

GAO

AD-A281 779



June 1994

United States General Accounting Office

Briefing Report to the Chairman and  
Ranking Minority Member,  
Subcommittee on Military Construction,  
Committee on Appropriations, U.S.  
Senate

# MILITARY CONSTRUCTION

## Planning and Design Costs



94-21644



GAO/NSIAD-94-182BR



United States  
General Accounting Office  
Washington, D.C. 20548

National Security and  
International Affairs Division

B-257285

June 22, 1994

The Honorable Jim Sasser  
Chairman  
The Honorable Slade Gorton  
Ranking Minority Member  
Subcommittee on Military Construction  
Committee on Appropriations  
United States Senate

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This report responds to a requirement contained in the Senate Report accompanying the Military Construction Appropriation Bill for fiscal year 1993 that we review the Department of Defense's (DOD) military construction planning and design (P&D) costs for the military services and defense agencies. Our objectives were to (1) identify trends in P&D costs for DOD and its military services and defense agencies as a percentage of total project cost; (2) determine what, if any, differences exist in the percentage of total project costs directed to P&D by project size and type; and (3) compare DOD's P&D percentages and time devoted to planning and design to four federal civilian entities--the Coast Guard, Federal Aviation Administration (FAA), General Services Administration (GSA), and the Department of Veterans Affairs (VA).

On July 19, 1993, and June 6, 1994, we briefed Subcommittee staff on the results of our work. This report documents the information presented at those briefings. (See apps. I to IV.)

BACKGROUND

Each year, DOD requests funds from the Congress for military construction. The annual appropriations for military construction for fiscal years 1989 through 1992 ranged from \$5.1 billion to \$5.7 billion. The P&D funds included in these appropriations were generally used to pay for the design and engineering services required before awarding a construction contract and after authorizing a project for design.

Under the military construction program, the Army Corps of Engineers is the design and construction agent for the Army, 80 to 90 percent of Air Force projects, and DOD agencies. The Naval Facilities Engineering Command is the design and construction agent for the Navy and for 10 to 20 percent of Air Force projects. The Corps and Naval Facilities Engineering Command acquire a substantial part of the engineering and design services by contract with private-sector architect-engineer firms. The Corps provides about 25 percent of these services in-house, and the Navy provides about 3 to 5 percent in-house.

In July 1992, the Senate Committee on Appropriations expressed concern that future military construction activities will be moderated due to budget constraints and that P&D costs, at least for some types of projects, appeared to be increasing. As a result, the Committee asked us to review DOD's military construction P&D costs.

## RESULTS

The percentages of the construction costs devoted to P&D were relatively comparable for fiscal years 1989 through 1992 for DOD as a whole and among the services and defense agencies. Lower cost projects tended to incur a higher percentage of P&D costs than higher cost projects. We could find no clear trends for the percentage of P&D costs for various types of projects or across the services and defense agencies. However, the Air Force's and defense agencies' percentages were significantly higher than the Army's P&D percentages. Although DOD's P&D percentages were generally higher than those of the other federal agencies we reviewed, the percentages for DOD's medical facilities were significantly higher than those reported by VA.

Because the Coast Guard and FAA had a very small number of projects in comparison to the other entities included in our review, we compared only GSA's and VA's times for planning and design to those of DOD's military services and the two defense agencies--the Defense Medical Facilities Office and the Defense Logistics Agency--that had a majority of the defense agencies' projects. We found that DOD's military services and defense agencies devoted substantially more time to planning and design than GSA or VA.

SCOPE AND METHODOLOGY

We interviewed officials and reviewed policies, procedures, and data to determine how planning and design costs are defined. We reviewed and analyzed cost data and time devoted to planning and design for fiscal year 1989 through 1992 projects to identify P&D percentages, trends in those percentages, and time devoted to design. For the Coast Guard and FAA, we reviewed only projects, such as hangars and control towers, that are similar to those constructed by DOD. (See app. V for a list of the organizations that we visited or contacted.)

The cost and time data provided was generally the most recent data available during the third or fourth quarter of fiscal year 1993. Some cost and time data was updated through April 1994. We did not verify the cost data, which agency representatives provided from various records and information or data systems.

Also, we reviewed related studies conducted by the Logistics Management Institute to determine if cost and time data had already been analyzed and action taken in response to those studies. (See app. IV.)

We discussed the results of our work with DOD, Coast Guard, FAA, GSA, and VA representatives. Generally, they agreed with the information presented in this report. We made changes and incorporated their comments where appropriate.

