Construction Contract Modifications: Comparing the Experiences of Federal Agencies With Other Owners (1986)

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EXECUTIVE SUMMARY

Federal agencies have been criticized periodically by members of Congress and other government officials for excessive changes to their construction contracts. Congress is interested for the following reasons:

- Contract modifications are sole-source negotiated procurements, which are assumed to be more costly than competitively bid procurements and, therefore, inherently undesirable.
- Contract modifications usually add to the cost of a contract, and any action that increases expenditures is viewed with suspicion.
- Contract modification rates are one of the few objective criteria Congress has for judging the effectiveness of agency management.
- Some members of Congress believe that construction agencies too often accept design work from professional architects and engineers (AEs) that is incomplete or substandard, and they use the rate of contract changes as a measure of the quality of the design work performed for the government by AEs.

Because contract modifications have been the subject of close congressional scrutiny, federal construction agencies have made strenuous and costly efforts to control the number of changes on their projects. Recently, however, some agencies have become concerned that efforts to control changes might have gone too far. This concern has been prompted in part by the high cost and considerable effort required to administer programs to control contract changes and in part by complaints from user organizations that the functional performance of new buildings has been jeopardized by too stringent limitations on contract modifications.

Some agencies have noted, however, that it is difficult to discuss government contract modifications objectively because of a dearth of information on the contract change rates for nonfederal projects and because of differences in the way various agencies record and report contract changes. Accordingly, the agencies that sponsor the Federal Construction Council asked the Building Research Board to form a committee of knowledgeable experts to explore these issues.

The committee was formed and conducted its study during 1985. In the course of the study the committee received and analyzed statistics from three federal construction agencies (the Army Corps of Engineers, the Naval Facilities Engineering Command, and the Veterans Administration) on the number and dollar amount of modifications to their construction contracts and from the Bureau of the Census on cost growth on nonfederal construction projects.

On the basis of its study, the Committee concluded that:

- Although it would be unrealistic and a waste of money to try to eliminate all modifications to federal construction contracts, reasonable efforts to control modifications are justified and appropriate. Two essential ingredients for an effective control effort are sensible criteria on what constitutes an acceptable contract modification rate and accurate data on actual contract modifications.
- Statistics on the contract modification rate for nonfederal projects would be of great value in establishing contract modification criteria for federal agencies. Useful statistics currently can be provided by the Bureau of the Census at very low cost. With some additional expenditures, the Bureau of the Census could develop more complete statistics.
- Uniform statistics on the contract modification rates of various federal agencies are needed to establish criteria, to provide guidance on where efforts to control modifications should be concentrated, and to judge the effectiveness of the agency control efforts. Currently, several agencies collect contract modification data; however, the value of such data is limited because all agencies do not collect the same type of data.

Accordingly, the committee made two recommendations:

1. All federal construction agencies that are required either by a congressional committee or agency policy to collect and report statistics on contract modifications should adopt uniform standards for such statistics. As a minimum, these agencies should develop statistics on the number, dollar amount, and percentage of original contract amount of modifications to their construction contracts and the reasons for the modifications. To the extent feasible, the following separate breakdowns of the data should be provided:

- by type of facility--using, if possible, the categories and definitions developed by the Bureau of the Census for public sector construction (see Appendix B);
- by new construction versus repair and alteration work (however, operating and maintenance contracts should not be included);
- by the original dollar amount of the contracts, and grouped in the following categories: less than $1 million, $1 million to $5 million, $5 million to $10 million, and more than $10 million;
- by the type of contract used (e.g., fixed price, unit price, cost reimbursable);

- by the contract clause under which the modifications were executed;
- by whether the modifications were planned and anticipated (e.g., to initiate a new phase of a planned multiphase project or to exercise an option in a contract) or unplanned.

In preparing statistics on the reasons for modifications, for comparison purposes agencies should use the five broad categories of reasons that the committee adopted (i.e., design deficiencies, criteria changes, unforeseen conditions, changes in scope, and other). For their own purpose, agencies can use subcategories like those adopted by the CoE and NAVFAC. If possible, the CoE and NAVFAC should try to agree on the reason subcategories (codes) they will use and the definitions of those subcategories.

The statistics should include only projects in the 50 states of the United States. Agencies having projects in U.S. territories and foreign countries should develop some method of excluding data from such projects from their statistics.

The statistics should be prepared on the basis of completed projects; that is, contract modifications should be reported for the year in which the government takes beneficial occupancy of the constructed or rehabilitated facility.

2. The Bureau of Census should periodically (e.g., annually) prepare and publish cost-growth statistics on nonfederal construction contracts similar to the statistics prepared for this report. In addition, the Bureau of the Census should investigate the feasibility of providing additional breakdowns of the data like those outlined in recommendation 1.

INTRODUCTION

BACKGROUND

Federal construction agencies have been criticized periodically by Congress and others for excessive changes to their construction contracts. For example, the Surveys and Investigations Staff of the House of Representatives has issued at least two reports (1979, 1982) that criticized the Army Corps of Engineers (CoE) and the Naval Facilities Engineering Command (NAVFAC) for failing to satisfactorily control changes on their projects. Similarly, a report prepared by the Office of the Inspector General of the U.S. Department of Transportation (1982), with the assistance of the inspectors general of the General Services Administration, the Department of Defense (DOD), the Veterans Administration (VA), and the Environmental Protection Agency, criticized the audited agencies for allowing too many changes because of "a general lack of emphasis to minimize changes to contracts." The report noted that:

> during FYs 1980 and 1981, the agencies included in the audit processed over 62,000 changes to construction contracts that resulted in increased costs of over $912 million. For the specific contracts reviewed, change orders had increased overall construction costs by about 9.4 percent.

In addition, agency representatives are almost invariably questioned closely about contract changes at congressional budget hearings, and various congressional committees have established guidelines or limits on changes. For example, the House of Representatives Committee on Appropriations (1984) has set a 5 percent cost-growth target for military construction contracts.

There are several reasons for congressional interest in and concern about the number of changes made to federal construction contracts:

- Contract modifications are sole-source negotiated procurements, which are assumed to be more costly than competitively bid procurements and, therefore, inherently undesirable.
- Contract modifications usually add to the cost of a contract, and any action that increases expenditures is viewed with suspicion.

- Contract modification rates are one of the few objective criteria Congress has for judging the effectiveness of agency management.
- Some members of Congress believe that construction agencies too often accept design work from professional architects and engineers (AEs) that is incomplete or substandard, and they use the rate of contract changes as a measure of the quality of the design work performed for the government by AEs.

Change Orders--A Special Type of Contract Modification

Many people use the term "change order" for any contract modification. Actually, a change order is just one of several types of contract modification, albeit a very common type. In the strict sense, a change order is a contract modification made under the "changes" clause in the contract. This clause gives the owner (the government) the right to unilaterally order a change in the work being performed, provided that the change does not modify the general scope of the contract and the contractor is compensated for any extra costs associated with carrying out the change. Such clauses have been included in federal government contracts since the earliest days of the republic. Nash (1975) quotes an 1818 U.S. Army contract for 10,000 muskets that contained a change clause with essentially the same provisions as current change clauses. Clauses giving owners the right to order changes are also found in many private construction contracts.

There is some confusion about the term "change order" because some procurement specialists use the term only in the strict sense whereas others apply it more broadly. The CoE, for example, issues change orders for all modifications that are within the general scope of the contract (Corps of Engineers, 1976). Thus, the CoE issues change orders under various contract clauses in addition to the "change" clause; for example, the "Differing Site Conditions" clause, the "Termination for Default" clause, and the "Time Extensions" clause. On CoE projects, only changes that are outside the general scope of the contract are handled by "supplemental agreements"--the alternative to change orders. Some procurement specialists (e.g., Nash, 1975) consider any modification that is accomplished through the mutual agreement of the parties involved to be a supplemental agreement, regardless of the impact of the change on the scope of the contract.

