



UNITED STATES GENERAL ACCOUNTING OFFICE  
WASHINGTON, D.C. 20548

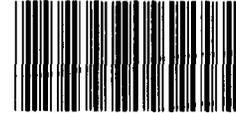
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HUMAN RESOURCES  
DIVISION

DECEMBER 30, 1981

B-204206

The Honorable Ronald M. Mottl  
Chairman, Subcommittee on Hospitals  
and Health Care  
Committee on Veterans' Affairs  
House of Representatives



117249

Dear Mr. Chairman:

Subject: Opportunity to Reduce the Cost of Building  
VA Medical Facilities (HRD-82-28)

At your request, we have reviewed the Veterans Administration's (VA's) medical facility construction program. As agreed with your staff, we concentrated on (1) the reasons for cost growth in the program, (2) the reasons for large numbers of changes to design and construction contracts, and (3) the costs these changes added to projects. The results of our work are in the enclosure.

VA's construction program has changed significantly since the projects we reviewed were being designed and constructed. Congressional concerns about cost growth in VA's major construction program prompted (1) the Congress to enact legislation to control the growth of VA projects beyond their original cost estimates and (2) VA to create an Advanced Planning Fund to enable it to provide the Congress better cost estimates. Although it is too soon to fully evaluate the effectiveness of these actions, they should enable the VA to submit better cost estimates to the Congress and will provide an upper limit cost control on approved projects.

The time it takes to complete medical facility construction projects could be reduced by up to 15 months by extending the Advanced Planning Fund to allow VA to contract for final designs while the Congress reviews the projects. This could reduce overall project costs by minimizing the effects of inflation; however, there would be the added risk that, if the Congress did not approve or fund a project so designed, the final design costs would be wasted. Whether the change should be made rests largely on the confidence the Subcommittee has in VA's ability to identify and prioritize its construction requirements.

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COST GROWTH: A SIGNIFICANT  
PROBLEM IN THE 1970s

The actual cost of new or replacement projects (as opposed to alteration or renovation projects) which VA built during the 1970s averaged about 58 percent higher than the original cost estimates VA provided to the Congress. Change orders increased construction contract amounts by about 8 percent. For the 10 projects we reviewed, the actual cost averaged 74 percent higher than the original estimate submitted to the Congress--change orders to construction contracts on these projects increased the contract amounts by 7 percent. (See table 3 on p. 12 of the enc.)

In December 1974, the House Appropriations Committee directed its surveys and investigations staff to analyze VA's construction programs. As part of the analysis, the staff reported on the extent and causes of cost overruns on major construction projects.

The staff found that cost estimates for 28 major hospital construction projects had increased an average of 81 percent from their original budget submission to the Congress. Individual project cost estimates had increased as much as 391 percent. The Committee's reaction to the trend of cost overruns in VA construction projects is reflected in the following remarks of a Committee member to a VA official during a 1975 hearing:

"When you come up here with a justification figure there is no way we can depend on it. It is discouraging for us to sit here and think we are going to build a hospital for x dollars and find out later you weren't within 50 percent of the cost."

The staff noted that the preponderance of cost growth occurred before construction contracts were awarded and that cost increases during construction were generally limited to 5 to 10 percent of the contract amounts.

The staff concluded that the basic reason for the large cost growth was VA's failure to base its budget estimate on a well-defined project. The staff also cited other causes: understated cost estimates and inflation factors, changes in project scope due to changing medical program requirements, and increases due to such design requirements as changes in fire and safety codes.

The staff recommended that the Committee require VA to

- (1) improve its long-range planning for construction projects and
- (2) establish a line item appropriation for construction planning and design funds. Although the Committee did not formally require

VA to take specific actions, it expressed its concern with the cost growth problem and told VA to improve the program without delay.

PUBLIC LAW 96-22 SHOULD GIVE THE CONGRESS  
BETTER CONTROL OF PROGRAM CHANGES

The House and Senate Veterans' Affairs Committees shared the Appropriations Committee's concern about the uncontrolled cost growth in VA major construction projects. After several years of debate, the Congress enacted Public Law 96-22 in June 1979. Title III of this law revised VA's authority to construct medical facilities by requiring that (1) the House and Senate Veterans' Affairs Committees approve projects before they can be funded; (2) VA prepare and annually update a 5-year plan for the construction, replacement, and alteration of medical facilities, including a priority list of the 10 hospitals most in need of construction or replacement; and (3) VA not increase a project's cost by more than 10 percent above the amount approved by the Veterans' Affairs Committees.

Operating under Public Law 96-22, VA submitted 54 construction projects (4 of them are hospitals) for approval by the Veterans' Affairs Committees for fiscal years 1981 and 1982, and the Committees have approved 53 of the projects. However, none of these projects has been constructed; therefore, VA's compliance with the 10-percent cap on cost growth cannot be evaluated now.

