences. The different manners in which these two surveys are conducted and the way questions are asked may account for some differences in estimates. For example, the AHS asks respondents about expenditures over a 2-year period and there may be telescoping of information into that period from an earlier time frame. The CES asks about activity over a 3-month period which may introduce recall problems of a different nature. It was noted that the AHS is currently undergoing a review of methodology which may present an opportunity for increasing comparability between these two surveys. Unfortunately, aside from these two programs, there is little reliable information available regarding expenditures for residential improvements and repairs to allow for additional comparisons.

A discussant from the Bureau of Economic Analysis observed that by examining the input/output tables one can see that the residential improvement and repair estimates are low. That is, there is more manufacturing output of products that typically go into residential improvement and repairs than is reflected in the residential improvement and repair estimates. He also observed that more recently the match has been closer. One attendee noted that production estimates of building products from the Vinyl Siding Institute agree quite well with estimates from the C50. Another attendee stated that movements of building materials do not track well with corresponding movements in improvement and repair expenditures.

A periodic survey of remodelers or other construction firms to ask them to report on the amount of work done in residential improvement and repairs was proposed. Most attendees felt that such an approach is not realistic as it would be very difficult to obtain cooperation. Furthermore, such a survey would not capture do-it-yourself projects.

Despite problems with AHS and CES estimates, attendees agreed that a household survey is the best way to collect information about residential improvements and repairs. The survey requires a sufficiently large sample size to avoid large weights and problems that arise from them. The suggestion was made to employ the American Community Survey (to be instituted by the Census Bureau in the future) to collect information on residential improvements and repairs.

There was some discussion of the level of detail provided in the C50 and one discussant suggested that we break out information in the C50 report by rental and vacant.

## CENSUS BUREAU COMMENTS AND RESPONSES

One of the primary concerns voiced in this session was that the C50 estimates appear low and we at Census are working on several fronts to evaluate them and introduce program improvements. One should note that there are remodeling expenditures that we do not include in our estimates. For example, we do not include refrigerators (when costing out a kitchen remodeling job) and we do not include carpeting (when costing out a remodeling job in other areas of a house). Furthermore, we only include the cost of material for a do-it-yourself activity (in contrast to all costs, including labor, when the job is done by a contractor). These expenses are omitted by design and the program documentation makes this clear.

Since the CES is a household-based survey, nonresidential structures would never be subject to the questionnaire, and accordingly, expenditures for a nonresidential building in the process of converting to a residential structure would not be captured. This is a gap in our data collection and we are investigating options for addressing this problem. We do not know of other residential improvement and repair data systematically missing from our estimates.

We remove outliers from collected data when preparing estimates to reduce quarter-to-quarter variability and doing so is a source of downward bias in our estimates. We are reviewing our outlier procedures and investigating alternative methods to avoid introducing a downward bias. We also are reviewing all our imputation procedures, which compensate for nonresponse. We anticipate that through the introduction of new procedures in both these areas, our estimates of expenditures for residential improvements and repairs will increase and we plan to revise historical estimates reflecting this.

We have been working with staff in Housing and Household Economic Statistics Division who are responsible for the American Housing Survey (AHS) to increase comparability between programs and to evaluate and account for differences in estimates. They have redefined some data categories to encourage comparability between programs and have introduced a more extensive bounding procedure in the AHS to prevent expenses in earlier periods from being included in estimates for the current period. We plan to continue working in this area and we will report on our findings.

Employing disclosure avoidance measures similar to those employed for the CES and other household surveys, we have recently created and made available a microdata file of expenditures based on housing units from the Survey of Residential Alterations and Repairs (SORAR). Doing so provides researchers the opportunity to conduct a variety of analyses at various aggregation levels. We are currently investigating the possibility of creating a comparable microdata file for the CES contribution to our estimate, which consists of expenditures for owner-occupied units.

We agree with the consensus that the best way to collect expenditures for residential improvements and repairs is through a household survey. However, being dependent on the CES for reasons of economy requires that our sample be rather small for the purpose of collecting residential improvement and repair information. Two of the C50s major limitations—the high variability of estimates and the inability to produce estimates at subnational levels—are a consequence of this design. In addition, the timing of the CES data availability prevents a more timely release of our estimates.

# Value Put in Place Program

## LEAD DISCUSSANT

**Mr. Robert P. Parker**  
**Chief Statistician**  
**Bureau of Economic Analysis**  
**U.S. Department of Commerce**  
**Washington, DC 20230**

## BACKGROUND

The Value Put in Place Program (VIP) publishes estimates of the value of all construction work performed each month in the United States. Information is gathered from a variety of sources including a family of direct mail surveys collectively referred to as the Construction Progress Reporting Surveys (CPRS). The value of construction work for private nonresidential construction and for state and local government construction are collected through the CPRS using a frame of construction projects compiled by the F.W. Dodge company. The value of construction work performed for single-family houses is derived from Survey of Construction (SOC) data and value of construction work for multifamily units is collected from builders through the CPRS.

Concerning other components of VIP, information on nonresidential farm construction is provided by the Department of Agriculture; information on federal construction is provided by a variety of Federal agencies; and information on public utilities is provided by regulatory agencies and private sources. Residential improvements and repairs data for owner-occupied units are collected in the Consumer Expenditure Survey (CES), and information on residential improvements and repairs for all other units is collected in a followup to the CES. Estimates of VIP are adjusted to remove the affects of inflation using various price and cost indexes—each appropriate to the type of construction under review. Indexes for residential construction are calculated by the Census Bureau and the others are obtained from private and federal sources.

## LEAD DISCUSSANT

Mr. Parker began his discussion by explaining that the Bureau of Economic Analysis (BEA) uses the VIP estimates as the basic source data to prepare estimates of the structures component of the gross domestic product (GDP). The VIP estimates also are used to estimate the output of

the construction industry in the input-output tables, which provide the benchmarks for GDP, and also for estimates of gross product originating and for gross state product. In developing these measures, staff in BEA augment information from the VIP program with information from the Building Permits Survey and regulatory reports.

Mr. Parker stated that one of the major weaknesses in their structures estimates, which are prepared quarterly, is the absence of a reliable, independent annual measure in current dollars which can serve as a benchmark for the monthly VIP estimates. He discussed other weaknesses of the program such as undercoverage of nonresidential improvements, lack of a good price index for nonresidential construction, and delays in getting good benchmark information for state and local government construction. He did mention recent improvements in the program which allowed Census to estimate \$30-\$50 billion additional nonresidential construction and he advocated further program enhancements.

He then raised several classification issues that he would like to see addressed in future work. He suggested we review the definition of equipment and structure and attempt to develop a clear demarcation between them. It is often difficult to distinguish between equipment and structure in nonresidential construction, for example: is an elevator in a building structure or equipment; is an oil refinery all equipment? Construction activity is not always classified in the most appropriate category when companies build structures for one purpose but convert them to another purpose upon completion. There is the related classification problem when buildings are converted to purposes different from their previous usage (for example, old warehouses being converted to residential units). Another classification problem arises when a builder constructs a road for a housing development and turns the road over to the local government. There are inconsistencies when classifying such construction as either private or government construction.

Mr. Parker observed that we are likely to miss the component of “force-account” construction activity (that is, a firm doing construction using its own employees) because our frame for nonresidential construction comes from lists of projects contracted to construction firms. This may result in an underestimate of nonresidential improvements.

Mr. Parker observed that care must be exercised to exclude nonconstruction costs from the price of a house when developing VIP estimates of new residential construction. For example, we do not want the price of a refrigerator

(when sold along with a new house and included in the house price) to be included in the output of the construction industry. Commissions are included in the price of a house, but we would not want them to be included as output for the construction industry.

Mr. Parker observed that the VIP estimate for single-family housing is based on a model using information collected in SOC. He suggested that collecting single-family VIP through a direct measure would do a better job at capturing the cyclical nature of residential single-family construction. Under current practices, construction on a single-family housing unit contributes to the VIP estimate with phasing patterns used to allocate the total construction cost over a 12-month period. Mr. Parker feels that the patterns currently in use are dated and they tend to allocate construction costs incorrectly. Mr. Parker also reported that international guidelines for compiling GDP treat construction in progress as inventory and add it to investment for purposes of the GDP only at the time of sale, as with other goods.

Mr. Parker next raised the issue of price indexes. He observed that we use hedonic techniques for our single-family price index and that BEA has worked with Census staff to develop a multifamily index. He feels that its use to deflate multifamily construction has been a substantial improvement over the previous practice of employing a single-family index for that purpose. He observed that there are no price index programs for nonresidential construction. He suggested that the Bureau of Labor Statistics (BLS), as part of the newly expanded service industry producer price index program, may provide new prices in this area and that Census, BLS, and BEA should consider joint work in this area. In the meantime the VIP program and BEA employ a variety of cost indexes to calculate inflation-adjusted values for nonresidential construction.

As a final issue, Mr. Parker discussed revisions to the GDP. He observed that VIP revisions cause GDP revisions and suggested that we try to put procedures in place that keep our revisions as low as possible. He noted that recent improvements have been good but more are needed and added that the VIP program always needs attention.

## FLOOR DISCUSSION

Several attendees remarked that our one-family phasing patterns are dated and they suggested alternatives to their use. One attendee suggested that we collect monthly construction costs from all single-family homes in the Survey of Construction, from start through completion, to allocate construction costs in the month incurred. (This corresponds to how we collect monthly construction costs for multifamily structures as well as for private nonresidential construction.) Others suggested that we update our phasing patterns to more accurately reflect current building practices. It was suggested that we might vary the pattern to account for different stages of the business cycle.