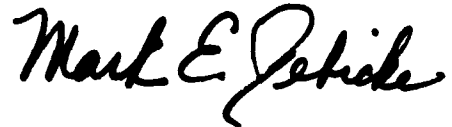
We conducted our review from April 1993 through March 1994 in accordance with generally accepted government auditing standards.

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We are sending copies of this report to the Chairmen, Senate and House Committees on Armed Services and Appropriations; the Secretaries of Defense, the Army, the Air Force, the Navy, Transportation, and Veterans Affairs; the Administrator of the General Services Administration; and the Director of the Office of Management and Budget. Copies will also be made available to others upon request.

B-257285

If you have any questions concerning this report, please contact me at (202) 512-5140. The major contributors to this report are listed in appendix VI.

A handwritten signature in black ink that reads "Mark E. Gebicke". The signature is written in a cursive style with a large, prominent initial "M".

Mark E. Gebicke  
Director  
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## CONTENTS

	<u>Page</u>
Letter	1
<b>APPENDIX</b>	
I	P&D Percentages for DOD, the Military Services, and Defense Agencies 7
II	Comparison of P&D Percentages For DOD And Selected Civilian Agencies 13
III	Time Devoted to Planning and Design 14
IV	Studies by the Logistics Management Institute on DOD's P&D Costs for Military Construction 15
V	Locations Visited or Contacted during Our Review 17
VI	Major Contributors to this Report 18
<b>TABLE</b>	
I.1	Trend in DOD-Wide P&D Percentages for Fiscal Years 1989-1992 7
I.2	The Army's P&D Percentages by Project Type for Fiscal Years 1989-1992 10
I.3	The Air Force's P&D Percentages by Project Type for Fiscal Years 1989-1992 11
I.4	The Navy's P&D Percentages by Project Type for Fiscal Years 1989-1992 12
II.1	P&D Percentages for DOD and Selected Federal Civilian Agencies for Fiscal Years 1989-1992 13

III.1	Time Devoted to Planning and Design for Military Services, Defense Agencies, GSA, and VA for Fiscal Years 1989-1992	14
III.2	Time Devoted to Planning and Design for Medical Facilities Over \$3 Million for Fiscal Years 1989-1992	14
IV.1	Selected Recommendations from 1990 and 1991 Logistics Management Institute Studies and Subsequent DOD Actions	16
<b>FIGURE</b>		
I.1	P&D Percentages Varied Among the Services and Defense Agencies for Fiscal Years 1989-1992	8
1.2	DOD's P&D Percentages for the Services and Defense Agencies Varied by Project Size for Fiscal Years 1989-1992	9

#### ABBREVIATIONS

DOD	Department of Defense
FAA	Federal Aviation Administration
GSA	General Services Administration
P&D	planning and design
VA	Department of Veterans Affairs