VA'S CREATION OF AN ADVANCED PLANNING  
FUND SHOULD PROVIDE THE CONGRESS  
BETTER COST ESTIMATES

VA's Advanced Planning Fund should allow VA to more fully develop its plans and cost estimates in major construction projects before presenting the projects to the Congress, as recommended by the surveys and investigations staff.

In the past, VA requested congressional approval and funding for construction projects before they entered the preliminary design phase. In 1978, VA created the Advanced Planning Fund to contract with architect/engineering (A/E) firms for preliminary design work before it presented the project to the Congress. VA's annual request for advanced planning funds does not specify for which projects the funds will be used. Through fiscal year 1981, the Congress had appropriated \$27 million for advanced planning activities, and VA's request for fiscal year 1982 was \$16 million.

During fiscal years 1981 and 1982, VA submitted 50 construction projects 1/ for congressional approval whose preliminary design was financed by the Advanced Planning Fund. A comparison of the final cost to the original estimate presented to the Congress will have to wait until construction of these projects is completed. Eight of the projects designed under the Fund have reached the construction phase, and as of December 15, 1981, none has been completed.

EXTENDING THE ADVANCED PLANNING FUND  
COULD REDUCE PROJECT TIME AND COST

The design and construction process would be shortened if VA could use the Advanced Planning Fund to contract for final designs. Currently, VA suspends the design work until the Congress approves and funds the project. If VA were to contract for final design work concurrently with the congressional review process, it could save up to 15 months on large projects. This would minimize the effects of inflation on overall project costs but also add risks if the Congress should not approve or fund a project.

VA's construction authority would  
have to be amended to extend the Fund

Public Law 96-22 amended VA's basic construction authority (38 U.S.C. 5001, et seq.) to require that the House and Senate Veterans' Affairs Committees approve medical facility construction projects before they could be funded. Section 5001(2) defines construction to include all actions--including final design work--carried out after the completion of advanced planning. The legislative history of Public Law 96-22 indicates the Committees' concerns over cost growth in VA's medical facility construction program, but does not explain why advanced planning was limited to preliminary design work.

The Corps of Engineers uses the concept of an advanced planning fund to fund its preliminary and final design work on medical facilities for the Army and Air Force. It relies on 31 U.S.C. 723 for its authority. 2/

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1/Four projects approved in fiscal years 1981 and 1982 had preliminary design work performed before the Advanced Planning Fund was created.

2/31 U.S.C. 723 states: "There are authorized to be appropriated without fiscal year limitation, funds for advance planning, construction design, and architectural services in connection with public works projects which are not authorized by law."

Under its Advanced Planning Fund, VA usually plans the project in-house, contracts with an A/E firm for preliminary design work, submits the project to the Congress for approval and funding, and then contracts with the same or a new A/E firm for final design. Although VA may select the A/E firm for final design work before the Congress funds the project, VA uses the funds appropriated for the project to pay the A/E firm and, therefore, must wait until those funds are available before it can actually sign the contract and have the A/E firm begin working.

Benefits and risks from extending  
the Advanced Planning Fund

If final design work can be performed during the congressional approval process instead of after it, VA should be able to begin construction earlier and pay a lower price by avoiding some effects of inflation.

The amount of time VA can actually save will vary by project and will depend on the project's complexity. The more complex a project is, the longer it will take to prepare the working drawings and specifications necessary to bid the construction work. On the 10 projects we reviewed, final design ranged from 9.5 to 32.5 months. (See table 2 on p. 9 of the enc.) The congressional review process usually takes 15 months--from the time a project is included in VA's internal budget process in June or July, through VA's submission of its budget to the Office of Management and Budget in September and to the Congress in January, until the funds become available at the beginning of the fiscal year in October. By performing the final design work during this process, VA can reduce project time up to 15 months. During fiscal year 1981, the index VA used to project inflation rates for its construction projects rose 9.28 percent. Based on this, VA may be able to reduce construction costs by up to 11.6 percent.

Extending the Advanced Planning Fund should not affect the benefits sought by Public Law 96-22 of congressional review of projects at a time when VA's cost estimates should be reasonably firm. VA would submit projects if the Fund were extended at the same time it does now--after preliminary design work has been completed.

Such an action would require larger appropriations to the Advanced Planning Fund than are currently made, in amounts depending on the number of projects VA intends to construct. These additional Fund appropriations would, however, eliminate the need for the Congress to include funds for final design in appropriations for the construction of approved projects.

If VA were to design a project through the Advanced Planning Fund and the Congress not approve or fund that project, the amount spent on the design would be lost; currently, only the amount spent on preliminary design would be lost. The average cost of final design work for the 10 projects we reviewed was about \$800,000, ranging from about \$165,000 for a nursing home to about \$3.1 million for a replacement hospital.