One attendee asked if land development costs show up in our VIP estimates for new residential housing. A Census representative indicated that they are reflected in the price of a house and contribute to the VIP estimate.

One attendee observed that there is geographic detail in the annual report but none in the monthly and asked if there can be sub-annual geographic breakouts. For example, could there be monthly sub-national geographic estimates for total VIP or could the Census provide geographic detail quarterly? A Census staff member observed that our sample size does not support publishing further geographic detail on a monthly basis.

One attendee asked if there would be advantages to publishing quarterly rather than monthly estimates and another responded that he finds monthly data valuable and uses it for internal indexing. Mr. Parker observed that if VIP estimates came out quarterly it would delay BEA's preparation of GDP by about 2 months. He felt that this would not be acceptable from a policy perspective.

One attendee stated that she would like to learn more about the employment picture on a monthly basis. She observed that industry trends affect employment. Census staff observed that detailed employment information is available from the Bureau only in its census of construction and that the BLS has found that their monthly contract construction employment and payroll track well with VIP. One attendee noted that even though BLS employment is given at the highest level of aggregation, it does provide information on employment in the construction industry.

In reference to indexes, one attendee stated that private companies publish building costs by type of building and provide costs broken down into labor and material costs. He stated that the government does not have to collect such data as they are available for sale from the private sector. Mr. Parker observed that there have been attempts to use private databases for computing indexes but that such input-based cost indexes are not a substitute for deflation, which requires price indexes. He noted that cost indexes do not reflect changes in profit margins or in labor or capital productivity.

One attendee observed that private sector methodology is often treated as a trade secret and accordingly users are not as comfortable with their estimates as with estimates from government sources. The discussant who raised the issue of private data sources observed that private estimates can be as reliable as government estimates and they are widely used by those who require reliable information.

One attendee asked whether a separate estimate for senior housing could be published. He observed that there has been an increase in the type of multifamily residential construction that provides more than just housing for residents. For example, in some buildings, meals and various levels of care may be provided. Another attendee observed that housing for the disabled is also of interest and that there has been expanded activity in that area.

One attendee observed that the VIP program provides the main input for the Industrial Outlook and it would be good to have more detail by type of construction. Census staff noted that we will soon be publishing VIP for new types of construction and there will soon be more detail at the annual level.

## **CENSUS BUREAU COMMENTS AND RESPONSES**

We agree with Mr. Parker's comments that additional reliable annual benchmarks for VIP are desirable. We currently benchmark industrial buildings to estimates from the Annual Capital Expenditures Survey (ACES) and we would like to expand the use of that survey into other categories of nonresidential construction. A comprehensive review of ACES estimates is currently underway. We also benchmark state and local government construction to the census of governments, but that information is available only several years after the annual reference period.

We agree with Mr. Parker on the need for indexes of nonresidential building construction for use in preparing the GDP. Nonresidential indexes produced in the private sector are essentially input indexes; that is, weighted averages of construction material prices and hourly wages. These indexes are inadequate for deflating GDP estimates to current dollars because they fail to reflect price changes because of changes in productivity and market conditions. We are currently working with BEA and BLS to develop appropriate nonresidential price indexes.

As observed by Mr. Parker, we are missing some improvement and repair information in the nonresidential sector. Our sampling frame, which is based on contract awards, does tend to undercover the smaller nonresidential improvement projects. We submitted an FY99 budget initiative for funds to conduct a survey of nonresidential improvements and repairs, but it was denied.

As Mr. Parker further noted, there are conceptual problems in distinguishing between structure and equipment

expenditures, and we add that breaking out structure and equipment expenditures is often difficult for survey respondents. We provide respondents with extensive instructions and examples on how to report expenditures. In fact, we ask for equipment expenditures on the questionnaire to have them separated out from structure expenditures.

Estimates for single-family VIP are based on a model using single-family sales and contract prices. Nonconstruction costs are subtracted from the sales price (for example, cost of raw land, price of movable appliances, sales commissions, etc.) when determining construction costs. Factors for removing these costs are based on surveys of builders conducted in the early 1980s, and we are in the process of preparing new factors from a 1998 survey. Phasing patterns used in allocating construction costs to months are based on information collected in 1974. We will investigate working with industry groups to make our phasing patterns more current so, along with new nonconstruction cost factors, we will more accurately allocate monthly single-family VIP.

In principle, we could estimate single-family VIP directly by collecting the monthly VIP of a sample of single-family housing units in SOC. Providing monthly VIP information for individual housing units will likely prove difficult for builders. In addition, such a request will significantly increase the response burden and costs in SOC. We feel that employing a model and keeping model parameters current is the most cost effective method for estimating single-family VIP.

Several attendees asked that we provide more detailed estimates of VIP in our data releases. We will introduce annual estimates of private nonresidential construction by more detailed type of construction categories in 1999. We also are investigating whether we can provide estimates of total nonresidential construction VIP by state. More detailed monthly VIP estimates of private nonresidential construction and state and local construction may be introduced in the year 2000.

## Economic Census: Construction Sector

### LEAD DISCUSSANT

**Mr. Manuel D. Gutierrez**  
**Manager, Market Research**  
**Kohler Company**  
**Kohler, WI 53044**

### BACKGROUND

Data on the construction sector of the economy are collected every 5 years as part of the Bureau's economic census program. Data are actually collected from a representative sample of construction firms, including builders, general contractors, and special trade contractors representing all facets of the construction industry. All large establishments are in our sample as well as a representative sample of small establishments. Firms report business receipts, payroll, assets, and other economic information as well as types of construction they were engaged in during the year of the census.

With each Census we produce reports in three publication series. The *Industry Series* provides information on each construction industry. Included in the reports are value of work by type of construction, statistics by size classes, assets data, and selected industry ratios. The *Geographic Area Series* provides information on each Census Division. Reports include the statistics mentioned above by state. The *Subject Series* provides summary data for 3-, 4-, and 6-digit NAICS codes and census regions. Estimates from the 1997 Economic Census will be produced at the National and state levels. In the past, estimates also were produced for selected metropolitan areas.

### LEAD DISCUSSANT

Mr. Gutierrez began by providing an overview of the Census of Construction Industries<sup>1</sup> (CCI), noting that it has been conducted on a regular basis since 1967 and currently provides estimates for employer establishments and contains supplemental information for nonemployer establishments. It provides break-outs for residential and non-residential builders, heavy construction, and general and special trade contractors. Information has been provided for the total United States, for states, and for selected metropolitan areas.

<sup>1</sup>This data collection and publication program is currently referred to as the *Economic Census: Construction Sector* to highlight that it fits into the framework of the economic census.

He emphasized how the CCI provides valuable information on the structure of the construction industry. It provides information on: average number of employees by establishment, average receipts of establishments, and percent of one-person establishments to total establishments, to give only a few examples. One is able to get the information by state by establishment size and one can observe how this information has changed over time.

Mr. Gutierrez observed that this information is valuable to companies that market products to the construction industry. Information from the CCI can be employed to understand the distribution of construction establishments by state, to study market penetration and to evaluate demand for products and potential markets by state. By providing a national cross-section of the construction industry, the CCI is used in survey sample verification to weight the results of private surveys. In addition, Mr. Gutierrez stated that his company compares total counts of establishments on their mailing lists to counts from the CCI and is able to reduce costly mailing by looking for large discrepancies.

Mr. Gutierrez discussed some improvements he would like to see in the CCI program. He would like to have annual data, even if on a smaller, less comprehensive scale, such as data on number of firms and number of employees. He also advocated a more timely release of CCI information, especially an earlier preliminary release. He would like to see data released in a more easily usable, electronic format and he advocates reducing our paper output. For example, he recommended release through the Internet and in SAS downloadable files for CD-ROMS. He would like to see more comparability of information between the CCI and other Bureau programs and with other data sources, such as National Association of Home Builder estimates.

Mr. Gutierrez recommended that we provide data at greater geographic detail, such as by 3-digit ZIP Code, and that we consider the release of microdata from the CCI through the use of data masking to avoid breaching confidentiality. With the availability of ample computer resources, working with large data sets is no longer a problem for data users.

### FLOOR DISCUSSION

One attendee asked why there is an emphasis on establishments as opposed to firms for data collection and

publication in the economic censuses. He observed that users are often interested in the business entity and not local establishment activities.

Census staff responded that we release information on an establishment basis in order to provide geographic data and to provide detailed industry data. It is more difficult to place a firm in an appropriate industry classification when its establishments operate in more than one classification area.

Census staff observed that since we collect information on an establishment basis and have links between establishments belonging to the same firm, we are able to create firm data based on our collection of establishment information. An attendee responded that it would be very helpful if firm data were also broadly available from our data release program.

One attendee observed that microdata files are housed in the Census Bureau's Center for Economic Studies and they are extremely useful for special projects. He noted the problem of ease of access and raised the issue of release of this microdata. Census staff observed that we have had little success in creating public use economic microdata sets. The skewed distribution of economic establishments makes it very difficult to mask data enough to protect the confidentiality of respondents while simultaneously maintaining data utility.

One attendee asked about possibilities for the release of microdata products from the CCI employing techniques comparable to those used in the release of demographic microdata to protect confidentiality. Census staff responded that, whereas households are fairly homogenous, the population of industrial establishments is highly skewed and individual establishments have unique characteristics. Efforts to effectively mask establishment data to prevent identification would seriously impinge on the utility of the data. Another Census staff observed that we recognize the need for microdata and have experimented with options and are very uncomfortable with the results. He noted that there is direct access to the CCI microdata through controlled conditions at the Center for Economic Studies at Census headquarters and at satellite sites.