As noted above, there are two important provisos associated with change order clauses: (1) The change order must not modify the general scope of the contract, and (2) the contractor must be compensated for any extra costs associated with carrying out the change. Change orders frequently result in disputes between owners (government agencies) and contractors over the amount of compensation to be paid for a change. In fact, the change clause is the most frequently litigated provision in government contracts (Nash, 1975), and federal agencies have developed highly refined procedures for processing claims for additional compensation. To minimize disputes, most

agencies try to reach agreement with the contractor on the cost of the change before work begins. However, frequently this is not possible either because the work cannot wait for the preparation of a detailed cost analysis or because the work involves too many unknowns to permit the preparation of a cost estimate that is sufficiently reliable to be accepted by both the contractor and the government.

The requirement that a change order must not modify the general scope of a contract has not caused many disputes in the past because most contractors welcome an opportunity to do extra work on a negotiated fee basis (which is generally more lucrative than competitively bid work); consequently, they have no reason to question the impact of a change order on the scope of the contract. However, the impact of change orders (or any other type of contract modification) on the general scope of a project might become a more serious issue in the future. Under the recently enacted Competition in Contracting Act (Public Law 98-369), all new procurements must involve competition, and any modification that changes the general scope of a contract ordinarily should be considered a new procurement. Thus, if a negotiated contract modification appears to increase the scope of a project, other contractors might challenge the legitimacy of the modification on the grounds that it violates the Competition in Contracting Act and should be competitively bid.

This report considers all types of contract modifications. Therefore, in the interest of precision, the term "change order" is used only in the strict sense discussed above; that is, when it has been issued under the change clause of the contract. Other terms relating to contract modifications are defined in Appendix A.

Agency Efforts to Control Contract Modifications

Because contract modifications have been the subject of close congressional scrutiny, federal construction agencies have made strenuous and costly efforts to control the number of changes on their projects. The CoE, for example, has established a contract modification control mechanism called "corporate groups" to reduce "design and construction change orders...by minimizing user originated changes and ensuring [that] only those changes are approved that best serve the interest of the Army" (Duscha, 1984).* The corporate groups are composed of three senior level managers or professionals who represent, respectively, the CoE headquarters, the major command responsible for programming the project, and the responsible regional office of the CoE. The corporate groups have broad authority to reject, approve, or modify changes proposed by user organizations. However, changes can be approved only if certain conditions are met; for example, cost-growth targets are not exceeded, the general scope of the project is not

*The CoE has used the corporate group concept for several years. The directive quoted here essentially restated existing policy.

expanded, and the members of the corporate groups unanimously agree to the proposed change.

The CoE's action to control changes was taken in part because of pressure from the DOD, which was responding to congressional criticism. For example, a DOD memorandum (Stone, 1984) established a construction contract cost modification goal of 5 percent or less for the military agencies. The memorandum also required the agencies to report their contract cost-growth to DOD.

The CoE, of course, is not the only agency that has taken steps to control changes on construction contracts. As indicated in a report by the Federal Construction Council Consulting Committee on Contract Management (1983) "most construction agencies have tried to lessen the problem of excessive changes by adopting procedures aimed at reducing the opportunities for changes to be initiated...."

Recently, however, some agencies have become concerned that efforts to control changes might have gone too far. This concern has been prompted in part by the high cost and considerable effort required to administer programs to control contract changes and in part by complaints from user organizations that the functional performance of new buildings has been jeopardized by too stringent limitations on contract modifications. Such complaints were voiced, for example, by several directors of VA hospitals at hearings held by a Senate subcommittee (Senate Committee on Appropriations, 1984) and by various Air Force commanders in interviews to determine their views on Air Force facilities (Brett and Poe, 1985).

Some agencies have noted, however, that it is difficult to discuss government contract modifications objectively because of a dearth of information on the contract change rates for nonfederal projects and because of differences in the way various agencies record and report contract changes. Accordingly, the agencies that sponsor the Federal Construction Council asked the Building Research Board to form a committee of knowledgeable experts to explore these issues.

OBJECTIVES AND SCOPE OF THE STUDY

The objectives of the study, as stated in the original charge to the committee, were two-fold:

1. Assemble statistics on the number and dollar value of changes encountered on construction projects (both public and private).
2. Develop a standardized method of categorizing and reporting changes on future federal construction projects.

The committee was not asked to comment on the validity of congressional criticism of agencies regarding contract modifications or of agency efforts to control modifications in construction contracts.

HOW THE STUDY WAS CONDUCTED

The committee met four times during the study. The meetings were devoted to reviewing general literature and documents on the subject, analyzing statistics on contract changes provided by three federal construction agencies (CoE, NAVFAC, and VA),* and discussing material prepared for this report by various committee members--including some new cost-growth statistics on nonfederal construction projects prepared by committee member George Roff of the Bureau of the Census. The committee also interviewed several current and former congressional staff members to hear firsthand the reasons for congressional concerns about construction contract modifications.

ORGANIZATION OF THE REPORT

The remainder of the report comprises five chapters. Chapter 3 discusses the nature of construction and why changes to construction contracts are common and inevitable. Chapter 4 presents and discusses statistics on contract changes on nonfederal construction projects. Chapter 5 presents and discusses statistics on contract modifications from three federal agencies. Chapter 6 summarizes the results of the committee's analysis of the data. Chapter 7 presents the committee's conclusions and recommendations.

*In FY 1984 (the last year for which complete statistics are currently available), these three agencies spent over $3.9 billion on construction, which represented more than 35 percent of total direct federal construction expenditures for the year (Construction Review, 1985).

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PUTTING THE PROBLEM IN PERSPECTIVE

The process through which a building or similar structure is planned, designed, and constructed is often lengthy and usually complex. For a government building, the entire process generally takes about 5 years (sometimes much longer) and involves a number of separate steps and different organizations. For a typical federal project, the five main participants are:

1. the using agency--the government organization that has requested the proposed facility and ultimately will occupy it;
2. the construction agency--the government organization that coordinates and manages the design and construction of the project;
3. the funding organizations--the various congressional committees and offices in the government executive branch that determine whether a project will be funded and, if so, the level of funding;
4. the design organization--the organization responsible for preparing detailed drawings and specifications (ordinarily a group of private professional architecture-engineer firms under contract to the construction agency, but occasionally a design office in the construction agency itself); and
5. the construction contractor--the organization hired to construct the facility (usually a private general contractor plus various subcontractors, materials suppliers, and equipment manufacturers).

The four major steps in the process are:

1. programming, during which the scope and purpose of the proposed facility are determined, the objectives are outlined, a preliminary cost estimate is made, and the feasibility of the project is evaluated;
2. preliminary design, during which various conceptual designs are considered, an appropriate design is selected, and a budget estimate and funding request are prepared;
3. final design, during which detailed drawings and specifications are prepared in accordance with the preliminary plans and budget; and

4. construction, during which the facility is built in accordance with the detailed drawings and specifications (modified, if necessary, to deal with problems and conditions that arise during construction).

In addition, each major step in the process involves several substeps, and some intermediate actions must be taken between the steps; for example, selecting an architect-engineer design firm and advertising for bids from construction contractors.

Carrying out the steps in the process often is difficult and challenging. Programming and preliminary design, for example, can be frustrating and prone to miscommunication because the using organization usually does not fully understand the design and construction process, and the construction agency generally does not fully understand the problems and needs of the using agency. The design phase is difficult for the same reasons, as well as, and because almost every design is unique and the money and time available for design are limited. The construction phase is difficult simply because construction is a hard, messy business; it involves the handling and placement of heavy, awkward materials under adverse conditions, and it frequently requires the coordinated efforts of hundreds of workers and a dozen or more subcontractors.