These risks could be minimized, however, if VA would provide more detailed justifications with its budget requests for the Advanced Planning Fund. VA's annual request for the Fund does not specify for which projects the funds will be used. If VA were to relate its request for advanced planning funds to its 5-year construction plans, the Congress would be able to evaluate the funding request in light of those plans.

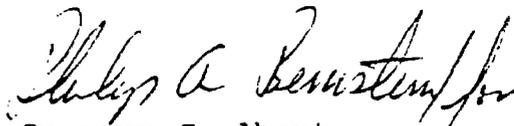
MATTERS FOR CONSIDERATION  
BY THE SUBCOMMITTEE

The Subcommittee should consider amending the definition of construction in 38 U.S.C. 5001(2) to allow VA to extend its Advanced Planning Fund to include final design work. While the benefits of potentially lower costs and earlier completion are attractive, there are risks involved. The Subcommittee should also consider VA's ability to prepare long-range construction plans that are acceptable to the Subcommittee and establish appropriate priorities. The degree of confidence the Subcommittee has in VA's plans directly affects the degree of risk inherent in preparing final designs before final congressional approval is obtained.

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At your request, we did not obtain VA's comments on matters discussed in this report. Also, as agreed with your office, we are sending copies of this report to the Chairmen, House and Senate Committees on Veterans' Affairs and Appropriations; the Administrator of Veterans Affairs; and other interested parties.

Sincerely yours,



Gregory J. Ahart  
Director

Enclosure

CHANGES TO VA MEDICAL FACILITY DESIGN AND  
CONSTRUCTION CONTRACTS ON PROJECTS REVIEWED BY GAO

The Veterans Administration (VA) operates the largest health care delivery system in the United States. Its fiscal year 1982 budget for medical care services exceeded \$7 billion. To deliver such care, VA operates hospitals, nursing homes, and other facilities. VA is also a leader in medical facility construction, and its fiscal year 1982 budget for major (more than \$2 million) medical facility construction was about \$500 million. The Chairman, Subcommittee on Special Investigations, House Committee on Veterans' Affairs (now the Chairman of the Subcommittee on Hospitals and Health Care), asked us to review VA's construction program, giving particular attention to the cost growth 1/ in construction projects.

VA'S HEALTH CARE DELIVERY SYSTEM

Since it was established more than 50 years ago, one of the primary missions of the VA has been to provide medical care to the Nation's veterans. Section 610 of title 38 of the United States Code authorizes hospital and nursing home care to veterans (1) with a service-connected disability, (2) receiving disability compensation, (3) unable to pay for medical care from private sources, or (4) over age 65. Medical care is provided through VA's nationwide system consisting of 172 hospitals, 226 outpatient clinics, 95 nursing home care units, and 16 domiciliarys with a total of more than 100,000 patient beds. Each VA hospital is part of a VA medical center consisting of the hospital, one or more outpatient clinics, and frequently a nursing home or domiciliary.

The heart of the health care delivery program is the system's 172 hospitals, 137 of which are affiliated with medical schools. In addition to normal inpatient and outpatient services, VA hospitals offer a variety of specialized medical programs (e.g., alcohol and drug abuse, spinal cord injury, and hemodialysis) to provide high-level medical care to veterans.

VA'S MEDICAL FACILITIES  
CONSTRUCTION PROGRAM

The medical facilities through which VA provides medical care to veterans range in age from buildings constructed in the last century to those completed last year. The age of existing buildings necessitates frequent alterations and improvements in order to maintain high-quality medical care. These projects are carried

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1/Cost growth refers to the increase in a project's cost from the original estimate provided by VA to the Congress.

out under the VA's Medical Facilities Construction Program and range from minor alterations to an existing building to total facility replacement.

Since 1979, the VA has annually provided the Congress with a 5-year Medical Facility Construction Plan detailing anticipated major construction requirements. The latest plan (1982-86) lists 271 projects ranging from a \$2.8 million elevator improvement project in Atlanta, Georgia, set for 1983, to the \$378 million hospital replacement in Houston, Texas, to begin in 1984. The combined estimated construction cost for all projects listed in the current 5-year plan exceeds \$5 billion.

#### OBJECTIVES, SCOPE, AND METHODOLOGY

The Subcommittee asked us to review VA's major construction program. Of particular interest to the Subcommittee were (1) the reasons for cost growth in the program, (2) the reasons for large numbers of changes to architect/engineering (A/E) and construction contracts, and (3) the cost these changes added to projects.