One attendee remarked that one major shortcoming of the data collected on the CCI is that it is available only every 5 years. It is very difficult to measure trends and data users resort to estimating information in the noncensus years. Doing so makes it difficult to address many policy issues. The attendee advocated an annual program that collects information comparable to that collected in the CCI. A Census representative stated that we concur with that need and that Census has requested funding for an Annual Survey of Construction in our FY99 budget initiative.

One attendee observed that three delivery methods for construction projects are: design/bid/build, construction management, and design/build and noted that design/build construction is an increasingly important component of the industry. He stated that the CCI does not collect information

on the delivery methods for construction projects. He advocated that the CCI collect information on delivery methods and noted that the Design-Build Institute would be glad to work with Census to capture that information.

Census staff agreed that this is an important issue and stated the CCI includes information on design/bid/build and construction management methods of delivery. We also added a question on percent of receipts for design/bid/build work and we will analyze the information we collect and assess the ability of establishments to report this information to us. We will publish information on method of delivery if the data supports doing so.

One attendee asked that the CCI provide more information on employment by type of work stating that it would be valuable to know this information to better understand labor issues in the construction industry. He went on to observe that it would be desirable to have percent of employment by type of activity comparable to information on percent of receipts by type of activity. Right now, if a user wants to know how many residential construction workers there are, one must prepare estimates based on the residential construction receipts. He would be interested in a classification of establishments by type of work activity rather than by source of receipts. He also inquired about the possibility of obtaining worker hours by type of activity.

A representative of the Bureau of Economic Analysis (BEA) observed that classification of establishments by receipts is important to the preparation of the National Income and Product Accounts. Census staff noted that in our 1990 Record Keeping Practices Survey, we found that employee by function or worker-hours by type of activity are a problematic set of questions for respondents to answer well. Adding a question of this sort would constitute a large increase in response burden to companies. It was further noted that the CCI releases information on receipts by specialization, which may provide information on employment issues.

Census staff provided information on data products for the CCI and noted that preliminary reports will be available in early 1999 and the complete industry and geographic reports by the end of 1999. We will be using less paper and industry reports will be available on CD-ROM and in downloadable data files on the Internet. We are developing new data access software which will be easy to use and which will provide users with powerful capabilities.

Census staff further noted that employment and payroll data for the Construction sector are available on an annual basis through the County Business Patterns (CBP) program. One attendee noted that the 2-digit SIC levels on the CBP are acceptable, but information below that level is not useful because they are incomplete as many cells are suppressed due to confidentiality protection. It was suggested that we release all 4-digit SIC information at the MSA level, which should not require many suppressions. A Census representative observed that if we were to publish more MSA data we may have to suppress more county data to avoid derivative complementary disclosures.

## CENSUS BUREAU COMMENTS AND RESPONSES

Data on the construction sector of the economy are collected as part of the 1997 Economic Census. Forms were mailed to respondents in January 1998 and respondents were requested to provide information for calendar year 1997. The forms were due in February 1998, processing was closed-out in August 1998 and data review proceeded from that time onward. The first data will be released as part of the *Economic Census Advance Report* due out the first part of 1999. Our first 1997 construction industry reports will be released in March 1999.

The reports will be released as portable data format (PDF) files and electronic data files on the Census Bureau Internet site [www.census.gov](http://www.census.gov) and also will be available on CD-ROM. The 1997 construction industry and state reports will not be released in printed format, only the Subject Series, Industry, and Area U.S. summaries will be released as printed documents in addition to the electronic format releases.

Statistics on selected metropolitan areas have been discontinued as a cost saving measure to absorb cuts in funding. Information by state will continue to be released. We can produce tabulations for individual metropolitan areas or other suitable geographic areas on a cost reimbursable basis.

As noted in the floor discussion, we find it very difficult to release economic microdata because of confidentiality concerns. We do invite those interested to advise us of special tabulations needed that we may be able to provide. Another option is to take advantage of the microdata

housed in the Census Bureau's Center of Economic Studies for the conduct of special studies.

Several discussants indicated an interest in an annual construction survey to provide information between censuses, in particular, annual estimates of receipts which would prove valuable for the National Income and Product Accounts. Realizing a demand for annual data, we requested funds for an annual construction survey in our FY99 budget initiative, however, our request was denied.

As discussed earlier, we collect information at the establishment level (rather than the company level) because we can clearly define an industry classification for each establishment. Establishment information can be aggregated across states and other geographic areas to produce geographic based estimates. Furthermore, establishment information can be aggregated to the company level to produce company information and tabulations can be created on a cost reimbursable basis.

An important issue for Census is comparability between estimates from different programs and we endeavor to cross-check information between programs. For example, we added a question on the 1997 construction census report forms about residential housing starts in an effort to investigate comparability in data collection between the economic census program for construction statistics and Survey of Construction.

We also continually review data collected in all our programs to provide information that is useful and current. As an example, we added a question on the 1997 construction census report forms on receipts obtained under design/bid/build contracts to measure the emergence of new project delivery methods in construction.

# Section 2

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## Overview of Construction Statistics Programs



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## Construction Statistics Programs

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The following sections describe in general terms and in detail the major programs conducted within the Census Bureau's Manufacturing and Construction Division (MCD) for producing construction related statistics. Our programs provide information on new construction, expenditures for residential improvements and repairs for existing structures, and manufactured homes. Even though this report was prepared in conjunction with the Construction Statistics Data Users' Conference, held on October 28, 1997, it can serve as an independent document providing an integrated description of our programs. These programs are constantly changing and some methods used in the past are no longer employed. We have noted some of the significant changes.

Our programs are complex, and data collected for one program are often used by other programs. We have

included flowcharts to help make the program activities easier to understand and to show relationships between programs.

Some statistics on construction are compiled by other divisions of the Census Bureau and by other government agencies. The programs that produce those statistics are not described in this report .

In the Brief Summary of Programs of this report, we introduce our programs, list their major products, and provide a display showing the products, programs, and data sources used in the estimates. In the next section, we present details of each of the programs and highlight how our programs are related to one another.

For those wishing more detail on any of our programs, we recommend the technical appendixes in our published reports. They provide detailed information on methodology, definitions, data limitations, and a wealth of other features.

## Brief Summary of Programs

### DESCRIPTION OF INDIVIDUAL PROGRAMS

#### Building Permits Program

The Building Permits Program collects information on building permits issued for new private residential construction. Information is collected from permit-issuing jurisdictions on number of housing unit permits issued and their permit valuation. These statistics are a leading economic indicator.

Data are collected monthly from a sample of permit-issuing places and annually from the remaining permit-issuing places. Places not previously issuing permits are contacted every few years to determine if they have begun issuing permits and the sample is periodically reselected to better represent the expanding universe of permit-issuing places.

Monthly and annual estimates of housing units authorized by building permits are available on the Internet both unadjusted and seasonally adjusted for the United States and the four regions. Unadjusted estimates by states and metropolitan areas are also available. Data for individual permit offices are available from the Census Bureau.

#### Survey of Construction (SOC)

The Survey of Construction (SOC) collects and publishes information on residential units started, sold, and completed each month. In addition, a variety of housing characteristics, such as unit price, number of bathrooms in unit, and size of unit, are published quarterly and annually. Information is collected directly from builders by field representatives.

The publication series *Housing Starts* (C20) is published monthly and provides information on the number of housing starts throughout the United States. Information includes estimates of housing units authorized, started, and authorized but not yet started. The Housing Units Started series is a Cyclical Indicator of Fixed Capital Investment.

The publication series *New One-Family Houses Sold* (C25) consists of 12 monthly reports. Information includes estimates of units sold and for sale, average and median sales prices, and price distributions of units sold. The Price Index of New One-Family Houses Sold also appears in this report.

The *Characteristics of New Housing* report (C25A) is published annually. It includes price and physical characteristics data for new houses completed, new houses sold, and new multifamily buildings completed. More than 25 physical characteristics are shown—for example, size, number of bathrooms, type of heating system, and type of exterior wall.

The series *Housing Completions* (C22) is published monthly and provides information on the number of housing units completed in a month and on those under construction.

The series *New Residential Construction in Selected Metropolitan Areas* (C21) is published quarterly and provides information by metropolitan area on units authorized, started, and completed. We are currently evaluating the need for this publication and it may be soon discontinued if we find that it is not widely used.

#### Value Put in Place Program (VIP)

The Value Put in Place Program (VIP) publishes estimates of the value of construction work performed each month. Information is gathered from a variety of sources including a family of direct mail surveys collectively referred to as the Construction Progress Reporting Surveys (CPRS).

The value of construction work performed for single-family houses is derived from Survey of Construction data and value of construction work for multifamily units is collected from builders through a CPRS survey. Information on improvements for owner occupied units is collected in the Consumer Expenditure Survey (CES) and information on improvements for rental units is collected in a followup to the Consumer Expenditure Survey.

The value of construction work for private nonresidential construction and for state and local government construction are collected through a CPRS using a frame of construction projects compiled by the F.W. Dodge Company. Information on nonresidential farm construction is provided by the Department of Agriculture; information on Federal construction is provided by a variety of Federal agencies; and information on public utilities is provided by regulatory agencies and private sources.

The monthly publication series *Value of Construction Put in Place* (C30) provides information on the value of construction work done. Included in the reports are national estimates by type of construction in current and constant dollars and price deflators. An annual revision is published

as an expanded May report. The quarterly publication series *Expenditures for Residential Improvements and Repairs* (C50) provides information on residential improvements.