**P&D PERCENTAGES FOR DOD, THE MILITARY  
SERVICES, AND DEFENSE AGENCIES**

Table I.1: Trend in DOD-Wide P&D Percentages for Fiscal Years 1989-1992

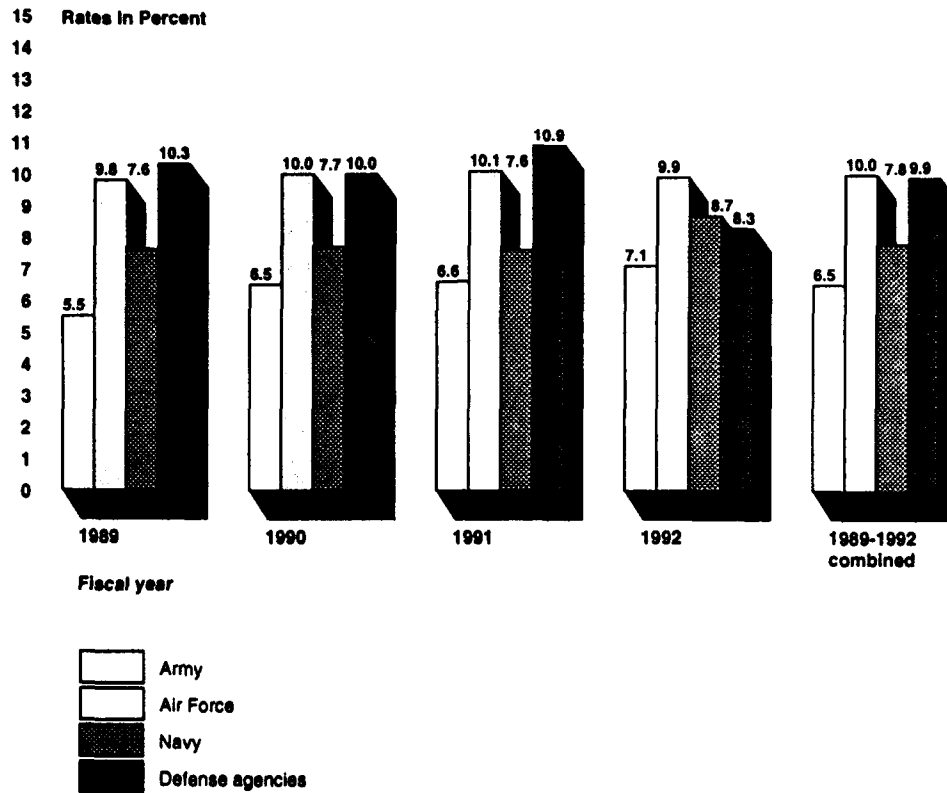
Dollars in billions

	Fiscal year				
	1989	1990	1991	1992	Total
Total cost of projects	\$3.71	\$2.37	\$2.80	\$3.04	\$11.93
Total P&D costs obligated for these projects	0.30	0.23	0.23	0.25	1.01
P&D as a percentage of total project cost	8.1	9.7	8.2	8.2	8.5

The above DOD percentages represent projects for which designs were completed. These figures do not include costs for "design breakage," which are design costs for projects that are canceled, dropped, or deferred. Also not included in these figures is the cost of engineering and design criteria, such as guide specifications and handbooks, and engineering support systems. According to a DOD official responsible for military construction, these additional costs, if adequately funded, increase the planning and design percentage to about 10.5 percent.



Figure I.1: P&D Percentages Varied Among the Services and Defense Agencies for Fiscal Years 1989-1992



Many individual projects had P&D percentages much higher or lower than the services' or defense agencies' average P&D percentages shown in figure I.1. DOD representatives told us that projects with P&D percentages less than 6 percent generally had adapted an existing design, whereas projects with percentages of 20 percent and higher generally had extensive design changes.

Figure I.2: DOD's P&D Percentages for the Services and Defense Agencies Varied by Project Size for Fiscal Years 1989-1992

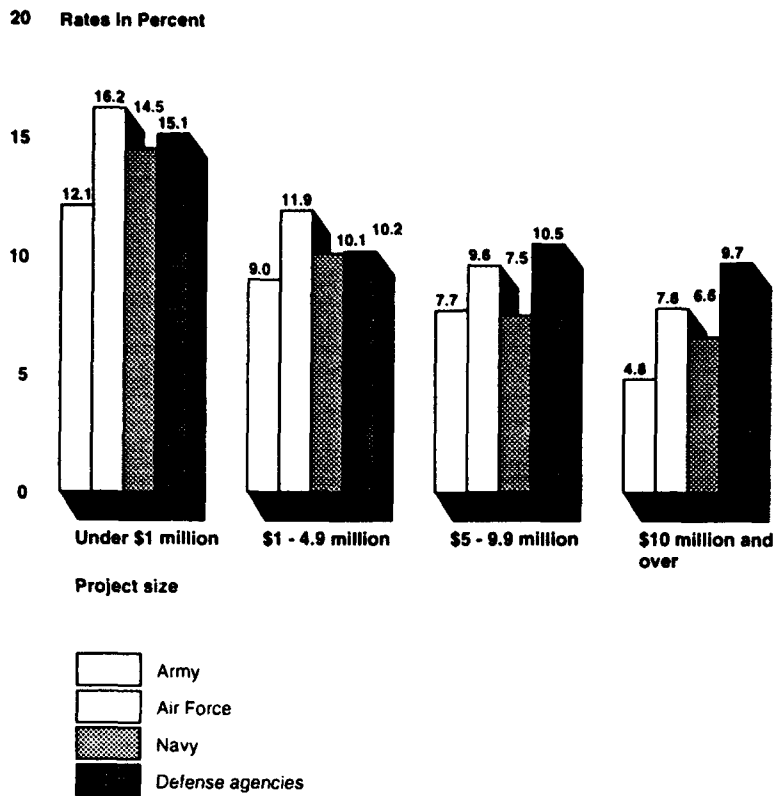


Figure I.2 illustrates how project size affects P&D as a percentage of total project costs. Lower cost projects tended to incur a higher percentage of P&D costs than higher cost projects. Of the 612 DOD fiscal year 1992 projects, 182, or 30 percent, had P&D percentages of 15 percent or higher. About 95 percent of the 182 projects were under \$5 million. In addition to design changes that contribute to higher P&D percentages, according to an official in the Office of the Deputy Under Secretary of Defense (Environmental Security), there are routinely certain fixed costs that tend to result in smaller projects having higher P&D percentages. For example, he said that a drawing package, design specification package, cost estimate package, and certain field investigations are common to all projects regardless of their size and, therefore, the smaller the job, the more these costs will increase the P&D percentage. He said that as a job becomes larger, these fixed costs become less of a factor in the P&D percentage.