Our approach was to examine, in detail, several recently completed major construction projects which were built from the ground up (as opposed to alteration or renovation projects). With the help of VA officials, we identified 34 projects which met our criteria. We chose 10 of these projects for detailed review based on a desire to avoid projects where the amount of change was unusually high and to choose at least 1 project from each of the following categories: replacement hospitals, nursing home care units, research and education facilities, and additions to existing facilities. (Table 1, p. 3, presents general information on each project we reviewed.)

For each project, we reviewed the funding history, award of design and construction contracts, and changes to the contracts. In reviewing the changes to both design and construction contracts we examined documentation contained in VA's construction project files. In addition, we interviewed VA officials and reviewed applicable agency regulations and manuals. We performed our work at VA headquarters in accordance with our current "Standards for Audit of Government Organizations, Programs, Activities, and Functions."

#### VA'S PROCESS FOR PLANNING, DESIGNING, AND CONSTRUCTING MEDICAL FACILITIES

Establishing the health care needs that a construction project is to satisfy is the responsibility of VA's Department of Medicine and Surgery (DM&S), while designing and building the facility is the responsibility of the Office of Construction.

Table 1  
Medical Facility Construction Projects  
Reviewed by GAO

<u>Location</u>	<u>Category</u>	<u>First appropriation</u> (fiscal year)	<u>Construction contract awarded</u> (calendar year)	<u>Completed</u>	<u>Total cost</u> (millions)
San Diego, CA.	811-bed replacement hospital	1966	1969	1972	\$40.3
Tampa, FL.	720-bed replacement hospital	1965	1968	1972	23.7
San Antonio, TX.	760-bed replacement hospital	1966	1970	1974	37.1
Los Angeles, CA.	820-bed replacement hospital	1973	1973	1977	87.0
Long Beach, CA.	180-bed nursing home	1973	1973	1975	3.0
Sepulveda, CA.	120-bed nursing home	1973	1974	1976	3.5
Jackson, MS.	120-bed nursing home	1974	1975	1977	3.3
Phoenix, AZ.	120-bed nursing home	1975	1976	1978	4.2
Phoenix, AZ.	328-bed hospital addition	1967	1972	1976	20.3
Houston, TX.	research & education building	1973	1976	1978	5.2

Following World War II, the Congress established DM&S within VA and designated its head as Chief Medical Director. The department's goal, established by the first Chief Medical Director, was to provide veterans with the best possible health care--this is still DM&S's goal.

The Office of Construction is responsible for VA's construction program. Over 95 percent of the construction budget is devoted to medical facilities. Consequently, the Office's primary objective is to provide the medical facilities needed by DM&S. To accomplish VA's medical services goal, the Office assists DM&S in planning individual projects and DM&S participates with the Office in designing and constructing these facilities.

The process by which projects are listed on the 5-year plan and are accomplished involves three general phases: planning, design, and construction. The chart on the next page illustrates the functions and products involved in each of the three phases. As the chart illustrates, the process begins with the identification of project need and ends with a completed facility.

#### The planning phase

A construction project begins when VA identifies health care services and facilities that do not meet current VA criteria. Annually, DM&S requests each of the 172 medical centers to identify health care delivery system weaknesses requiring construction for correction. Their submissions are reviewed by district, regional, and central offices of DM&S and form the basis for VA's 5-year construction plan.

The Office of Construction develops cost information for DM&S on projects to be included in the 5-year construction plan. DM&S then clarifies the identified needs for each project by performing studies to determine the extent of the problem at each individual medical center. Such studies include determination of the number of patients to be served, medical services required, staffing levels needed, etc. Assistance is often requested from the Office to clarify the specific need--especially when alteration or modernization of existing buildings is involved. When program needs have been determined, the project then competes with other projects for design funding. DM&S selects and lists the projects in order of priority. Once the process is complete, the Office assumes responsibility for design and construction.

#### The design phase

The first step in the design phase is to transform the medical needs into space requirements. The Office of Construction

	<u>PLANNING</u>	<u>DESIGN</u>		<u>CONSTRUCTION</u>
		<u>Preliminary</u>	<u>Final</u>	
<u>Functions:</u>	<ul style="list-style-type: none"> <li>--Identify health service needs requiring construction</li> <li>--Review construction needs submitted by 172 medical centers</li> <li>--Establish agencywide priorities</li> <li>--Clarify scope of health and service needs for individual projects</li> <li>--Define construction alternatives to meet functional needs</li> <li>--Prepare plan showing medical services to be provided, staffing, bed distribution, workload, and other pertinent data</li> </ul>	<ul style="list-style-type: none"> <li>--Develop space requirements from data package</li> <li>--Prepare preliminary plans</li> <li>--Estimate project cost based on preliminary plans</li> </ul>	<ul style="list-style-type: none"> <li>--Prepare documents necessary to advertise construction</li> </ul>	<ul style="list-style-type: none"> <li>--Build facility</li> </ul>
<u>Products:</u>	<ul style="list-style-type: none"> <li>--Five-year medical facility construction plan</li> <li>--Fiscal year Advanced Planning Fund budget request</li> </ul>	<ul style="list-style-type: none"> <li>--Architectural preliminary plan</li> <li>--Engineering preliminary plan</li> <li>--Fiscal year construction budget, project funding</li> </ul>	<ul style="list-style-type: none"> <li>--Working drawings</li> <li>--Specifications</li> <li>--Invitation for bids</li> </ul>	<ul style="list-style-type: none"> <li>--Medical facility</li> </ul>