### **Manufactured (Mobile) Home Program**

The Mobile Home Placement Survey collects information from mobile home dealers about inventories and sales each month. The National Conference of States on Building Codes and Standards (NCSBCS) acting as an inspection agent for Department of Housing and Urban Development produces a frame of units shipped by manufacturers to dealers from which we sample. Information is collected and estimates are published on the price of units sold and their characteristics. We also publish information on manufacturers' shipments of mobile homes compiled from manufacturers' reports to NCSBCS.

Both the NCSBCS' shipments data and estimates produced from the Mobile Homes Placement Survey appear in the *Housing Starts* publication series. The monthly placements estimates include mobile homes in dealer's inventories, mobile homes placed, and average sales price of mobile homes. The *Housing Starts* publication in June contains annual estimates of characteristics and state estimates of placements and sales prices.

### **Economic Census: Construction Sector**

Data on the construction sector of the economy are collected every 5 years as part of the Bureau's economic census program. Data are actually collected from a representative sample of construction firms, including builders, general contractors, and special trade contractors representing all facets of the construction industry. All large

establishments are in our sample, as well as a representative sample of small establishments. Firms report business receipts, payroll, assets, and other economic information as well as types of construction they were engaged in during the year of the census. The sample includes all larger establishments and a sample of smaller establishments.

With each Census we produce reports in three publication series. The *Industry Series* provides information on each construction industry. Included in the reports are value of work by type of construction, statistics by size classes, assets data, and selected industry ratios. The *Geographic Area Series* provides information on each Census Division. Reports include the statistics mentioned above by state. The *Subject Series* provides summary data for 3-, 4-, and 6-digit NAICS codes and census regions.

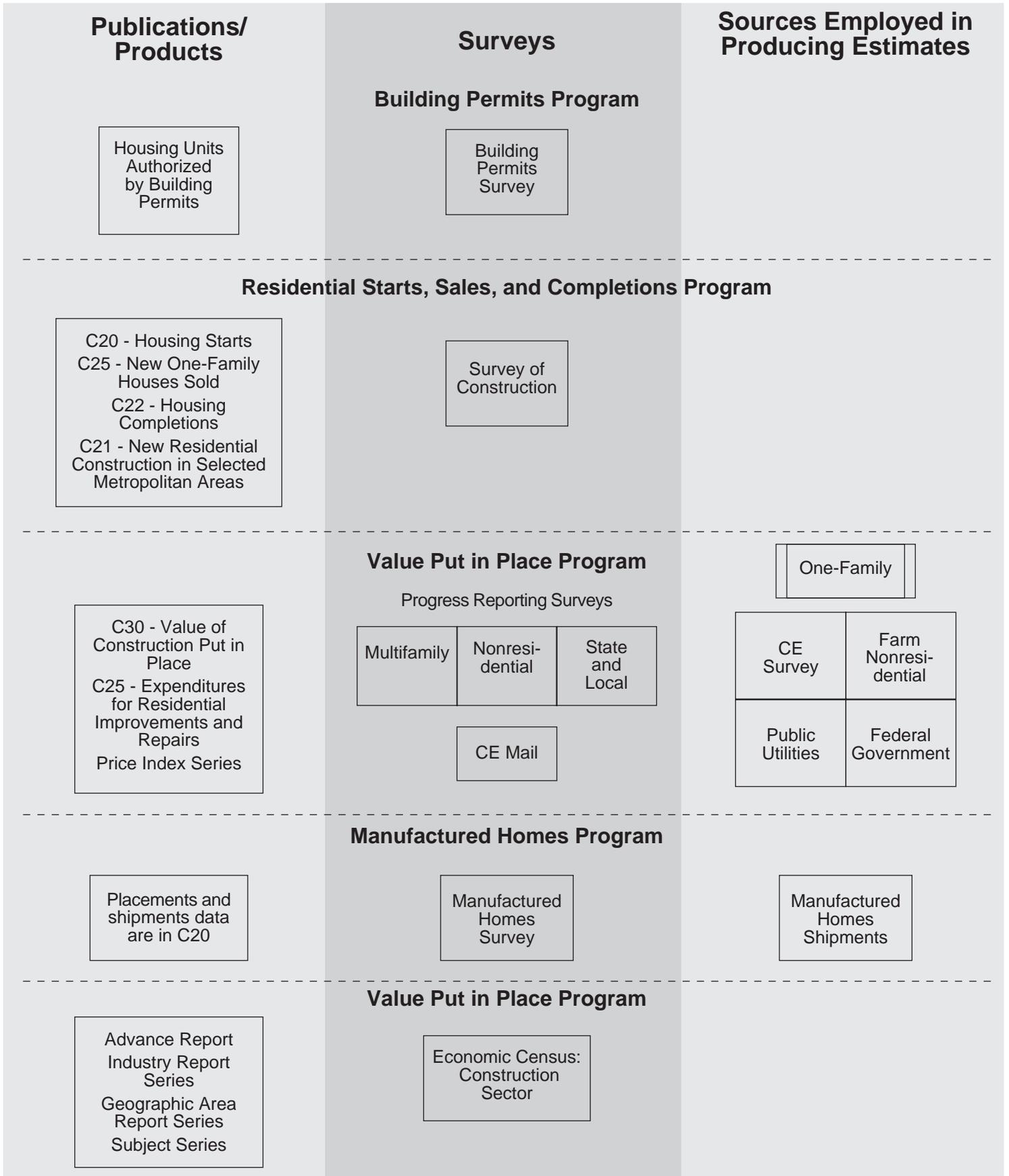
Estimates from the 1997 Economic Census will be produced at the National and state levels. In the past, estimates also were produced for selected metropolitan areas.

### **SUMMARY DISPLAY OF CONSTRUCTION STATISTICS PROGRAMS**

The display on the next page presents a summary of the major construction statistics programs. In the left column, we show the publications and products from each major program. These are in a state of change at this time as we move to increased electronic dissemination. In the second column are the surveys that provide estimates for the data products in the first column. In the last column are additional sources of data which also are used to provide information for our data products and contribute to our estimates. The next section contains detailed information about these programs and highlights interrelationships between them.

Figure 1.

# Construction Statistics Programs



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## Program Details

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### BUILDING PERMITS PROGRAM

The Building Permits Program consists of two surveys, a monthly and an annual survey of local government offices that are responsible for recording and regulating new construction. In 1995, about 19,000 county, city, town, township, and village governments required permits for new construction. These places are referred to collectively as the Building Permit Place Universe and constitute the sampling frame for this program. From estimates available from the Survey of Construction (SOC), we know that about 97 percent of all residential construction in 1997 occurred in places covered by this universe.

New permit places are constantly being identified. Places (cities, towns, counties, etc.) without permit systems could begin issuing permits at any time. These new places are not immediately introduced into our sampling frame to avoid distorting estimates of month-to-month change. Before a new monthly sample is selected, the new places are added to the Building Permit Place Universe and our frame is updated at that time. The last time new places were added to the universe and a sample selected was 1994 and the universe went from 17,000 permit offices to about 19,000. The first time data was published for this sample was January, 1995 with the publication of annual data for 1994.

#### Monthly Survey

For the monthly Building Permits Survey we usually select a new sample of permit-issuing places from the Building Permit Place Universe after a decennial census. The sample includes all permit places in all Primary Metropolitan Statistical Areas (large population centers located near other large population centers) and the 25 largest Metropolitan Statistical Areas (large population centers not located near other large population centers), which provides for precise estimates for these areas. The remainder of the Building Permit Place Universe is stratified by state to allow for good state estimates. In some of the small states, all permit-issuing places are in the sample. In other states there is a certainty stratum and a noncertainty stratum which is sampled at the rate of 1 in 10. The total sample size is about 8,500 places. Each month permit offices in sample are mailed a questionnaire which they are asked to return to our National Processing Center (NPC) in Jeffersonville, Indiana, for data entry. On the questionnaire,

we ask how many residential buildings and units were authorized in the past month for single, two, three or four, and five-or-more-unit buildings and what was the total permit value. Data for additions and alterations, demolitions, and nonresidential structures were collected in the past, but are no longer included in this program.

There are a number of permit offices which have special arrangements with us and they send printouts or electronic transmissions of permit activity. There are also some special arrangements for joint data collection with state agencies that want data from places in their state. The arrangement might result in the state agency collecting the data and providing it to us or vice versa. A variety of arrangements have existed throughout the life of this survey.

After the data are entered in Jeffersonville, they are transmitted to headquarters for computer editing, correction, review, and tabulation. Since correlations among data items are small, there are few inter-item ratio edits and no extensive multivariate edits. Imputation for item nonresponse is performed during a computer edit at headquarters. Ratios of current period data to prior year's annual data for respondents are computed and these ratios are applied to the prior year's annual data for nonrespondents to create imputes for the current time period. During the edit in Jeffersonville and at headquarters telephone calls may be made to the respondents to confirm or correct reports.

Monthly estimates include totals of housing units authorized for one, two, three or four, and five-or-more-family buildings at the National, regional, and state levels and for metropolitan areas. Sample data are weighted up by the inverse of their probability of selection and aggregated to provide estimates. National and regional estimates of authorizations are seasonally adjusted, however, state and metropolitan estimates are not adjusted.

A preliminary estimate is produced in the middle of the month following the month covered by the data. At the end of that month a revised estimate is published. When the annual survey is complete, monthly estimates are revised again as they are benchmarked to the annual totals to ensure that the sum of the 12 monthly estimates equals the total from the annual survey.