Obviously, in a process like construction that is long, complex, and difficult and involves many people and organizations, opportunities for errors, oversights, unexpected developments, and changes of opinion are numerous. Therefore, it is not surprising that almost all construction contracts need to be revised several times during the course of construction. Specific reasons for these changes in construction contracts include the following:

- to correct or compensate for errors or omissions in the drawings or specifications; for example, an improperly sized structural element or a mislocated air duct;
- to compensate for a construction error that would be prohibitively expensive to correct; for example, a mislocated structural element that could not be relocated without destroying a considerable amount of other work already in place;
- to provide for new or previously unrecognized needs or desires of the user; such changes can range from substitution of one finish material for another, to a substantial increase in the size of the facility being constructed;
- to incorporate changes in basic design criteria; for example, changes in national standards, local building codes, environmental regulations, or agency criteria;
- to take advantage of a cost-saving opportunity; for example, substituting a new, less costly piece of equipment, product, or material for an item originally specified; and
- to deal with an unanticipated situation or changed condition; for example, the discovery of an underground spring on the building site.

During the last decade, the inherent difficulties of construction have been compounded by a desire for quicker completion of projects. As a result, such techniques as "phased construction," "fast track construction," and construction management have been developed and used to expedite the construction process. This desire to accelerate the design and construction process has been prompted by inflation and high interest rates. Invariably, speed increases the chance of error, and errors usually necessitate contract modifications.

Construction specialists generally agree that it would be impossible to eliminate all changes on construction projects and, furthermore, that it would be prohibitively expensive and time consuming to strive for perfect plans and specifications. A recent issue of the American Consulting Engineers Council (ACEC) newsletter (Windman, 1985) emphasized this idea. The ACEC recommended that owners recognize that changes in construction contracts "may be required as the result of possible omissions, ambiguities, or inconsistencies in the plans and specifications...." The ACEC further recommended that owners establish a contingency reserve to cover such changes.

Because contract modifications are inevitable on construction projects, and because they usually increase the cost of projects by only a few percent, many agency construction specialists have suggested that congressional concern about modifications is unjustified. Although it is true that contract modifications generally do not greatly increase the cost of any one construction project, the cumulative cost of contract modifications is substantial. For example, the total value of construction put in place in the United States in 1984 was approximately $313 billion, of which approximately $44 billion came from the federal government either directly for construction purchases or indirectly via grants and loans to state and local governments and private organizations (Construction Review, 1985). Assuming a 5 percent contract modification rate, the total cost of construction contract modifications in 1984 was approximately $15.7 billion for the entire economy and $2.2 billion for the federal government.* Given the nature of construction, it would be unrealistic and a waste of money to try to eliminate all contract modifications. However, because of the amount of money involved, the matter certainly deserves attention, and efforts to control the number of changes to construction contracts are fully justified.

*The cost of contract modifications probably has increased in recent years because of the demise of the so-called "Rice Doctrine," which limited a contractor's cost recovery on changes to the costs directly associated with the change. Now, contractors can claim "ripple" or consequential damages for the impact of a change on work not directly affected by the change.

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STATISTICS ON CONTRACT MODIFICATIONS FOR NONFEDERAL PROJECTS

A review of the literature revealed almost no statistics on construction contract modifications in the private sector or on state and local projects. The subject was, for example, not even addressed in the Business Roundtable's very comprehensive Construction Industry Cost Effectiveness Project.* In fact, the only statistics the committee found were a few assembled by the U.S. General Accounting Office (GAO) on private hospital construction projects (Bernstein, 1983). The GAO information covered 18 hospital projects with a total original cost of almost $79 million. The average rate of changes for all the projects was 4.5 percent. The rate for individual hospital corporations ranged from 7.8 percent to a negative 1.4 percent. (A negative rate means that contract changes resulted in a net cost reduction.) The GAO concluded that the modification rate for the private projects was not out of line with the rate for Veterans Administration projects.

While there have been numerous papers written on legal considerations regarding contract modifications (and especially on resolving disputes about change orders through arbitration), the committee could find no papers that discussed the number of changes on private or state and local government projects or the dollar value of changes, either in absolute terms or as a percentage of the original amount of contracts. The committee does not know if the dearth of statistics indicates a lack of interest in the subject or merely insufficient data.

To obtain contract change statistics on nonfederal projects, the committee contacted the U.S. Department of Commerce's Bureau of the Census. The Bureau publishes monthly estimates of all construction activity in its C30 report, Value of New Construction Put in Place. As part of its overall data collection program, the Bureau conducts a monthly Construction Progress Reporting Survey (CPRS) of a sample of privately owned and state or local-government owned construction projects. Each sample project is tracked from start to completion using census questionnaires that obtain such information as start

*The results of the project are presented in 23 detailed reports. The major conclusions and recommendations are summarized in the Business Roundtable's (1983) report, More Construction for the Money.

date, estimated construction cost at the time of start, monthly progress payments during construction, completion date, and completion cost. In 1984, nearly 10,000 such sample projects were completed.

The Bureau of the Census indicated that while it has never published such statistics, it could, by using reported data from the CPRS, develop ratios of the completion cost to the original cost estimate for all sample projects in order to determine the percentage increase in costs over the duration of the projects. These statistics would be based on aggregate amounts and would reflect both increases and decreases in the project costs.

The committee gratefully accepted the offer of the bureau and requested that the work proceed. Table 1 is the result of that effort. It presents the ratios of completion cost to original cost estimate, by ownership category and type of construction, for the years 1976 through 1984. The table was prepared by committee member George Roff.

Although the information in this table represents a new and valuable addition to statistics on the construction industry and a major contribution to the discussion of construction contract modifications, two limitations of the statistics should be recognized. First, the "original cost" of some sample projects is the estimate reported by the owner or architect, not necessarily the original contract amount. If the original cost is overestimated, the percentages of cost growth indicated in the table would be understated to some extent. The low percentages of cost growth indicated for some types of state and local government projects may be due to the use of "unit price" estimates since there is no definite low bid for such projects. Second, it is common practice, especially in the private sector, to deal with some problems encountered during construction by informal trade-offs; that is, by allowing the contractor to omit some work called for in the plans and specifications to offset the cost of performing some additional work that was not called for. Such arrangements tend to reduce the dollar amount of changes that would otherwise be reported.

TABLE 1 Ratio of Completion Cost to Original Cost Estimate[a] for Sampled Construction Projects, by Ownership, Type of Construction, and Year of Completion, 1976-1984.

Ownership and Type of Project	Completion Year									
	1976	1977	1978	1979	1980	1981	1982	1983	1984	All Years
Privately owned projects:										
Total	1.028	1.046	1.044	1.073	1.069	1.065	1.053	1.078	1.038	1.056
Nonhousekeeping residential	1.100	1.007	1.032	1.073	1.030	1.206	1.091	1.033	1.064	1.076
Industrial	1.040	1.062	1.068	1.140	1.106	1.077	1.109	1.187	1.024	1.100
Office	1.044	1.069	1.068	1.058	1.052	1.065	1.049	1.049	1.048	1.053
Other commercial	1.010	1.024	1.021	1.037	1.048	1.037	1.018	1.044	1.022	1.030
Religious	0.956	1.028	1.041	1.067	1.031	1.008	0.968	1.043	1.054	1.022
Educational	1.036	1.058	1.091	1.043	1.058	1.155	0.983	1.057	1.048	1.056
Hospital & institutional	1.071	1.063	1.069	1.027	1.100	1.080	1.055	1.055	1.037	1.057
Miscellaneous	1.017	1.058	0.980	1.030	1.073	1.064	1.030	1.081	1.054	1.042
(Number of projects in sample)	(5053)	(5685)	(6308)	(6897)	(7687)	(7284)	(6502)	(6016)	(7741)	(59,155)
State or local government owned projects:										
Total	1.004	1.020	1.013	1.026	0.995	1.037	1.029	1.021	1.039	1.020
Housing	0.997	1.031	1.063	1.012	1.031	1.060	1.011	1.027	0.995	1.026
Educational	1.004	1.001	1.033	1.019	1.043	1.103	1.030	1.047	1.063	1.038
Hospital	1.009	1.045	1.115	0.945	1.006	1.094	1.037	1.047	1.078	1.043
Other buildings	1.031	1.055	1.036	1.047	1.043	1.057	1.092	1.034	1.064	1.052
Highways & streets	0.989	0.998	0.943	1.001	0.987	1.000	1.005	1.003	1.015	0.994
Conservation and development	1.021	1.017	1.032	1.018	1.142	1.026	1.066	1.015	1.034	1.046
Sewer systems	1.003	1.001	1.004	1.016	0.881	1.048	1.026	0.982	1.061	0.994
Water supply facilities	0.981	1.070	1.040	1.107	1.024	1.030	1.009	1.029	1.021	1.032
Miscellaneous non-building	1.049	1.107	1.147	1.120	1.079	0.977	1.049	1.109	1.036	1.069
(Number of projects in sample)	(2298)	(2125)	(2205)	(2247)	(2827)	(2957)	(2715)	(2338)	(2222)	(21,934)

