

**Department of Commerce
U.S. Census Bureau
OMB Information Collection Request
Construction Progress Reporting Surveys
OMB Control Number 0607-0153**

Part B. – Collections of Information Employing Statistical Methods

1. Universe and Respondent Selection

The monthly universe for private construction is approximately 4,800 projects with an estimated sample size of 760 new projects selected each month. State and local governments have a monthly universe of approximately 5,250 projects with an estimated sample size of 630 new projects selected each month. The federal government has a monthly universe of approximately 300 projects with an estimated sample size of 90 new projects selected each month. The monthly universe for multifamily is approximately 220 projects with an estimated sample size of 185 new projects selected each month. Construction projects stay in sample until conclusion of the project (an average of 12 months). On average 25,000 projects are asked to report monthly. The monthly unit response rates after 3 months of collection effort are: 31 percent for private projects; 75 percent for state and local projects; 72 percent for federal projects; and about 32 percent for multifamily projects. The total quantity response rates (TQRR) after 3 months of collection effort are: 41 percent for private projects; 78 percent for state & local projects; 74 percent for federal projects; and 63 percent for multifamily projects.

Projects are selected each month using stratified systematic sampling procedures. Projects are stratified within ownership (private nonresidential, state & local, federal) by type of construction (TC) and estimated project value. Stratum sampling rates were determined by applying Chromy's algorithm for multivariate sample allocation which optimizes sample size based on cost and variance constraints. The target coefficients of variation (CVs) for major TCs were set between 10-20%, and 35% and 50% for nested subcategories within each major TC. Optimal sample sizes were then boosted to account for expected rate of nonresponse in each TC group and sampling rates for each strata were determined. These rates can be found in the survey methodology posted online at <http://www.census.gov/construction/c30/methodology.html>. Multifamily residential projects that are not duplicates or out-of-scope are selected with certainty from multi-unit projects included in the sample for the Survey of Construction

2. Procedures for Collecting Information

The Census Bureau is contracted with an outside vendor to provide source data on private, state and local government, and federal government construction projects valued

at \$75,000 or more. Projects in areas not covered by building permit systems or reported by the outside vendor are obtained by Census field staff within a small number of non-permit areas, and are selected with certainty. Projects are stratified by type of construction and valuation and then a systematic sample is taken in each strata using predetermined sampling rates which can be found in the methodology posted on our webpage. Each month all new privately owned multi-unit residential building projects with 2 or more units are selected to report in CPRS from the sampled cases used in the Census Bureau's Survey of Construction.

Once a project is selected, it remains in the sample until it is completed. Monthly construction project reports are requested from the appropriate owner, contractor, builder, or agent responsible for the project. Imputations are made for projects that have not reported at the time of the monthly tabulation, based on estimated total construction value and month of start of the project. Estimates of value put in place are obtained by multiplying the final weight of each project by the monthly reported value and summing all projects. The final weight is a product of the basic weight (reciprocal of the probability of selection) and adjustment factors to account for outliers, costs not included in the monthly construction spending such as architectural and engineering fees, and frame duplication. Weighted data are summed over all sample project by type of construction and ownerships (private, state and local, and federal). In addition undercoverage factors are applied to projects in each ownership to account for projects not included in the frame. Private manufacturing construction is benchmarked to the Annual Capital Expenditures Survey.

3. Methods to Maximize Response

To increase response rates, respondents are offered the option to report online. Respondents who choose to respond via Centurion receive email notifications rather than paper forms or letters. Several attempts are made to collect information by telephone follow-up if a response has not been received online or by mail or fax. If a respondent has more than one project in the sample, information is requested for all projects with one telephone call. Each respondent is contacted at their requested time by the computer assisted interview process known as the Call Scheduler. In addition to telephone follow-ups, letters are mailed to respondents to encourage response (see Attachments F-I). For State and Local Government's that publish their project spending on their websites, we extract the relevant spending information that is needed for our survey without requesting additional response from the respondent. Additionally, we have developed reporting arrangements with other State and Local Governments who send us consolidated reporting via a monthly spreadsheet.