When the universe is increased to introduce new permit-issuing places, we estimate National and state totals of authorizations under both the old sample (representing the older, smaller universe) and the new sample (representing the new, larger universe). We conduct the overlap sampling

for 12 months to observe the change in levels due to the new expanded universe. Based on the overlap, a user can adjust the historical series so that comparisons with previous year of rates of growth and level estimates can be made on a common universe structure.

## Annual Survey

All permit-issuing places in the Building Permit Place Universe that are not in the monthly sample are canvassed annually by mail. Data from places in the monthly sample are summed to provide annual values, which are combined with data from places in the annual survey to obtain annual totals. Annual data are published for each permit-issuing place and are aggregated to provide United States, state, and metropolitan area totals. Imputed data are included in these totals for places that do not report.

After the annual totals become available, monthly estimates of residential authorizations are benchmarked to the annual totals by Census region and type of structure. Annual totals are used as the measures of size when the monthly sample of permit-issuing places is reselected. In addition, these data are employed in various demographic surveys.

## Special Features

Building Permits Survey (BPS) data are not confidential, so we are able to provide response data to users. Data for the past 10 years are available for a fee. This includes additions and alterations and nonresidential data collected in the past but no longer collected.

SOC field representatives visiting permit offices have observed that some permits do not contain sufficient information to distinguish attached single units from multifamily units. Permit offices occasionally classify them incorrectly when they report data to us. We do not adjust the Building Permits Survey's estimates of authorization for these errors. Such an adjustment would not affect estimates of total units, but would alter the distribution between single family and multifamily.

Some states require permits for certain types of construction anywhere in the state, for example, buildings with more than a specified number of units. If a local jurisdiction does not issue the permit, a state office will issue one. The type of state permit place that is created is different from state to state. We attempt to include these types of places in the permit universe.

The highly reliable estimates of housing units authorized that are produced in the BPS are used to ratio-adjust estimates of units started from the SOC. This substantially reduces the variance of the SOC estimates. Building Permits Survey estimates also are used to ratio-adjust estimates from the American Housing Survey.

## THE SURVEY OF CONSTRUCTION

The Survey of Construction (SOC) is one integrated operation which provides estimates of starts, sales, and completions of residential buildings. For the purpose of this survey, a start is defined to be when excavation begins for the footings or foundation of a building. A single-family housing unit is defined to be complete when it is occupied or when the finished flooring is installed and a multifamily residential building is defined to be complete when at least 50 percent of the units in the building are complete. A sale of a single-family house is defined to be when a contract is signed to purchase a unit and this can occur at any stage of the construction process: before a permit is taken out, after the unit is completed, or any time in between. Sales of multifamily units (condominiums) are not collected.

## Sample Design

The name Survey Use of Permit (SUP) is given to the SOC activities in areas of the country where building permits are required. The name Nonpermit Survey (NP) is given to SOC activities in areas of the country where building permits are not required. The only differences between the two surveys is the sample design and the initial data collection. The sample design for the Survey Use of Permit will be described in the next section followed by the sample design for the Nonpermit Survey.

**Survey Use of Permit (SUP).** Sampling for the SUP is a four stage design. The entire nation is divided into groups of counties and New England towns which are collectively referred to as Primary Sampling Units (PSUs) and they are sampled for the Current Population Survey (CPS). The first stage of sampling for the SUP is the same as the sample selection of PSUs for the Current Population Survey. In the second stage of sampling for SOC we select a subsample of the Primary Sampling Units selected for the Current Population Survey and in the third stage, a sample of permit-issuing places is selected in each PSU. The fourth and final stage of sampling is a selection of building permits from each place included in the third stage sample.

The final sample of permits is produced by field representatives visiting permit issuing offices, preparing a list of the residential permits issued during the month and choosing a sample from the list (following a well-defined procedure). The final stage of sampling is repeated monthly. Each month field staff list new permits and select a sample of them. The sampling weights on each sampled permit reflects all four stages of the process.

With the recent introduction of computer assisted personal interviewing (CAPI) and collection of data with the use of laptops, the field staff enters the list of new permits into a CAPI listing instrument and the CAPI system selects the sample of permits for interviewing. A process referred to as patterned sampling is used for this final stage of

sampling under CAPI. As permit information is entered into a laptop computer, the computer selects a sample. As more permits are entered, the sample is adjusted so its size is approximately constant. Certain patterns of selected and nonselected cases are preprogrammed to accomplish this adjustment to a constant size sample.

**Nonpermit (NP) Survey.** Since a portion of the country is not covered by permit-issuing places, the Nonpermit Survey is conducted. The first and second stages of sampling are the same as for the SUP: a subsample of PSUs is currently employed in the CPS. All of the census enumeration districts that are in these PSUs and are not within the jurisdiction of a permit-issuing place become the frame for the third stage of sampling. A sample of these districts is selected as the third stage. The selected districts are referred to as area segments. Area segments are canvassed each month for new residential construction and all units identified are included in the SOC sample.

Before 1980, the NP Survey covered 15 percent or more of the residential construction. Around 1980 the percentage dropped below 10. In 1995, following the most recent building permit universe update, the amount of residential construction in nonpermit areas fell to 3 percent of the total.

## Processing and Estimation

Data are collected by field interviewers. For the SUP, each building permit selected in the sample contains the address of the proposed construction location and the name of the builder. For the NP Survey, the field representative must locate a builder for the started housing unit observed. Under either scenario, builders are contacted each month to obtain start date and completion date for all sample units and sale date for single-family units built for sale. A permit or observed start address stays in sample until the building is completed and sold (for those for sale) or until it is designated as "abandoned."

Most response data are collected via telephone calls from the interviewer's home to the builders of the sampled units. In order to collect all of the start, sale, and completion information, a respondent may be called in many months. If the builder or some other respondent is not available by phone to provide needed information, the interviewer is required to visit the building site for the information. A start is determined if excavation for a foundation is observed at the site. If sale or completion information is required and no respondent is available by phone, we treat that as not sold or not completed and the next month we attempt to interview.

For single-family houses, characteristics such as presence of basement, number of bathrooms, square footage, and so on are collected. For multifamily houses, characteristics of the building are collected, for example, number of efficiency units in the building and number of units with

two bathrooms. One use of these characteristics is to develop price indexes for single-family and multifamily buildings. Price indexes are described later in this report.

For many years, the SOC has been conducted using forms to list permit information and two questionnaires to record respondent information (a one-family version and a multifamily version). Forms were sent to Jeffersonville, keyed, and then sent to headquarters. After data arrive at headquarters, the review, correction, and tabulation process begins. A computer assisted personal interviewing (CAPI) system has replaced these forms with laptop computer programs. In the permit listing program, the interviewer enters permit information. Builder addresses already on file are copied by the computer to the questionnaire for sample cases and the interviewer enters builder address information for the builders not on file, updating the builder file. The computer selects the sample, a case management system organizes the telephone interviews, and an automated questionnaire guides the interview and edits the response data.

The system achieves a more rapid collection of data, fewer late reports, and better quality of data since questionable responses are verified immediately. All data collected in the field are transmitted directly to headquarters for review and tabulation.

Monthly estimates of starts, sales, and completions are made at the National level and for regions, and starts and completions estimates are made for selected metropolitan areas for one, two, three or four, and five-or-more-family buildings. The quarterly or annual estimates include units started, one-family units sold, units completed, and a wide range of characteristics of housing such as sales price, square footage of house, presence of garage, etc.

A large reduction in variance occurs from a ratio adjustment procedure using the BPS's estimate of authorizations since this estimate has a low variance. To ratio-adjust, we first estimate the ratio of some characteristic to housing units authorized. For example, we may form the ratio of units started to total authorizations, where both components of the ratio are estimated from the SOC design. These ratios are multiplied by the Building Permits Survey's estimates of housing units authorized to yield a "ratio adjusted" SOC estimate of units started.

The major estimates from SOC (starts, sales, and completions) are highly seasonal. Seasonally adjusted annual rates (SAAR) are computed using the Bureau's seasonal adjustment programs.

Starts and completions estimates are published as preliminary, first, and second revisions. Since sales estimates are subject to greater numbers of late reports than starts and completions, they have a third revision. The first estimates of starts are released about 2 weeks after the reference month as preliminary estimates. First and second revisions are issued in the subsequent 2 months. The first estimates of sales and completions are issued about 4 weeks after the reference as preliminary estimates. First

and second revisions for completions and first, second, and third revisions for sales are issued in subsequent months.

## Special Features

### **Survey of Construction data used in other programs.**

The SOC collects respondent name and address and building location for multifamily buildings authorized in the permit-issuing places in sample. This data becomes the sampling frame for the Multifamily Construction Progress Reporting Survey portion of the Value Put in Place Program. A sample of nonresidential building permit information collected in SOC is employed in an evaluation of the construction project frame used in the nonresidential Value Put in Place Program.

The Value Put in Place Program derives one-family construction value estimates from SOC. In addition, the single-family price deflator for single-family Value Put in Place is computed from data collected in SOC. The BEA has developed a multifamily price deflator for Value Put in Place estimates which also uses data collected in SOC.

The Survey of Market Absorption (SOMA) uses completed multifamily buildings as its sampling frame. The field interviewers working on SOC usually collect the data for SOMA. The permit listings for the permit places visited by SOC interviewers are used in the Permit Address Listing (PAL) portion of CPS.