NOTE: These ratios were developed from data reported to the Census Bureau on survey forms C-700 and C-700(SL) as part of the Construction Progress Reporting Surveys (CPRS) program. A description of the surveys and discussion of the sources and reliability of the data appear in Construction Reports C30-80s and C30-85-5.

[a]The original cost estimate is the amount of the contract award or the owner's estimate of the cost of the project at the time of start.

SOURCE: Construction Statistics Division, Bureau of the Census, U.S. Department of Commerce.

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STATISTICS ON CONTRACT MODIFICATIONS FROM FEDERAL AGENCIES

The committee asked for and received statistics on contract change orders from three federal agencies: the Army Corps of Engineers (CoE), the Naval Facilities Engineering Command (NAVFAC), and the Veterans Administration (VA). Collectively, these agencies spent more than $3.9 billion on construction in 1984, which represented more than 35 percent of the total direct federal expenditures for construction that year (Construction Review, 1985). The agencies were asked to provide as much information as possible without collecting more data or performing lengthy calculations.

ARMY CORPS OF ENGINEERS

The CoE reported that until FY 1984, it did not maintain detailed statistics on contract changes. For prior years, it had only a limited amount of data on the average rate of cost growth on CoE projects for specific fiscal years or time periods. Much of the information for prior years was prepared on an ad hoc basis for congressional committees. Table 2, for example, shows information that the CoE gave Congress on modifications to contracts completed in FY 1977 and FY 1980. The CoE advised Congress that the statistics might not be entirely accurate "due to nonconformity in data submitted" by various CoE districts and divisions.

In FY 1984, the CoE began collecting more detailed information on contract modifications. Specifically, they began keeping separate statistics on Army and Air Force projects (the CoE manages many Air Force construction projects) and for various types of facilities, as summarized in Table 3. They also began recording the reasons for modifications, using the following 17 codes:*

1. design deficiency - no professional architect and engineer (AE) action warranted (includes all in-house deficiencies)
2. design deficiency - investigation under way to determine if sufficient basis exists to initiate recovery action against AE (temporary code)

*The CoE did not provide detailed definitions of these codes.

TABLE 2 Statistics on Modifications to Army Corps of Engineers Construction Contracts Completed in FY 1977 and FY 1980[a]

	Fiscal Year	
	1977[b]	1980[c]
Number of contracts completed	480	395
Total original value of contracts (thousands)	$588,383	$548,533
Average original value of contracts (thousands)	$1,226	$1,389
Total number of modifications to contracts	5,816	4,849
Average number of modifications per contract	12.1	12.3
Total cost of modifications (thousands)	$48,644	$53,562
Average cost of a modification (thousands)	$8.4	$11.0
Average cost of modifications to a contract (thousands)	$101.6	$135.3
Final amount of contracts (thousands)	$636,979	$602,095
Percentage increase in amount of contracts	8.3	9.8

[a]Includes Air Force construction contracts that were managed by the CoE.
[b]SOURCE: Surveys and Investigations Staff, 1979.
[c]SOURCE: Surveys and Investigations Staff, 1982.

TABLE 3 Statistics on Modifications to Army Corps of Engineers Construction Contracts Completed in FY 1984, by Facility Type.

	Army Projects				Air Force Projects				
Facility Type	Number of Contracts Completed	Original Value of Contracts ($, thousands)	Cost of Modifications ($, thousands)	Percentage Increase	Number of Contracts Completed	Original Value of Contracts ($, thousands)	Cost of Modifications ($, thousands)	Percentage Increase	Percentage Increase, All Projects
Operations and training	25	45,801	2,998	6.5	48	163,019	7,078	4.3	4.8
Maintenance and production	51	75,536	5,147	6.8	41	53,761	3,144	5.8	6.4
Research, development, and testing	4	5,324	224	4.2	3	14,056	1,088	7.7	6.8
Supply	15	23,146	-118	-0.5	8	15,077	674	4.5	1.5
Hospital and medical	15	67,440	5,058	7.5	1	147	36	24.5	7.5
Administration	5	5,591	678	12.1	23	23,882	2,258	9.5	11.0
Housing and community	44	95,862	6,023	6.3	27	78,421	3,229	4.1	5.3
Utility and ground improvement	77	74,194	5,307	7.1	42	58,520	3,439	5.9	6.6
Total	236	392,894	25,317	6.4	193	406,883	20,946	5.1	5.8

SOURCE: Army Corps of Engineers.

3. design deficiency - determination made that sufficient basis exists to initiate recovery action against AE
4. new federal regulation, code, criteria, or mission changes directed by services headquarters; that is, Army, Navy, Air Force, etc., or higher
5. contract option exercised with construction funds after award of the basic contract
6. title II (inspection) services and increases in other direct costs
7. differing site conditions (refer to contract clause 44)
8. value engineering change (refer to contract clause 61)
9. administrative - contract changes such as contractor address change, funding change, etc. (no time or cost is added to the contract)
10. major command or lower user changes and enhancements as a result of installation or using unit criteria, mission, or facility use requirement changes
11. excusable delay - a change in contract period for strikes and other except weather (time only, no cost) (refer to contract clause 64)
12. excusable delay - a change in contract period for weather (time only, no cost) (refer to contract clause 64)
13. corrections of deficiencies in government furnished equipment or property (refer to contract clause 59.1 and 59.2)
14. additional work required from real estate or right-of-way problems, conflicting contracts, material or supply shortages, flooding or other events beyond the control of the contractor or government
15. variations in estimated quantities included in the contract; overruns and underruns (refer to contract clause 6)
16. suspension of work (refer to contract clauses 7 and 63)
17. variations not readily identifiable during design (no design deficiency involved)

In responding to the committee's request for statistics, the CoE merged these 17 codes into five broad categories and provided the following statistics on the percentage of modifications in 1984 that were attributable to each category: design deficiencies, 38 percent; criteria changes, 22 percent; unforeseen conditions, 12 percent; changes in scope, 13 percent; and other, 15 percent.

In 1984, the CoE also began keeping statistics on time extensions caused by contract modifications; however, they declined to release these statistics to the committee because they considered the initial data to be faulty.

NAVAL FACILITIES ENGINEERING COMMAND

The NAVFAC issued instructions for reporting change orders* in 1980 (Commander, NAVFAC, 1980). However, like the CoE, NAVFAC apparently did not keep detailed statistics on contract modifications

*Although the term change order is used in the NAVFAC instructions, the procedures appear to be applicable to all types of construction contract modifications.

until 1984. Nevertheless, it did occasionally develop statistics for particular years in response to congressional requests. Table 4 shows statistics that NAVFAC gave Congress on construction contract changes for FY 1977 and FY 1980.