The following three tables show the services' P&D percentages for selected project types.

Table I.2: The Army's P&D Percentages by Project Type for Fiscal Years 1989-1992

Army projects	Fiscal year			
	1989	1990	1991	1992
Barracks or dormitories	5.9	6.4	5.7	7.9
Child care	9.7	7.7	6.7	18.8 <sup>a</sup>
Maintenance	5.5	4.4	8.7	9.3
Fire stations	<sup>b</sup>	<sup>b</sup>	24.2	13.2
Warehouse/storage	3.3	10.4	8.4	9.8
Utilities	6.0	10.2	6.7	6.4
Training	12.3	8.0	10.0	7.1
Ordnance	8.5	9.3	<sup>b</sup>	11.3
Administrative office	6.4	13.9	4.0 <sup>c</sup>	11.1
Research	9.2	<sup>b</sup>	6.9	11.5
Control towers	<sup>b</sup>	<sup>b</sup>	<sup>b</sup>	15.2

<sup>a</sup>For fiscal year 1991, the largest project of \$6.2 million had a very small P&D percentage of 1.8 percent, while for 1992, the largest project of \$5.5 million had a high P&D percentage of 27.1 percent. An Army Corps of Engineers official told us that the location for this project changed three times and with each change, redesign was necessary. Also, he said that the project was changed from just a child care center to a child care and community center.

<sup>b</sup>There was none of this type of project for the fiscal year.

<sup>c</sup>The largest project of \$67.6 million had design cost of only \$777,000, or 1.1 percent, which drastically lowered the overall percentage.

Table I.3: The Air Force's P&amp;D Percentages by Project Type for Fiscal Years 1989-1992

Air Force projects	Fiscal year			
	1989	1990	1991	1992
Barracks or dormitories	8.4	8.6	8.6	7.4
Child care	5.5	12.3	6.9	11.6
Maintenance	10.6	10.6	8.2	10.7
Fire stations	13.9	18.6	19.3	14.4
Warehouse/storage	8.1	10.1	11.9	14.5
Utilities	9.6	8.5	10.6	10.4
Training	10.2	11.4	9.3	13.6
Ordnance	8.5	8.0	9.6	11.1
Administrative office	11.2	12.2	11.9	10.2
Research	11.4	12.4	14.4	12.4
Control towers	12.8	<sup>a</sup>	10.2	10.4

<sup>a</sup>There was none of this type of project for the fiscal year.

Table I.4: The Navy's P&amp;D Percentages by Project Type for Fiscal Years 1989-1992

Navy projects	Fiscal year			
	1989	1990	1991	1992
Barracks or dormitories	4.1	4.9	5.2	7.9
Child care	14.9	18.5	12.0	10.3
Maintenance	9.2	8.4	8.3	9.5
Fire stations	6.1	12.6	14.0	5.0
Warehouse/storage	8.2	5.7	9.5	8.1
Utilities	5.9	6.8	7.9	9.0
Training	8.4	8.8	9.3	11.5
Ordnance	8.2	4.2	5.8	6.3
Administrative office	12.5	7.3	8.2	9.5
Research	6.8	10.4	9.2	10.5
Control towers	<sup>a</sup>	<sup>a</sup>	<sup>a</sup>	15.2

<sup>a</sup>There was none of this type of project for the fiscal year.

COMPARISON OF P&D PERCENTAGES FOR DOD AND  
SELECTED CIVILIAN AGENCIES

Table II.1: P&D Percentages for DOD and Selected Federal Civilian Agencies for Fiscal Years 1989-92

	Fiscal year				
	1989	1990	1991	1992	Total
DOD-wide	8.1	9.7	8.2	8.2	8.5
Coast Guard	6.6	8.2	8.2	8.5	7.9
FAA	5.8	6.1	6.1	6.4	6.1
GSA	8.1	8.6	6.4	8.4	7.4
VA	9.1	10.4	7.5	8.1	8.6
Defense medical facilities	10.9	10.8	11.6	8.8	10.6

As can be seen in table II.1, the P&D percentages for DOD are generally higher than those of the civilian agencies. Because VA constructs primarily health care facilities, we also compared VA's P&D percentage just with DOD's medical facilities. DOD includes several types of costs in P&D that the civilian agencies generally do not; these include such administrative overhead costs as travel and/or training and supplies. If these costs were included, the civilian agencies' P&D ratios would increase. However, the civilian agencies had not conducted analyses to determine how these additional costs would affect the P&D percentages. For example, according to a VA representative, VA's annual administrative overhead costs for construction for fiscal years 1989 through 1992 ranged from \$41 million to \$44 million, but VA does not routinely conduct a project-by-project analysis to determine what percentage of these additional costs would apply to P&D since they do not account for the costs as P&D. VA's total annual obligations for construction during the same time period--fiscal years 1989 through 1992--ranged from \$457 million to \$660 million.