**Survey of Construction estimation issues.** Since a sale is defined to be when a sales contract is signed, sales contracts signed prior to an authorization are a particular problem because they will not be recorded by a field

representative in the survey as a sale until a permit is taken out. We attempt to estimate for them and they are, in part, responsible for the large revisions in our preliminary estimates.

Attached housing units that are separated by a complete ground to roof wall are considered one-family units for purposes of SOC. Some permit places treat these types of units as multifamily. During the listing of the permits at the permit office, the interviewer cannot tell if a multifamily building is one-family by our definition. If it is listed as multifamily and later turns out to be one-family, its status is changed. The one-family units which have now been newly identified are treated as if they were part of the one family list of permits and they are sampled as an extension of that sample.

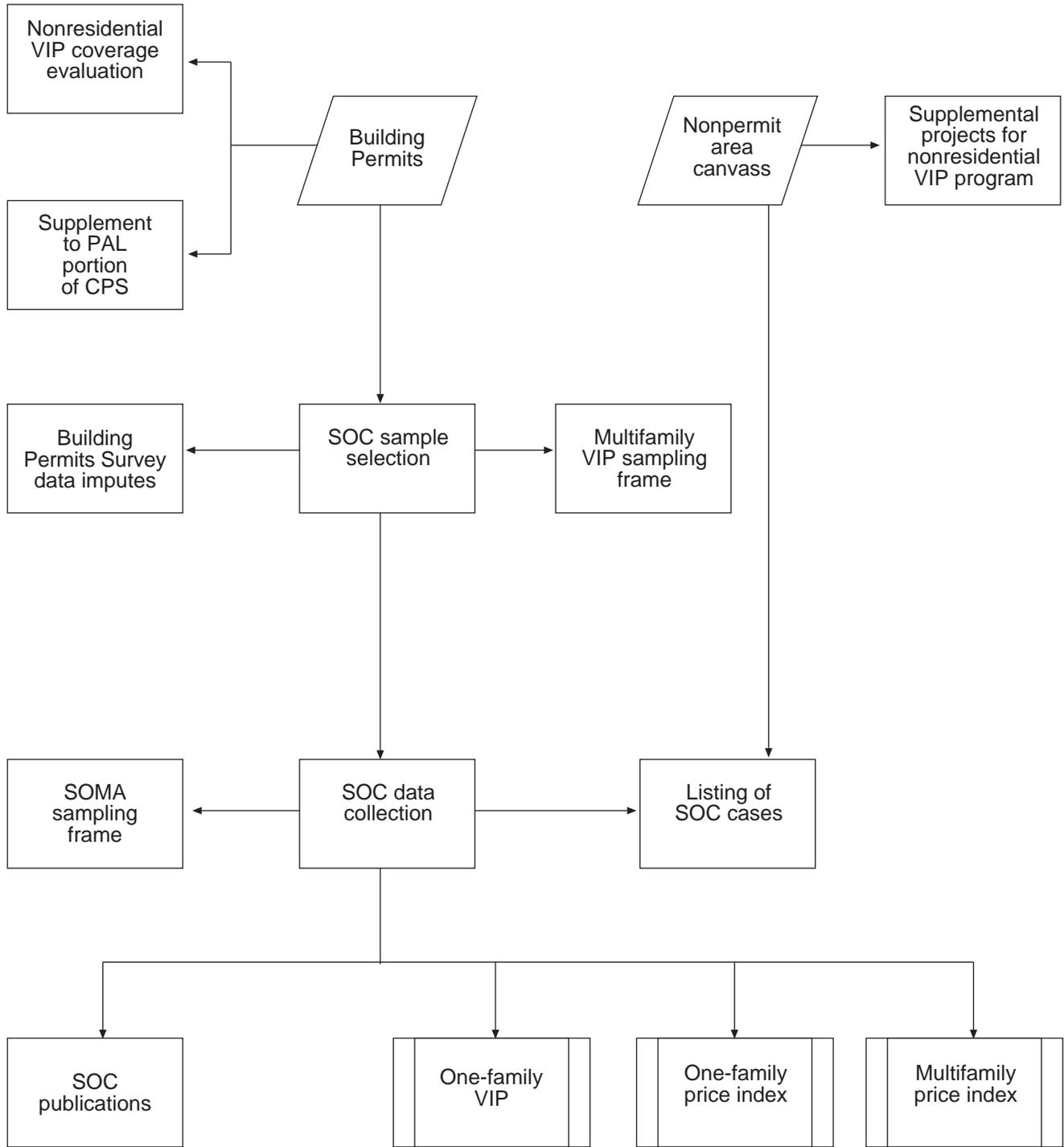
In order to account for housing units started in permit-issuing places without authorization, an adjustment factor of 1.033 is applied to SOC estimates. This factor was computed from an evaluation study conducted in the 1960s. Due to the great expense involved in such a study, the operational difficulties with collecting the necessary data, and the inability to accurately estimate for what is most likely a small value, the evaluation study has not been repeated. The old factor is still in use even though there is considerable doubt that it is warranted, especially in urban and metropolitan areas. Accordingly, we are planning to eliminate the 3.3 percent factor from our estimates.

## Survey of Construction Flowchart

The flowchart on the next page shows how data in SOC are collected and employed in providing direct estimates or as input to other construction statistics programs.

Figure 2.

# Survey of Construction and Related Activities



## VALUE PUT IN PLACE PROGRAM

The Value Put in Place Program is a complex collection of data gathering activities with the purpose of estimating the total dollar value of construction work done each month for use in the National income and product accounts. Estimates of Value Put in Place (VIP) are produced at the National level by type of construction and include new construction, additions and alterations to existing buildings, and major replacements of components of existing buildings. The architectural, engineering, and miscellaneous costs associated with construction are included in VIP. Maintenance and repair costs and the cost of land are out of scope and are not included. Current dollar and constant dollar series are produced and published as well as the indexes used to deflate the current dollar series. Estimates for the various components of VIP are derived from different sources and each component will be discussed separately below.

The Construction Progress Reporting Surveys (CPRS) refer to three monthly surveys that we conduct to directly

collect information on monthly expenditures on construction projects for use in the VIP estimates. They collect information for 1) new multifamily construction, 2) private nonresidential construction, and 3) state and local government construction. They all collect information on the progress made on a sample of construction projects and are discussed in detail individually below. A project consists of all buildings and other related items under construction for which construction costs can be provided jointly by a respondent.

The table below shows components of the VIP estimates, their percent of total VIP in 1997, and the source of the data used in producing the estimates. The total value of construction work put in place in 1997 in current dollars was \$618.2 billion. The flowchart on the following page highlights the components of VIP estimates and data sources used in the production of the estimates, as described in the table below. Each of these factors are discussed in detail in this section.

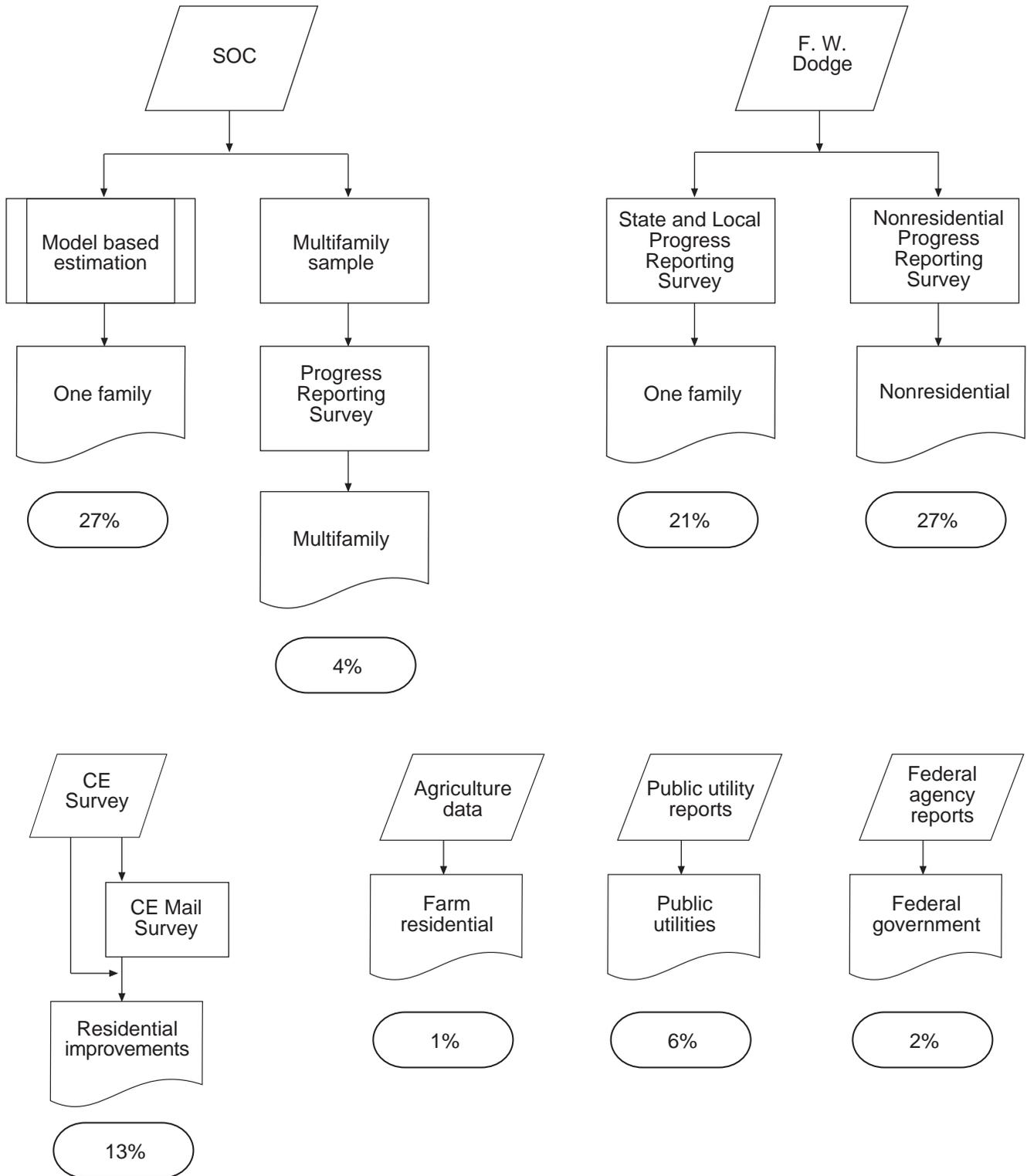
### Components of the Value Put in Place Program Estimates