ENCLOSURE I

ENCLOSURE I

does this by applying VA space criteria 1/ to the individual project's needs. Once the medical center's needs have been identified and reviewed, DM&S provides the Office with a data package containing (1) a tentative scope for the individual project identifying the medical functions involved and (2) information which helps determine facility size, such as demography, facility staffing, workload, etc. This data package provides the information necessary for the Office to determine specific space requirements for each medical function in the scope of the project.

Two separate design efforts--preliminary and final--are involved before a project can be constructed. All decisions on what is to be built and the construction methods to be used are normally made during the preliminary design phase. Preliminary designs involve determining the layout of the medical functions in a manner acceptable to DM&S, deciding on the nonmedical components needed (i.e., heating and air conditioning equipment), and estimating the project's cost. The preliminary design entails preparation of both an architectural preliminary plan and an engineering preliminary plan, both of which are needed to prepare working drawings and reasonably accurate cost estimates. The architectural preliminary plan includes a finished floor plan drawn to scale, and the engineering preliminary plan diagrams the information required to describe the selected engineering systems.

Final design involves the preparation of design documents in sufficient detail to build the facility. A series of drawings are required for each major construction effort--site work, foundation work, structural, mechanical, electrical, etc. These drawings serve as the basis for the actual construction drawings used by the contractor to build the facility. Consequently, the different sets of drawings must be coordinated if the facility constructed from them is to function properly. Since there are many more drawings in the final design of a project, they require more staff hours to complete than the preliminary designs do.

VA uses in-house staff and/or contracts with A/E firms for preliminary and final designs. Currently, about 90 percent of design work is done under contract. However, 8 of the 10 projects we reviewed had preliminary designs prepared by VA staff and final designs developed by A/E firms. One project was designed entirely by VA staff and the other was designed entirely by an A/E firm.

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1/The net square footage needed for each part of a facility (based on staffing projections and patients to be served) and preferred operational layouts (considering staff and patient flow and relationships to the other parts of the facility).

Contracting with A/E  
and construction firms

VA follows the principles of Public Law 92-582, the "Brooks Bill," and implementing regulations when contracting with A/E firms:

- VA advertises the availability of the contract in Commerce Business Daily.
- VA's A/E evaluation board preselects firms that apply and have the basic qualifications for performing the services needed.
- The evaluation board recommends at least three firms for selection.
- The Administrator selects the firm considered best qualified.
- VA negotiates the price of the contract with the selected firm.

The A/E firm is usually involved throughout the project. During the design phase, the firm is responsible for developing preliminary plans, preparing working drawings, and attending VA reviews of working drawings. The A/E firm is also required to provide technical services during construction, such as clarifying drawings and specifications, reviewing reports submitted by the contractor, preparing detailed construction cost estimates for changes, and correcting design deficiencies. The A/E firm may also be required to attend weekly job site meetings and make special site visits to resolve problems or inspect completed work.

VA follows procedures spelled out in the Federal Procurement Regulations when awarding construction contracts:

- VA advertises the availability of the contract in Commerce Business Daily and makes the design documents available to all prospective bidders.
- VA receives sealed bids from firms, opens these bids in public, and identifies the lowest bidder.
- VA evaluates the lowest bidder to determine that the firm can perform under the contract.
- The Administrator approves the award to the selected firm.

CHANGES TO DESIGN AND CONSTRUCTION CONTRACTS  
INCREASED PROJECT TIME AND COST

VA frequently changed the scope of design and construction contracts on the projects we reviewed. VA modified the 10 A/E contracts 1/ we reviewed 198 times, increasing their cost 18.8 percent. Design completion slipped on nine contracts an average of 9.6 months (ranging from 2 weeks to 19.5 months). VA changed the 11 construction contracts 2/ 1,847 times, with most of the changes being initiated by DM&S to provide it with features it wanted in the facilities.

Modifications to A/E contracts  
increased project time and cost

VA frequently modified A/E contracts to accommodate changes requested by DM&S. As shown in table 2, VA modified the 10 A/E contracts we reviewed 198 times at a cost of \$1.4 million. This represents an 18.8-percent increase over the original contract prices. Moreover, issuance of the design documents slipped on 9 of the 10 contracts because of these modifications.