Nonresponse Bias Study

As requested, a Nonresponse Bias Analysis for privately owned nonresidential construction and multifamily projects was completed (see Attachment M). Response rates were analyzed using the May 2017 production data which contains data spanning

27 months from March 2015 through May 2017. The study included analysis of Unit Response Rates (URR) and Quantity Response Rates (QRR) for monthly CPRS data. For Private Nonresidential projects, response rates were analyzed by certainty status, type of construction, and project selection value (PSV) groups. We looked at response rates for monthly spending and for the total construction cost (collected as Revised Item 5c). The study also examined the relative bias of Project Selection Value (PSV). PSV was used because it is available for both respondents and nonrespondents and is reasonably well correlated ($r > 0.75$) with both the revised item 5c and the total sum of monthly value of construction put in place (VIP) for a project. Relative bias was calculated across the 27 months by certainty status, type of construction, and PSV group.

The analysis of response rates found similar reporting patterns for both certainty and non-certainty units. Certainty units have a higher URR but a lower TQRR than non-certainty units. Across type of construction and value categories the response rates were again similar but a few categories, such as projects valued at \$10M or greater and manufacturing projects, have lower TQRRs than the other groups. The analysis of relative bias shows that nonresponse bias is present and largest among non-certainty cases and the Power, Healthcare and Religious construction types. Although most categories show a positive relative bias, the manufacturing category shows a negative relative bias indicating potential for underestimation of this total. However we currently benchmark this type of construction to the Annual Capital Expenditures Survey to mitigate this. Ideally this nonresponse bias would be eliminated by the current imputation methods. However we are currently researching methods to improve the current imputation methodology.

For multifamily projects, response rates were analyzed by certainty status and groups based on the project size, measured by the number of units in the project. Overall the response rates have similar reporting patterns, but certainty units have a higher URR but a lower TQRR than noncertainty units. Looking at response by project size, we found that projects with 5-24 units make up about 28% of all projects, while projects with 25-49, 50-99, 100-199, 200-299, and 300 or more units make up about 14% each. Projects 50 units or more have the highest response rates while smaller projects of 25-49 units have the lowest (URR and QRR). However the response rates are reasonably similar across all project sizes. We were unable to measure the relative bias for multifamily projects because we do not have a common frame variable that is correlated with monthly expenditures. Ideally any bias due to nonresponse would be eliminated by the current imputation methods.

4. Tests of Procedures of Methods

We completed an evaluation of the CPRS as required by the Statistical Policy Directive on Compilation, Release, and Evaluation of Principal Federal Economic Indicators; this evaluation was submitted to the OMB in March 2016. Additionally, testing and evaluation of the variance methods was conducted, which led to the implementation of updated variance programs in July 2015.

All changes to methodology or processing systems are tested. For example, during the development of our new processing system, we conducted thorough testing utilizing data from the previous production system to ensure similar and consistent survey results. Additionally, we have improved our sampling and tabulation programs to be more efficient, prior to implementation, we conducted thorough testing to ensure consistent results to the previous system.

5. Contacts for Statistical Aspects and Data Collection

The Economic Indicators Division (EID) plans and coordinates the survey. This includes the design of the reporting forms, instructions for collecting and editing information, tabulation and publication of the data. The Economic Statistical Methods Division (ESMD) is responsible for the survey methodology and sample selection.

The contact person for questions relating to the statistical aspects of the survey is Ms. Amy Newman-Smith, Methodology Director for Manufacturing, Investment, and Construction Programs, ESMD. She can be reached on (301) 763-6595.

The contact person for questions relating to the collection, analysis and processing of the data is Ms. Erica Filipek, Assistant Division Chief for Construction Indicator Programs, EID. She can be reached on (301) 763-5161.

Attachments:

- A. Form C-700: Construction Progress Reporting Survey for Private Construction Projects
- B. Form C-700(R): Construction Progress Reporting Survey for Multifamily Residential Projects
- C. Form C-700(SL): Construction Progress Reporting Survey for State and Local Governments
- D. Form C-700(F): Construction Progress Reporting Survey for Federal Government
- E. BEA Letter of Support for CPRS
- F. Respondent Letter for Newly Selected Private Construction Projects (C-700-L1A)
- G. Respondent Letter for Newly Selected Public Construction Projects (C-700-L1B)
- H. Abeyance Letter for Private Construction Projects (C-700-L2A)
- I. Abeyance Letter for Public Construction Projects (C-700-L2B)
- J. Picture of Centurion Login Screen for Confidentiality
- K. Picture of Centurion Burden Statement
- L. Picture of Centurion 'About the Survey'
- M. Nonresponse Bias Analysis