Component of VIP	Percent of total VIP in 1997	Sources of data
<b>Residential</b>		
New one family	27	Derived from SOC data
New multifamily	4	CPRS
Residential additions, alterations and improvements	13	Consumer Expenditure Survey, Survey of Residential Alterations and Repairs
<b>Private Nonresidential</b>		
Nonfarm nonresidential	27	CPRS
Farm nonresidential	1	Department of Agriculture International Trade Administration
Public utilities	6	U.S. Telephone Association Edison Electronic Institute Surface Transportation Board Federal Energy Regulatory Commission American Gas Association
<b>Government Construction</b>		
State and local	21	CPRS
Federal	2	Government Agencies

Total percent does not add to 100 because of rounding.

Figure 3.

# Summary of Value Put in Place Program



## New One-Family Value Put in Place

Data to estimate one-family VIP are derived from information collected in SOC on the construction of one-family houses. VIP estimates are derived from estimates of the number of houses started, estimated sales price or contract value, estimated time to completion, and estimated nonconstruction costs which are included in sales (or contract) price. Below we outline the steps in deriving an estimate of one family VIP from SOC information. Parameters for the various procedures were estimated from evaluation studies conducted in the past.

1. Each month the average price of houses started with the intention of being sold and the average contract value of houses built by contractors are estimated from SOC data.
2. The average construction cost of houses started is computed as the product of the averages above and the proportion of those averages that is true construction costs. Some costs included in the averages above but excluded from construction cost are land, marketing, and appliances.
3. The total number of units started each month, as estimated from SOC, is multiplied by the average construction cost and summed to arrive at total construction cost of houses started for each month.
4. Total construction cost for a month is multiplied by a phasing pattern factor to obtain the monthly contribution to VIP. The phasing pattern is used to allocate a proportion of the total construction costs of an average house to each month that a house is under construction.
5. The VIP for 1 month is the sum of the monthly contributions to VIP from houses started in the current month and each of the 11 previous months.

## New Multifamily Value Put in Place

Estimates of VIP for new multifamily buildings are obtained through a Construction Progress Reporting Survey (CPRS) of the multifamily projects selected in the SOC sample. When multifamily activity is high, all large projects are taken with certainty and smaller ones are subsampled. Otherwise all multifamily buildings in the SOC sample are included in the multifamily CPRS sample. Most projects are in permit places with only a very few in nonpermit segments.

Questionnaires are mailed each month to owners of projects selected in the sample and respondents are asked to report the value put in place for that project for the current month and succeeding months. Completed projects are removed from the survey and projects not yet started are held in an abeyance file until they start. The owner's

estimate of total construction cost and the total architecture, engineering, and miscellaneous costs also is collected when the project becomes part of the sample. Telephone follow-up is conducted for nonrespondents.

Response data are keyed in NPC and sent to headquarters for tabulation. Edits are performed to ensure that project estimates are reasonable. If a respondent does not provide an estimate of total construction cost for a project, one is imputed. If a respondent does not provide monthly VIP, a value is imputed based on total project costs.

The probability of selecting a project into the sample is available from SOC and the inverse of this probability is used to compute the weighted VIP. The weighted VIP are summed for all projects under construction in a month to obtain an estimate of total monthly VIP. A ratio adjustment with the Building Permits Survey's estimates of multifamily units authorized is used to improve estimate quality.

The monthly value put in place for each project in the sample is increased by the ratio of the architecture, engineering, and miscellaneous costs to the total construction cost to distribute these additional costs over the life of the project.

## Residential Improvements

Estimating for residential improvements is a two-part operation conducted in conjunction with the Consumer Expenditure Survey (CES). The CES is conducted by the Census Bureau for the Bureau of Labor Statistics and contributes to the derivation of the Consumer Price Index. The sampling units for the CES are households and the sampling frame is the address listings maintained by the Census Bureau. The sample for the CES is periodically reselected and the most recent sample was selected following the 1990 Census. For owner-occupied housing units, we employ information about improvements as collected directly on the CES questionnaire. For vacant or rented housing units, we collect information from the owners in a mail survey that we conduct, referred to as the Survey of Residential Alterations and Repairs (SORAR). Information is collected on expenditures for additions, alterations, major replacements (such as replacement of a roof), and maintenance and repairs. We collect the amount of money a household spent on construction materials and labor by type of job. Maintenance and repairs data are published but they are not included in value put in place estimates.

Approximately 70 percent of our estimate of residential improvements comes directly from the CES and the remaining portion comes from SORAR. We first describe activities in deriving estimates for owner occupied housing units and then describe activities for vacant or rental units.

**The Consumer Expenditure Survey (owner-occupied units).** All household expenditure data are collected for owner-occupied housing units by field representatives conducting personal interviews which typically last 2 hours or

more. Five interviews are conducted with each respondent over a 1-year period. After the initial interview, four more interviews are conducted at 3-month intervals to collect data on expenditures. After the fifth interview, the respondent is removed from the survey. As respondents are removed, new households enter the survey. Estimates are adjusted to compensate for nonresponse.

**Quarterly Survey of Residential Alterations and Repairs (rental and vacant units).** If a housing unit in the CES sample is vacant or occupied by a renter, the unit is included in SORAR, which is a mail survey sent to the owner of the unit.

The owner of a rental or vacant unit from the CES is contacted and asked to report construction expenditures for the property which includes the unit. About half the units are single-family houses. If a property is a housing complex which includes one or more buildings, data are collected for the entire complex and should include expenditures on common areas such as recreation buildings and swimming pools. The total expenditures for the property are divided by the number of housing units in the property to provide an expenditure value for the housing unit in sample.

Once this information has been keyed and edited we adjust for nonresponse. Separate nonresponse factors are computed for vacant units and for rental units.

### Private Nonresidential Construction (Nonfarm)

A private company, F. W. Dodge, produces a list of construction projects, which we purchase and use as a sampling frame of nonresidential construction. Construction projects include new buildings, an addition or alteration to an existing building, or a major replacement such as the replacement of a roof, and construction other than buildings such as golf courses. Maintenance and repair projects are not included in our survey.

Since the Dodge list does not usually include projects in nonpermit areas of the country, a canvass for these projects in nonpermit areas is conducted in conjunction with the residential canvass for SOC. Projects identified in the canvass are used to supplement the Dodge frame. Field interviewers working on SOC in permit-issuing places also list a sample of permits for nonresidential construction, which we employ to evaluate the Dodge sampling frame. This list is matched to the Dodge construction project frame and is used to provide an estimate of frame undercoverage.

A questionnaire is mailed to owners of all sampled projects that are about to be started (according to information from Dodge). Initially, respondents are asked to report total construction cost and architectural, engineering, and miscellaneous costs. The value put in place is collected monthly until the project is completed. Data are collected by mail and phone by the NPC staff. Data are keyed and sent to headquarters for analysis and processing. Edits are

performed to ensure consistency between the total construction cost and the sum of the monthly value put in place data. Information is imputed to compensate for nonresponse. Estimates also are adjusted to compensate for undercoverage in the sampling frame.

Monthly and annual estimates of VIP by type of construction are produced at the National level. Also provided annually are data on monthly progress from start to completion. Preliminary estimates of monthly value put in place are produced with revisions the first and second following months and a final revision at the end of the annual processing.

The monthly estimates of VIP are seasonally adjusted and constant dollar estimates also are produced. See the section below for more information on indexes.

### Farm Nonresidential

The Department of Agriculture compiles an annual estimate of farm nonresidential construction. This number is released in the middle of the following year and current estimates are forecasted by the International Trade Administration. A monthly series is produced from the annual series by using a benchmarking procedure. The annual series provides the benchmarking levels and other components of VIP are used to provide the month-to-month changes.

### Public Utilities

**Telecommunications.** In a monthly telephone survey, major phone companies report construction expenditures to us. Annually, we obtain construction levels for all phone companies from the U. S. Telephone Association. Annual construction for cable companies is obtained from an industry source. The monthly phone company data are combined with the annual data for small phone companies and cable companies to get annual estimates of telecommunication. Monthly estimates are produced by benchmarking the monthly construction of major phone companies to the annual totals for telecommunication.

**Railroads.** Major railroads are required to report construction expenditure data to the Surface Transportation Board (STB) each quarter and we access those data. The quarterly data are converted to a monthly series by benchmarking and interpolation. The data reported by the major companies to the STB include items that are out of scope. Annually these companies report detailed expenditure data to the STB that allow us to compile a correct annual total of construction expenditures. We benchmark the monthly series to the corrected annual totals.