About 80 percent of the 198 modifications and about 96 percent of the cost incurred were for the five hospital projects (four replacement and one addition).

Modifications requested by DM&S to  
improve delivery of health care

Decisions on what services and equipment are needed in a facility and how they are to be laid out were made during the planning and preliminary design phases. During the final design phase, the A/E firm prepared the detailed drawings necessary to advertise the construction contract and build the facility. At scheduled intervals these drawings were reviewed by VA. DM&S participated in these reviews and, as shown in the examples on page 10, changed its earlier decisions regarding services and equipment.

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1/VA had 10 A/E contracts on the 10 projects we reviewed; although VA designed the Long Beach nursing home entirely in-house, the Los Angeles replacement hospital was designed in two phases, each with a separate A/E contract.

2/VA had 11 construction contracts on the 10 projects we reviewed-- the Los Angeles replacement hospital was built in two phases, each with a separate construction contract.

Table 2  
Modifications to Design Contracts  
on Projects Reviewed by GAO

<u>Project</u>	<u>Original A/E contract price</u>	<u>Modifications during design</u>			<u>Months to design project</u>			<u>Modifications during construction</u>		
		<u>Number</u>	<u>Amount</u>	<u>Percent increase</u>	<u>Scheduled</u>	<u>Actual</u>	<u>Months slipped</u>	<u>Number</u>	<u>Amount</u>	<u>Percent increase</u>
<u>Hospitals</u>										
Tampa	\$ 665,000	11	\$ 49,052	7.4	13.5	22.0	8.5	13	\$ 81,673	12.3
San Antonio	995,000	17	121,865	12.2	15.0	32.5	17.5	13	164,866	16.6
San Diego	1,258,770	5	114,549	9.1	10.5	19.0	8.5	24	76,198	6.1
Los Angeles:										
Phase 1	497,970	9	94,245	18.9	3.5	11.0	7.5	7	87,632	17.6
Phase 2	2,499,938	8	33,304	1.3	10.5	13.0	2.5	17	178,527	7.1
<u>Nursing homes</u>										
Jackson	152,237	4	13,458	8.8	8.5	11.5	3.0	1	1,128	.7
Phoenix	272,274	16	12,077	4.4	15.0	15.5	.5	8	22,907	8.4
Sepulveda	230,835	5	6,163	2.7	9.5	9.5	-	1	(2,470)	(1.1)
<u>Other</u>										
Houston	309,700	4	(1,676)	(.5)	12.0	31.5	19.5	3	2,086	.7
Phoenix	509,600	10	136,298	26.7	14.0	32.5	18.5	22	198,056	38.9
Total	<u>\$7,391,324</u>	<u>89</u>	<u>\$579,335</u>	<u>7.8</u>	<u>112.0</u>	<u>198.0</u>	<u>86.0</u>	<u>109</u>	<u>\$810,604</u>	<u>11.0</u>

- At the beginning of the final design phase for the San Diego hospital, DM&S requested that an automated system be included to transport food and supplies. A modification was issued for \$63,504. However, after spending \$21,000 to develop this new system, DM&S determined the system would be too expensive and would not efficiently fit into the hospital. At the second review of the working drawings, DM&S requested the automated system to be deleted and the standard manual transport system be used. This redesign cost VA \$75,609.
- During the second review of the working drawings for the Tampa hospital, DM&S requested that a five-bed coronary care unit be included in the sixth floor nursing unit. This modification cost VA \$3,628. Later, when the working drawings were 80-percent complete, DM&S requested this coronary care unit be moved to the special care nursing unit on the same floor. This redesign cost \$10,000.
- During the third review of the working drawings for the Phoenix nursing home, patient lockers were increased in size from 12" x 24" to 24" x 24". This modification cost VA \$553.
- During the final review of the working drawings for the San Antonio hospital, DM&S requested changes in the dental and animal research areas and the addition of an inter-com/paging system. This modification cost VA \$2,240.
- After final design was begun on the Phoenix hospital addition project, DM&S determined that the hospital's existing surgical suite would not meet the space requirements for a new residency training program. DM&S requested the A/E firm to include a modern surgical suite in the new building. This modification cost VA \$51,100 and delayed completion of the working drawings about 6 months.
- During final design of the Jackson nursing home project a waiting room was added, a passenger unloading area was deleted, and the parking areas were revised. This modification cost VA \$2,662.

Modifications caused by  
inadequate data package

VA provides the A/E firm a data package to use during the final design phase. The data package consists of (1) the architectural and engineering preliminary plans which the A/E firm should be able to use, without any significant changes, to develop the working drawings and (2) VA construction standards and

specifications. However, as shown in the following examples, VA's failure to provide complete data packages caused modifications to some A/E contracts.