In 1984 NAVFAC began keeping detailed statistics on contract modifications. Statistics provided to the committee are presented in Tables 5 and 6. Note that the NAVFAC statistics are somewhat different from the CoE statistics. For example, NAVFAC did not provide a breakdown by facility type, but it did provide more data on the reasons for modifications. In addition, NAVFAC has distinguished between "unplanned" and "planned" modifications. Actually, the terms planned and unplanned are somewhat misleading; NAVFAC is really distinguishing between modifications for which someone might be blamed or praised and those to which no blame or credit is attached.

With regard to the reason codes used in Table 6 that are not self-explanatory, the NAVFAC instructions on reporting change orders (Commander, NAVFAC, 1980) provide the following definitions and guidance:

- Unresolved claim: This code refers to "a written request submitted to the contracting officer for payment of money, adjustment of contract terms, or other relief, which is in dispute or remains unresolved after a reasonable time for its review and disposition by the government, and for which a contracting officer's decision is demanded."
- Customer request: This is an "amendment to accommodate revised or new functional requirements of the facility."
- Criteria change: This is an "amendment to accommodate revised or new building, utility, or construction criteria, which does not relate to functional aspects of the project...."
- Design deficiency: Use of this code "is to be strictly limited to occurrence of one or both of the following: (a) Design error--defined as a designer mistake--typical examples, (1) elevations wrong, (2) design required a six inch pipe versus four inch pipe. (b) Design omission--occurs when an item is overlooked or not considered completely. Note: In all cases where design [deficiency] is designated, the responsibility of the designer must be questioned."
- Error or omission: This code should be used "when AE liability is under investigation...or when AE paid all or a portion of the change order.... If AE is found not liable for compensation, use [the design deficiency code]. If AE is found liable but refuses to pay, use [the error or omission code]."
- Change in scope: This code refers to an amendment "to add additional scope to the contract. This does not cover scope which was not included due to omission by the government."
- Value engineering: This is a change "reflecting the savings resulting from redesign to incorporate the result of [value engineering] studies."
- Administrative or accounting: This code refers to a change that does not affect the contract cost "on a net basis; [a] change to accounting or contract data."

TABLE 4 Statistics on Modifications to Naval Facilities Engineering Command Construction Contracts Completed in FY 1977 and FY 1980[a]

	Fiscal Year	
	1977[b]	1980[c]
Number of contracts completed	170	220
Total original value of contracts (thousands)	$199,945	$421,977
Average original value of contracts (thousands)	$1,176	$1,918
Total number of modifications to contracts	1,258	3,352
Average number of modifications per contract	7.4	15.2
Total cost of a modification (thousands)	$14,226	$49,078
Average cost of modifications (thousands)	$11.3	$14.6
Average cost of modifications to a contract (thousands)	$83.6	$221.9
Final amount of contracts (thousands)	$214,171	$471,055
Percentage increase in amount of contracts	7.1	11.6

[a]Includes Air Force construction contracts that were managed by the NAVFAC.
[b]SOURCE: Surveys and Investigations Staff (1979).
[c]SOURCE: Surveys and Investigations Staff (1982).

TABLE 5 Cost-Growth on Naval Facilities Engineering Command Construction Contracts Completed in FY 1984, by Major Progress Element.

Program Element	Number of Contracts Completed	Original Value of Contracts ($, millions)	Cost of Modification ($,millions)		Percentage Increase	
			All Modifications	Unplanned Modifications Only[a]	For All Modifications	For Unplanned Modifications Only[a]
Navy military projects	Not indicated	445.5	30.4	27.6	6.8	6.2
Naval reserve projects	Not indicated	15.1	0.8	0.8	5.3	5.3
Naval family housing projects	Not indicated	19.1	0.4	0.3	2.1	1.6
Air Force projects	Not indicated	76.3	5.8	3.4	7.6	4.5
Total	329	556.0	37.4	32.1	6.7	5.8

[a]Excludes contract modifications that initiate preplanned additional phases of work, execute options, adjust for fluctuation in the value of currency (overseas work), or are for administrative purposes.

TABLE 6 Number and Value of Modifications to Naval Facilities Engineering Command Construction Contracts Completed in FY 1984, by Reason Code (All Programs)

Reason Code[a]	Number of Modifications	Value of Modifications ($, thousand)	Percentage of Total for Category	
			By Number	By Value
Unplanned:				
Uncoded	43	78.0	2.0	0.2
Unresolved claims	1	2.0	0.0	0.0
Customer request	306	6,148.9	13.0	19.1
Criteria change	159	2,378.4	6.8	7.4
Design deficiency	966	13,331.1	41.2	41.4
Error or omission	22	337.7	0.9	1.0
Change in scope	40	283.5	1.7	0.9
Unforeseen condition	794	10,160.3	33.8	31.6
Value engineering	16	-533.6	0.7	-1.7
Total, unplanned modifications	2,347	32,186.3	100.0	100.0
Planned:				
Administrative or accounting	27	1,884.2	34.2	37.8
Currency reevaluation	4	-294.9	5.1	-5.9
Options	1	10.0	1.3	0.2
Planned changes	45	3,390.1	57.0	67.9
Time extensions	2	0.0	2.6	0.0
Total, planned modifications	79	4,989.4	100.0	100.0

[a]See text for definitions.

SOURCE: NAVFAC.

o Options: "Maintenance service contracts generally include option clauses which allow NAVFAC to extend the contract at the same price or at a fixed increase to the original price."

o Planned changes*: This code "refers to those changes that, prior to or at time of award, have been preplanned to be handled as change orders due to the nature of the work involved (a simple example here would be modifications to requirements contract...)"

VETERANS ADMINISTRATION

The VA Office of Construction has kept statistics on construction contract modifications for many years, and it provided the committee with the information shown in Table 7 on contract changes from 1974 through June 1985. Since almost all VA construction involves hospitals and related facilities, the VA does not break down its statistics by facility type. The VA also does not keep statistics on the reasons for changes.

*The NAVFAC definition of planned changes also mentioned options; however, it is assumed that this is an error, since options are defined separately.

TABLE 7 Statistics on Modifications to Veterans Administration Construction Contracts, 1974 to 1985

Calendar Year	Number of Projects Physically Completed per Year	Original Amount of Completed Contracts, Yearly Totals ($, thousands)	Net Amount of Changes to Complete Contract, Yearly Totals ($, thousands)	Rate of Cost Growth (percent)
1974	56	16,470	803	4.87
1975	128	91,928	8,162	8.88
1976	159	163,046	8,672	5.32
1977	202	132,717	4,706	3.55
1978	197	149,068	12,394	8.31
1979	204	183,267	9,091	4.96
1980	224	210,962	15,445	7.32
1981	259	245,654	15,297	6.23
1982	211	209,513	11,901	5.68
1983	214	495,199	19,322	3.90
1984	257	281,896	12,256	4.35
1985 (thru June)	89	96,517	4,411	4.57
Total	2,200	2,276,237	122,460	5.38

SOURCE: Veterans Administration.

6

ANALYSIS OF THE DATA

The committee made several comparisons of the data on contract modifications that were provided by the Bureau of the Census (on private sector projects and state and local government projects) and by the Army, Corps of Engineers (CoE), the Naval Facilities Engineering Command (NAVFAC), and the Veterans Administration (VA). Unfortunately, several comparisons the committee wished to make were not possible because of incomplete data. Nevertheless, the available data provided some interesting and useful insights.

AVERAGE CONTRACT MODIFICATION RATES

The committee based most of its contract-modification comparisons on the annual rate of the cost of modifications; that is, the net cost of contract changes completed during a particular year divided by the original amount of those contracts (or when the original amount of a contract was unknown, the estimated cost at the time construction started).