**Electric light and power.** We develop annual VIP for electric light and power from Federal Energy Regulatory Commission (FERC) data. Monthly estimates are formed by benchmarking trends obtained from progress of a small sample of electric utility projects to the annual VIP for electric light and power.

**Gas.** The American Gas Association publishes data on total construction for all gas companies, which include the cost of land and equipment. To this total we apply an adjustment factor to eliminate land and equipment from the data.

The adjustment factor for the total construction from the American Gas Association is derived annually from data from FERC. We use its data to derive the annual change in value for buildings and outside plant and the annual change in value for total assets for large gas companies. The ratio of the two annual changes is the factor applied to the American Gas Association's total gas company construction.

The annual estimate for gas company construction is converted to a monthly series by benchmarking trends obtained from progress of a small sample of gas utility projects to these annual estimates.

**Petroleum pipelines.** From construction expenditure data on file at FERC, we compile an annual total of VIP. Trends obtained from progress of a small sample of petroleum pipeline projects are benchmarked to these annual totals to provide a monthly petroleum pipelines series.

**Alternate data collection methods under consideration.** For the Electric Light and Power, Gas, and Petroleum Pipelines series, data collection through a sample survey of companies is being considered. The monthly estimates derived from this data collection could be benchmarked to the annual estimates of value put in place currently being compiled from regulatory agencies. For the Railroads series, there are plans to begin collecting monthly data directly from the major railroad companies which do not report to us.

## State and Local Government Construction

Data for state and local government construction are collected by a Construction Progress Reporting Survey that is very similar in design to the survey for private nonresidential construction. The sampling frame is purchased from F. W. Dodge and is periodically evaluated for quality of coverage. The last evaluation was done in 1988. A sample of state and local governments were contacted and asked to provide a list of construction project awards. These lists were matched to the Dodge project frame, and projects not found on the Dodge frame contributed to the undercoverage factor.

Initially, data are collected on the project owner's estimate of total construction cost and architectural, engineering, and miscellaneous costs. Value put in place data are collected monthly.

Edits are performed to ensure consistency between the total construction cost and the sum of the monthly value put in place data.

We benchmark our estimates of state and local construction to state and local government construction data available from the Annual Survey of Government Finances which is conducted by the Governments Division of the Census Bureau.

## Federal Government Construction

Monthly reports are received from government agencies, including branches of the military, which account for almost all of the federal construction. The reports are tabulated to arrive at monthly totals which are detailed by type of construction.

## MANUFACTURED (MOBILE) HOME PROGRAM

### Sampling Units, Sampling Frame, and Frame Coverage

The Department of Housing and Urban Development (HUD) has a contract with the National Conference of States on Building Codes and Standards (NCSBCS) to regulate the manufacture of mobile homes. NCSBCS contracts with inspection agents to inspect mobile homes in the manufacturing plants and produce a list of all units with the name of the dealer who will receive the finished unit. These lists provide the sampling frame from which we select a sample for our Survey of New Manufactured (Mobile) Home Placements. All mobile homes manufactured in the United States are inspected by HUD agents so this sampling frame has complete coverage.

### Data Collection and Processing

Data are collected each month through telephone interviews conducted by NPC staff. Sampled units stay in the survey until they are placed on a mobile home site for occupancy. If a unit is transferred to another dealer, we continue followup on the unit with the new dealer. Other data collected are the sales price of sold units and selected characteristics of the unit. Data are keyed in NPC and transmitted to headquarters for review, correction, and tabulation. Data are imputed for units where response data are not available.

### Estimation and Publication

Estimates are formed by weighting data for sampled units by the inverse of the unit's probability of selection. National estimates of mobile homes placed, sales price of units sold, and units in dealers' inventories are provided quarterly. State and selected metropolitan area estimates

are produced annually along with estimates for selected characteristics. We also publish monthly data compiled by NCSBCS on shipments of mobile homes from manufacturers.

## Special Features

Response rates for this survey have deteriorated over time. The sales price estimates have a higher rate of nonresponse than other items since some dealers consider the price confidential. We are trying to improve these response rates.

## ECONOMIC CENSUS: CONSTRUCTION SECTOR

### Sampling Units, Sampling Frame, and Frame Coverage

Data on the construction sector of the economy are collected as part of the economic census in years ending in 2 and 7. All establishments of multiunit companies and large single-unit establishments with employees that are engaged in construction are included. A sample of small single-unit construction establishments with employees is taken and data from the Internal Revenue Service is used for construction establishments with no employees. There are about 650,000 construction establishments with employees and over a million with no employees. About 200,000 of the employer establishments are included in the census.

The sampling frame, derived from information provided by the Internal Revenue Service and the Social Security Administration, is the Standard Statistical Establishment List (SSEL) maintained by the Bureau for economic surveys and censuses. The SSEL is regularly updated for new establishments, purged of discontinued establishments, and corrected for company splits, mergers, and other changes. This frame provides very good coverage of construction establishments.

### Data Collection and Processing

Data are collected using a mail questionnaire with several mail followups and a telephone followup of large establishments. Information on number of employees, payroll, receipts, cost of materials, work subcontracted out, kind of business, assets, depreciation, and other items is collected.

Followup mailings are supplemented with newly formed establishments. Questionnaires are returned to our processing center where they are reviewed and keyed. The keyed data go through a complex edit and are entered into a database. Analysts in headquarters review tabulated

data. Respondents are contacted during either the processing center or the headquarters operations to correct or clarify the data. Data are imputed for establishments that do not report or give incomplete information.

## Estimation and Publications

Estimates are formed by multiplying response data by the selection weight. Estimates from the 1997 Economic Census will be produced at the National and state levels. In the past, estimates also were produced for selected metropolitan areas. All estimates are for the year for which the census was conducted.

### Special Features

Data from the construction sector of the economic census are compared to annual Value Put in Place estimates to identify coverage problems in the latter for possible use as a benchmark. However, there are problems with comparing census data with VIP estimates.

Only about two-thirds of "construction," as defined in VIP, is actually done by the construction industry as defined by the census. Examples of construction work done outside the industry are architectural and engineering design, construction management (added for 1997), force-account construction, and secondary construction (installations done by employees of a hardware store, for instance). Also, outside the scope of the census is work done by nonemployers and a significant amount of construction work done in the underground economy. Further problems involve how one calculates "net" construction in the census. In developing comparisons between VIP and census data, estimates and assumptions have to be made for these differences.

## CONSTRUCTION PRICE INDEXES

### Bureau Produced Indexes

**New single-family houses.** Data from SOC are used to produce two versions of a price index: an index of units sold and an index of units under construction. Both indexes are produced from a hedonic regression model which relates the sales price or contract value of a house to its characteristics. In particular, sales price or contract value is the dependent variable and characteristics such as square feet in the unit, geographical location, number of fireplaces, and parking facility are independent variables. Indexes for detached houses are produced regionally and for attached homes at the national level. The final National indexes are a weighted average of the regional indexes for detached units and the National index of attached units. The index of

units sold is produced quarterly and annually at the National level and annually at the regional level. The index of units under construction is produced at the National level monthly.

The single-family index of units under construction is used to deflate current dollar estimates of new residential construction VIP. From time to time the questionnaire for SOC is revised to collect additional characteristic data for possible use in the index.

**New multifamily units.** The BEA has designed a multifamily index using data from SOC and the Multifamily VIP Survey and this index is produced each year at the Census Bureau. This index is also a hedonic regression model where the dependent variable is construction cost per unit and the independent variables are average square feet in the unit, number of bathrooms, parking structure, etc.

### **Use of Indexes From Outside the Census Bureau**

Besides the indexes discussed above, we use the following construction cost and price indexes from outside sources as deflators of various categories of the Value Put in Place series. They are:

- Turner Construction Company
- Federal Highway Administration—Composite
- Bureau of Reclamation
- Turner Telephone Plant
- Handy Whitman: Electric, Utility Building, Gas, Water

### **Further Information About Census Bureau Construction Indexes**

More information about indexes is contained in the appendixes of our reports. Information concerning the single-family price indexes is found in an appendix to the March issue of the *New One-family Houses Sold Report* (C25), Appendix A: Description of Price Index. Information on the various indexes used to deflate different components of the VIP estimate is found in the May issue of the *Value of Construction Put in Place* (C30), Appendix D: Adjustments for Seasonal Variations and Cost Change.

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## Appendix A. Conference Agenda

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**Construction Statistics Data Users' Conference  
Embassy Suites Hotel  
1250 22nd Street, N.W., Washington, DC  
October 28, 1997**

### Agenda

8:30-9:00 a.m.	<b>Registration</b>
9:00-9:15	<b>Welcoming Remarks</b> Frederick T. Knickerbocker, Bureau of the Census
9:15-10:30	<b>New Residential Construction</b> Michael Carliner, National Association of Home Builders
10:30-10:45	<b>Break</b>
10:45-12:00	<b>Residential Improvements and Repairs</b> Kermit Baker, Harvard University
12:00-1:30 p.m.	<b>Lunch</b> <b>Luncheon Speaker</b> Frederick T. Knickerbocker, Bureau of the Census
1:30-2:45	<b>Value Put in Place Program</b> Robert P. Parker, Bureau of Economic Analysis
2:45-3:00	<b>Break</b>
3:00-4:15	<b>Economic Census: Construction Sector</b> Manuel D. Gutierrez, Kohler Company
4:15-4:45	<b>Concluding Remarks</b> Thomas L. Mesenbourg, Bureau of the Census

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## Appendix B. Registered Participants

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