- VA failed to include some equipment drawings in the original A/E package for the San Antonio hospital. As a result, design changes were necessary in the following areas: physical medicine and rehabilitation, psychiatric research, pathology, and oral research. In addition, VA added a requirement for a respiratory failure unit and relocated the kidney failure unit. The design changes and addition cost VA \$13,246.
- VA failed to include construction standards and specifications for exterior walls in the A/E package for the Sepulveda nursing home. As a result, the A/E firm developed its own exterior design. However, VA found this unacceptable and issued a modification to design the exterior walls to its standard. The redesign cost VA \$3,666.
- VA failed to furnish accurate dimensions for a stair and elevator tower that joined the Phoenix nursing home to the hospital. As instructed, the A/E firm designed the nursing home so that it could be joined with a stair and elevator tower by separate project. However, during the development of working drawings for the tower, it became apparent that the dimensions VA had furnished were incorrect. After VA corrected the dimensions, the A/E firm had to redesign the nursing home so that it would be properly joined to the tower. The redesign cost VA \$3,127.

Changes to construction contracts  
added cost to projects

Changes to the VA medical facility construction contracts we reviewed added an average of about 7 percent to the cost of those contracts. More changes were made to hospital construction contracts than to other projects. Table 3 shows the number and amount of change orders VA issued to the construction contracts we reviewed. We classified change orders into three broad categories--(1) VA-initiated changes, (2) changes caused by design errors or omissions, and (3) changes that were the result of uncontrollable acts, such as strikes or floods. The distinction between the two predominant categories involved whether the change order was carried out to provide VA with particular features it wanted within the facility (VA-initiated) or whether the change order was required to provide VA with a fully functional facility (design errors and omissions).

Table 3Changes to Construction Contracts  
on Projects Reviewed by GAO

<u>Project</u>	<u>Original construction contract</u>	<u>Change orders issued</u>		
		<u>Number</u>	<u>Amount</u>	<u>Percent increase</u>
<u>Hospitals</u>				
Tampa	\$ 19,557,300	186	\$ 2,105,094	10.8
San Antonio	31,993,000	249	1,986,054	6.2
San Diego	34,523,000	318	739,254	2.1
Los Angeles:				
Phase I	12,617,500	23	1,883,278	14.9
Phase II	<u>59,333,000</u>	<u>368</u>	<u>5,726,623</u>	<u>9.7</u>
	<u>\$158,023,800</u>	<u>1,144</u>	<u>\$12,440,303</u>	<u>7.9</u>
<u>Nursing homes</u>				
Jackson	\$ 3,008,000	39	\$48,352	1.6
Phoenix	3,754,000	97	29,240	.8
Sepulveda	3,080,579	38	22,827	.7
Long Beach	<u>2,812,890</u>	<u>97</u>	<u>114,944</u>	<u>4.1</u>
	<u>\$ 12,655,469</u>	<u>271</u>	<u>\$215,363</u>	<u>1.7</u>
<u>Other</u>				
Houston	\$ 4,460,000	86	\$154,983	3.5
Phoenix	<u>17,970,000</u>	<u>346</u>	<u>524,640</u>	<u>2.9</u>
	<u>\$ 22,430,000</u>	<u>432</u>	<u>\$679,623</u>	<u>3.0</u>
Total	<u>\$193,109,269</u>	<u>1,847</u>	<u>\$13,335,289</u>	<u>6.9</u>

Unlike VA-initiated changes, orders caused by design errors and omissions are necessary if the facility is to function as originally intended. For example, changes were needed in the mechanical systems for the Los Angeles hospital due to numerous errors and omissions in the mechanical drawings. If these changes had not been made the mechanical systems would have malfunctioned, seriously affecting VA's ability to operate the hospital. Change orders caused by design errors and omissions averaged about 2 percent of original cost for the contracts we reviewed.

We analyzed the 1,847 change orders to determine the causes of the changes and their impact on construction costs. Tables 4 through 6, on pages 14 through 16, show the results of our analysis.

VA issued change orders mostly  
to incorporate changes  
requested by DM&S

VA-initiated changes were usually requested by DM&S to alter the medical features within the facility. The following are examples of changes which were requested by medical and ancillary services personnel at the site and by central office personnel. Changes requested at the site are made through the hospital director and may or may not be submitted to DM&S headquarters. The procedure followed depends upon the nature and size of the change requested.