When the committee plotted the yearly modification rates for different organizations, the year-to-year swings were so large that trends and differences were masked. To dampen these swings, the committee computed and plotted 2-year moving average modification rates. Figure 1 shows such rates for the VA construction program, private sector projects, and state and local government projects for the period 1976 to 1984. Because the committee did not receive data for all years from the CoE and NAVFAC, the modification rates for those agencies are shown as superimposed points for 1977, 1980, and 1984 (the years for which data were available).

Figure 1 indicates that the VA modification rate is quite similar to the rate for the private sector, and that the rate for state and local governments is lower than the rate for either of the other groups.

Because the VA construction program involves mostly hospitals, the committee compared the VA contract modification rate with the modification rates for hospitals constructed by the private sector and state and local governments. The results for the years 1976 to 1984, are

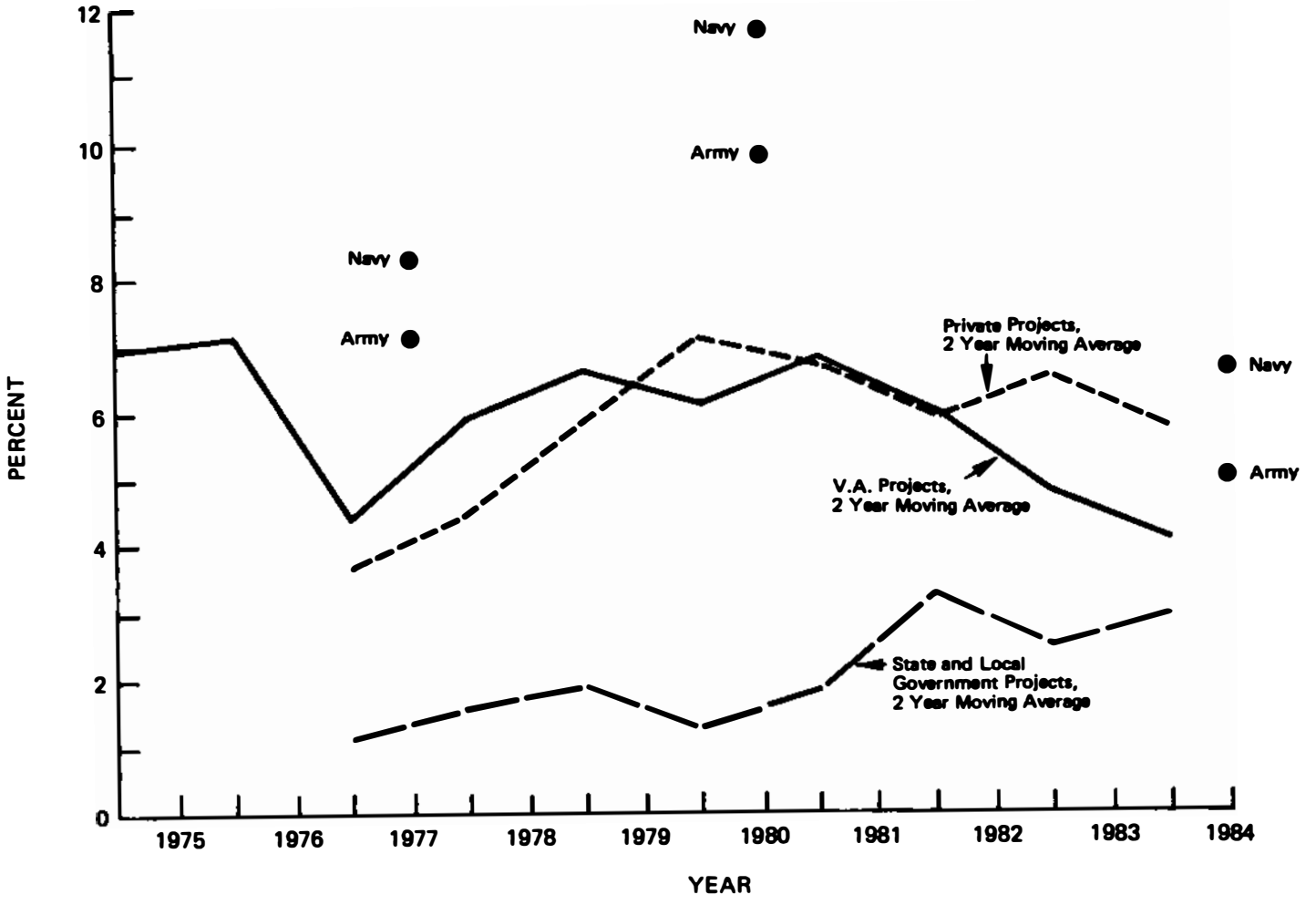

FIGURE 1 Changes in contract modification rates (cost of modifications as a percent of original contract costs) over time, shown as 2-year moving averages for the VA, private sector, and state and local government projects and as points for the CoE and NAVFAC.

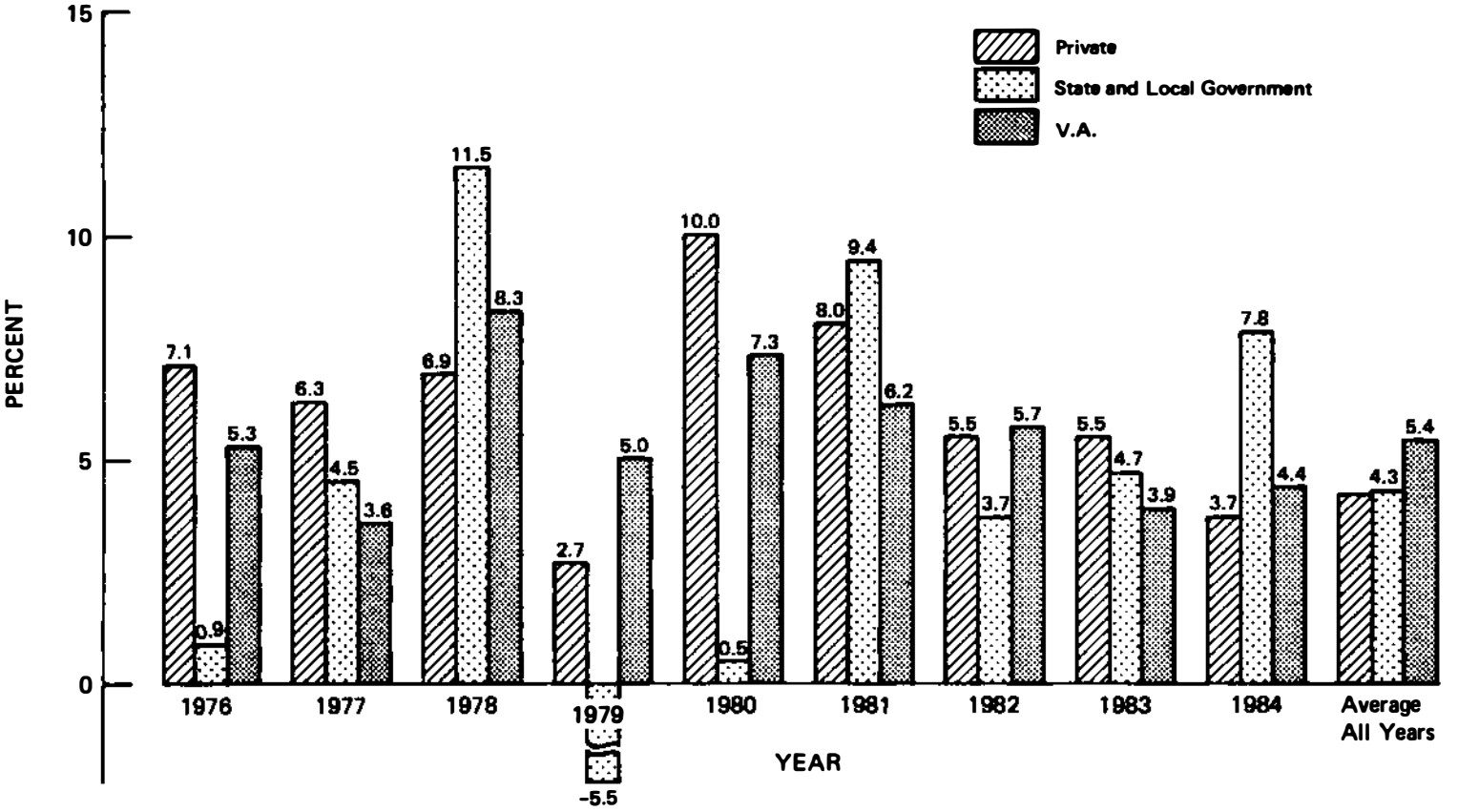

FIGURE 2 Yearly contract modification rates for private hospitals, state and local government hospitals, and VA construction for 1976 to 1984.