TIME DEVOTED TO PLANNING AND DESIGN

Table III.1: Time Devoted to P&amp;D for Military Services, Defense Agencies, GSA, and VA for Fiscal Years 1989-1992

Department/entity	Average time devoted to P&D (months)
Army	20.3
Air Force	23.9
Navy	28.8
Defense medical facilities	29.6
Defense Logistics Agency	27.5
GSA	14.7
VA	11.8

Table III.2: Time Devoted to P&amp;D for Medical Facilities Over \$3 Million for Fiscal Years 1989-1992

Type of facility	Average time devoted to design (months)
Defense medical facilities	33.4
VA facilities	34.4

Because the Coast Guard and FAA had a small number of projects in comparison to the other entities included in our review, we compared only GSA's and VA's design times to those of the military services, the Defense Medical Facilities Office, and the Defense Logistics Agency. The Defense Medical Facilities Office and the Defense Logistics Agency had a majority of the defense agencies' projects.

STUDIES BY THE LOGISTICS MANAGEMENT  
INSTITUTE ON DOD'S P&D COSTS  
FOR MILITARY CONSTRUCTION

The Logistics Management Institute<sup>1</sup> has done several studies on DOD's P&D costs for military construction. In November 1990, it issued a study, entitled "Military Construction Planning and Design Funding Requirements," which concluded that an aggressive program is needed to control "design breakage"<sup>2</sup> and "lost design."<sup>3</sup> In October 1991, it issued a study, entitled "Improving Management of Military Construction Planning and Design," which concluded that design cost controls and reporting needed to be improved. Table IV.1 summarizes selected recommendations from these studies and DOD's actions on these recommendations.

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<sup>1</sup>The Logistics Management Institute is a nonprofit, federally funded research and development center that has done logistics studies for DOD since 1961.

<sup>2</sup>Design breakage is the cost of designing projects that are canceled, dropped or deferred.

<sup>3</sup>Lost design is a design that is scrapped and/or redone prior to awarding a construction contract.



Table IV.1: Selected Recommendations from 1990 and 1991 Logistics Management Institute Studies and Subsequent DOD Actions

Recommendation	DOD action
Develop individual division and district targets for managing P&D programs.	Established P&D rate targets that currently being monitored.
Incorporate a new model into the Army, Corps of Engineers planning and budgeting decision process for military construction.	Incorporated a new P&D model that is used to develop the annual operating P&D budget for Military Construction, Army projects.
Clarify the definition of "lost design" and "design breakage."	Issued guidance to better define "lost design" and "design breakage."
Provide a uniform format for collecting and reporting lost design data.	Developed a uniform format for collecting and reporting lost design data and identified responsibilities for monitoring progress in lost design reporting.
Determine why P&D percentages for large and small projects are different.	Found certain fixed costs common to large and small projects result in higher P&D percentages for small projects.

LOCATIONS VISITED OR CONTACTED DURING OUR REVIEW

We interviewed or contacted officials at the following headquarters organizations:

- Department of Defense, Washington, D.C.
- Department of the Army, Washington, D.C.
- Department of the Air Force, Washington, D.C.
- Department of the Navy, Washington, D.C.
- Army Corps of Engineers, Washington, D.C.
- Naval Facilities Command, Washington, D.C.
- Defense agencies:
  - Defense Information Systems Agency, Arlington, Virginia
  - Defense Mapping Agency, Fairfax, Virginia
  - Ballistic Missile Defense Organization, Washington, D.C.
  - National Security Agency, Fort Meade, Maryland
  - Department of Defense Dependents School, Arlington, Virginia
  - Joint Staff J-4 Sustainability, Mobilization, and Engineering Division, Washington, D.C.
  - Defense Intelligence Agency, Washington, D.C.
  - Defense Logistics Agency, Alexandria, Virginia
  - Defense Nuclear Agency, Alexandria, Virginia
  - Defense Medical Facilities Office, Falls Church, Virginia
  - On-Site Inspection Agencies, Washington, D.C.
- Coast Guard, Washington, D.C.
- Federal Aviation Administration, Washington, D.C.
- General Services Administration, Washington, D.C.
- Department of Veterans Affairs, Washington, D.C.

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