- Two automatic doors were included in the original design of the Jackson nursing home, but later in the design process were eliminated as an economy measure over the objections of the hospital director. During the construction phase, VA issued a change order for \$17,072 to purchase and install the automatic doors.
- In the Houston research and education facility, the design for the basement area where the x-ray rooms were to be located was developed using space criteria based on specific planning data. However, the radiology staff at the site wanted the most up-to-date equipment to be installed. Therefore, VA issued a \$15,138 change order to change the existing layout to a floor plan that would accommodate any x-ray equipment which would be selected later in the project.
- The Los Angeles replacement hospital's supply service unit modified requirements for the film processor utility area which required replacement of equipment and changes to walls, doors, plumbing fixtures, and electrical outlets. VA issued a \$10,729 change order to meet the modified requirements.

- The surgical staff at the Los Angeles hospital requested that larger intercom boxes be installed in the surgical suites. VA issued a change order for \$778. The surgical staff also requested that the x-ray film illuminators be lowered from a height of 5 feet to 4 feet. VA issued a change order for \$27,815 to make this change.
- Maintenance personnel at the Los Angeles hospital requested that copper pipe be used instead of black steel pipe in certain areas to lower maintenance costs. VA issued a change order for \$40,414 for this change.
- VA central office ordered two changes for \$31,894 to purchase and install a sign to identify the Los Angeles facility as a VA hospital. The construction contractor entered into subcontracts to have the sign manufactured and installed.

Table 4

Causes of Change Orders  
on Projects Reviewed by GAO

<u>Reason for change order</u>	<u>Number</u>	<u>Percent of total</u>	<u>Amount</u>	<u>Percent of total</u>
VA-initiated	1,131	61.23	\$ 9,714,226	72.85
Design error or omission	713	38.60	3,618,487	27.13
Uncontrollable acts	<u>3</u>	.17	<u>2,576</u>	.02
Total	<u>1,847</u>		<u>\$13,335,289</u>	

Table 5VA-initiated Changes to Construction  
Contracts Reviewed by GAO

<u>Project</u>	<u>Number of changes</u>	<u>Percent of total</u>	<u>Cost of changes</u>	<u>Percent of total</u>
<u>Hospitals</u>				
Tampa	136	12.0	\$2,013,851	20.7
San Antonio	167	14.8	1,699,765	17.5
San Diego	88	7.8	312,162	3.2
Los Angeles	<u>179</u>	<u>15.8</u>	<u>4,990,761</u>	<u>51.4</u>
	<u>570</u>	<u>50.4</u>	<u>\$9,016,539</u>	<u>92.8</u>
<u>Nursing homes</u>				
Jackson	29	2.5	\$ 38,578	.4
Phoenix	72	6.4	15,032	.2
Sepulveda	25	2.2	5,070	.1
Long Beach	<u>64</u>	<u>5.7</u>	<u>56,236</u>	<u>.6</u>
	<u>190</u>	<u>16.8</u>	<u>\$ 114,916</u>	<u>1.2</u>
<u>Other</u>				
Houston	42	3.7	\$ 77,596	.8
Phoenix	<u>329</u>	<u>29.1</u>	<u>505,174</u>	<u>5.2</u>
	<u>371</u>	<u>32.8</u>	<u>\$ 582,770</u>	<u>6.0</u>
Total	<u><u>1,131</u></u>	<u><u>100.0</u></u>	<u><u>\$9,714,225</u></u>	<u><u>100.0</u></u>

Table 6

Changes to Construction Contracts  
Reviewed by GAO Caused by  
Design Errors and Omissions

<u>Project</u>	<u>Number of changes</u>	<u>Percent of total</u>	<u>Cost of changes</u>	<u>Percent of total</u>
<u>Hospitals</u>				
Tampa	47	6.6	\$ 88,666	2.5
San Antonio	82	11.5	286,289	7.9
San Diego	230	32.3	427,092	11.8
Los Angeles	<u>212</u>	<u>29.7</u>	<u>2,619,140</u>	<u>72.4</u>
	<u>571</u>	<u>80.1</u>	<u>\$3,421,187</u>	<u>94.6</u>
<u>Nursing homes</u>				
Jackson	10	1.4	\$ 9,775	.3
Phoenix	25	3.5	14,208	.4
Sepulveda	13	1.8	17,756	.5
Long Beach	<u>33</u>	<u>4.6</u>	<u>58,708</u>	<u>1.6</u>
	<u>81</u>	<u>11.3</u>	<u>\$ 100,447</u>	<u>2.8</u>
<u>Other</u>				
Houston	44	6.2	\$ 77,386	2.1
Phoenix	<u>17</u>	<u>2.4</u>	<u>19,466</u>	<u>.5</u>
	<u>61</u>	<u>8.6</u>	<u>\$ 96,852</u>	<u>2.6</u>
Total	<u>713</u>	<u>100.0</u>	<u>\$3,618,486</u>	<u>100.0</u>