presented in the form of a vertical bar chart in Figure 2. Interestingly, although the year-to-year variations are much greater for state and local government hospital projects than for either private sector hospitals or VA facilities, the average rate for state and local government hospitals for the entire span of years is very similar to the average for private hospitals (4.3 percent versus 4.2 percent), and not greatly different from the average rate for VA projects (4.3 percent versus 5.4 percent).

Because contract modification data were available from the CoE and NAVFAC for just three years--1977, 1980, and 1984--the committee made a comparison of the modification rates for all groups for those years. The results are presented in the form of a vertical bar chart in Figure 3. Some of the insights provided by this comparison are similar to those of previous comparisons; namely, that the modification rate for state and local government projects is more variable than the rates for other groups, and that the VA modification rate is fairly close to the rate for the private sector. The rates for the CoE and NAVFAC, in contrast, are consistently higher than the private sector rate. Specifically, the CoE and NAVFAC modification rates were higher than the private sector rates for the three years in question by the following percentages:

	CoE	NAVFAC
1977	80 percent	54 percent
1980	42 percent	68 percent
1984	53 percent	76 percent

REASONS FOR CONTRACT MODIFICATIONS

To effectively plan a control effort for contract modifications, statistics on the reasons for modifications are needed. Unfortunately, the committee received information on the reasons for contract modifications from only two agencies, the CoE and NAVFAC, for just one year--1984--and reason categories used by the agencies were slightly different; consequently, the data could not be compared. To overcome this problem, the committee combined the categories used by the two agencies into five broad categories, which are listed below together with the CoE and NAVFAC categories they encompass.

Using these categories the committee prepared Table 8. It is interesting that the experiences of the two agencies were similar for three of the five categories. Significant differences were found for two categories: criteria changes and unforeseen conditions. The committee believes it is notable that the experiences of the agencies were similar for the two most controversial categories: design deficiencies (which many attribute to substandard AE work) and changes in scope (which is often viewed as a sign of poor agency planning). Together, these two categories accounted for slightly more than one-half of the dollar value of all modifications.

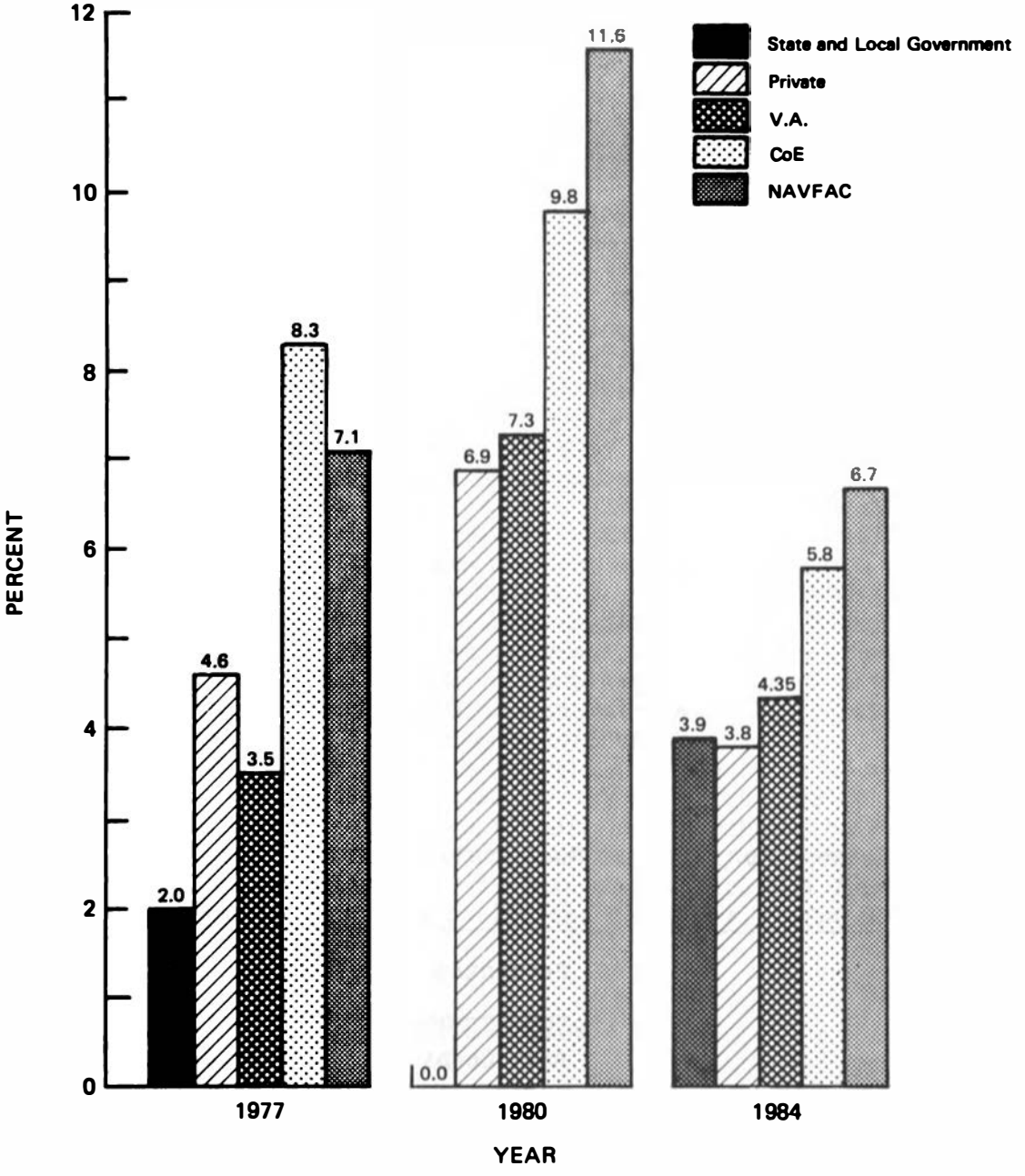

FIGURE 3 Yearly contract modification rates for state and local government projects, private projects, VA construction, CoE construction, and NAVFAC construction for 1977, 1980, and 1984.

Committee Categories	CoE Categories	NAVFAC Categories
Design deficiency	Design deficiency (AE action) Design deficiency (no AE action)	Design deficiency Error or omission
Criteria changes	Criteria changes directed by Department of the Army	Criteria change
Unforeseen conditions	Differing site conditions Variation in estimated quantities	Unforeseen conditions
Change in scope	User requested changes Variation in scope	Customer request Change in scope
Other	Contract option Value engineering Other (administrative/ combination) Deficiency in government furnished property New law/regulation/code Suspension of work	Option Value engineering Administrative/ accounting Unresolved claims Planned changes Currency reevaluation Uncoded

TABLE 8 Reasons for Contract Modifications on Military Construction Projects--FY 1984

	Percentage of all Change	
Category	Army Corps of Engineers	Naval Facilities Engineering Command
Design deficiency	38	37
Criteria changes	22	6
Unforeseen conditions	12	27
Changes in scope	13	17
Other	15	13
Total	100	100

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CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

Although it would be unrealistic and a waste of money to try to eliminate all modifications to federal construction contracts, reasonable efforts to control modifications are justified and appropriate. Two essential ingredients in an effective control effort are sensible criteria on what constitutes an acceptable contract modification rate and accurate data on actual contract modifications.

Statistics on the contract modification rate for nonfederal projects would be valuable for establishing contract modification criteria for federal agencies. Useful statistics currently can be provided by the Bureau of the Census at very low cost. With some additional expenditures, the Bureau of the Census could develop more complete statistics.

Uniform statistics on the contract modification rates of various federal agencies are needed to establish criteria, to develop guidance on where efforts to control contract modifications should be concentrated, and to judge the effectiveness of the agency control efforts. Currently, several agencies collect contract modification data; however, the value of such data is limited because all agencies do not collect the same type of data.

RECOMMENDATIONS

1. All federal construction agencies that are required either by a congressional committee or agency policy to collect and report statistics on contract modifications should adopt uniform standards for such statistics. As a minimum, these agencies should develop statistics on the number, dollar amount, and percentage of original contract amount of modifications to their construction contracts and the reasons for the modifications. To the extent feasible, the following separate breakdowns of the data should be provided:

- by type of facility--using, if possible, the categories and definitions developed by the Bureau of the Census for public sector construction (see Appendix B);
- by new construction versus repair and alteration work (however, operating and maintenance contracts should not be included);

- by the original dollar amount of the contracts, and grouped in the following categories: less than $1 million, $1 million to $5 million, $5 million to $10 million, and more than $10 million;
- by the type of contract used (e.g., fixed price, unit price, cost reimbursable);
- by the contract clause under which the modifications were executed; and
- by whether the modifications were planned and anticipated (e.g., to initiate a new phase of a planned multiphase project or to exercise an option in a contract) or unplanned.

In preparing statistics on the reasons for modifications, for comparison purposes agencies should use the five broad categories of reasons that the committee adopted (i.e., design deficiencies, criteria changes, unforeseen conditions, changes in scope, and other). For their own purpose, agencies can use subcategories like those adopted by the CoE and NAVFAC. If possible, the CoE and NAVFAC should try to agree on the reason subcategories (codes) they will use and the definitions of those subcategories.

The statistics should include only projects in the 50 states of the United States. Agencies having projects in U.S. territories and foreign countries should develop some method of excluding data from such projects from their statistics.

The statistics should be prepared on the basis of completed projects; that is, contract modifications should be reported for the year in which the government takes beneficial occupancy of the constructed or rehabilitated facility.

2. The Bureau of Census should periodically (e.g., annually) prepare and publish cost-growth statistics on nonfederal construction contracts similar to the statistics prepared for this report. In addition, the Bureau of the Census should investigate the feasibility of providing additional breakdowns of the data like those outlined in recommendation 1.

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APPENDIX A

DEFINITIONS

1. Cardinal Changes: Cardinal changes are major additions or changes to a project (not in furtherance of design) that significantly expand or modify the scope of the work. On federal projects, cardinal changes are considered a new procurement; thus, they are usually handled through a supplemental agreement rather than by a change order.

2. Change Order: A change order is a written amendment to a signed contract that authorizes a change in the work to be accomplished and/or an adjustment in the contract amount and/or in the time to complete the project. On federal projects, change orders can only be issued by the contracting officer; that is, the government official who is specifically authorized to act on behalf of the government. On private projects, the signature of the professional architect or engineer (AE) who designed the project often is also required on change orders, and in some cases private owners will delegate to an AE full authority to execute change orders. Almost all federal construction contracts and many private contracts include a change clause that permits the owner, when necessary, to issue change orders unilaterally, even though a price and a schedule modification have not been agreed to by the contractor. In such cases, these matters are decided later by negotiation (or possibly arbitration).

3. Cost-Growth: Cost-growth is the difference, for whatever reason, between the original contract amount and the final contract amount that the owner must pay.

4. Design Deficiency: This is a defect or omission in the contract documents that results in some aspect of the work being in violation of a building code or law or being inoperable, potentially hazardous, or unconstructible. Dimensional errors are in this category also, as well as failure of the design to properly take into account published standards by the owner.

5. Differing Site Conditions: Differing site conditions are actual physical conditions (such as subsurface or topographical) that differ materially from those indicated in the contract documents or from physical conditions normally expected to be encountered.

6. Impact: There may be two categories of added cost in any change order. The first is the actual cost of performing the changed work. The second is the effect a change order may have on other work

due to sequence changes, etc., or delay to the project. The latter category is labeled variously as "impact," "ripple effect," "consequential damages," or "loss of productivity."

7. Product Improvement or Criteria Changes: These are changes initiated by the architect or owner after contract award to improve or enhance the quality of some aspect of the facility, equipment, or furnishings. The Army Corps of Engineers and Naval Facilities Engineering Command define product improvement changes as discretionary upgrades of design requested by the customer.

8. Supplemental Agreement: A supplemental agreement is a bilateral agreement between owner and contractor incorporating a change in the scope of the work to be done, the price, and schedule effect thereof.

APPENDIX B

CONSTRUCTION PROJECT CATEGORIES

The following categories and definitions are used by the Bureau of the Census for public sector construction statistics. The committee recommends that federal construction agencies use the same categories when preparing contract modification statistics.

- Housing and Redevelopment includes houses, apartment buildings, dormitories, fraternity and sorority houses, and all other housekeeping and nonhousekeeping residential structures.
- Educational includes academic and associated buildings (libraries, cafeterias, dining halls, student unions, etc.) at educational institutions. Also included are buildings which serve an educational purpose, i.e., public libraries, museums, art galleries, planetariums, observatories, arboreta, botanical and zoological gardens, archives, conservatories, etc. This category does not include institutions for the deaf, blind, mute, handicapped, or teaching hospitals which are classified as "hospitals."
- Hospitals includes buildings and structures at hospitals, clinics, infirmaries, surgical centers, etc. Also included are rest homes, nursing homes, sanatoria, psychiatric institutions, quarantine colonies, schools for the handicapped, orphanages, homes for the aged, homes for unwed mothers, halfway homes, outpatient clinics, medical research centers, etc.
- Other State and Local Buildings includes general administrative buildings; police, fire and corrections buildings; bus, streetcar, subway and railroad garages and barns, stations and related buildings; enclosed parking facilities; airport buildings; maritime transport, storage and terminal buildings; electric power generating buildings; amusement-recreational buildings; and other commercial, industrial and miscellaneous buildings not elsewhere classified.

- Highways and Streets includes highways, streets, bridges, overpasses, tunnels, toll facilities, street lighting, and miscellaneous road construction.
- Conservation and Development includes all construction intended for water resources protection and control such as erosion control systems, fish hatcheries, spillways, pollution control plants, levees, seawalls, waterfront bulkheads, jetties, river and harbor development, dredging and drainage, canals, irrigation facilities, docks, piers, wharves, berths, and reservoirs built other than for potable water supply.
- Sewer Systems includes storm drainage and sewerage system lines, dry waste disposal plants, nonpotable water treatment plants and pumping stations, tunnels, outfalls, and all other sewer construction.
- Water Supply Facilities includes potable water distribution systems and storage facilities such as water lines, aqueducts, water pumping stations, treatment plants, dams, reservoirs, artificial lakes, brooks, ponds, and water wells.
- Miscellaneous Nonbuilding Construction includes open amusement and recreational facilities; power generating facilities; and other open construction (subway and streetcar construction, airport runways, open parking facilities, etc.).