REPORT OF THE COMPTROLLER GENERAL OF THE UNITED STATES

Use Of New Construction Method On Federal Projects At Three Agencies Can Be Improved

Under conventional construction, the Federal agency hires an architect to design the building. Once the design is completed, a general contractor is hired to construct the building. The agency's in-house staff supervises the design and construction.

Under the construction manager and phased construction method, a construction manager is hired as a consultant on the design and as the manager of the construction. To reduce the design and construction time, construction contracts are awarded as phases of the building are designed rather than after all design is completed.

The Department of Health, Education, and Welfare; General Services Administration; and Veterans Administration have had mixed success in

- reduced design and construction time frames, and
- increased value management savings.

Also the agencies should be working together, rather than independently, to develop and implement uniform guidance for selecting construction managers and identifying the projects most suitable for use of these techniques.

LCD-77-348

OCTOBER 26, 1977

COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

B-118623

The Honorable Norman Y. Mineta, Chairman
Subcommittee on Public Buildings and
Grounds
Committee on Public Works and
Transportation
House of Representatives

Dear Mr. Chairman:

Your letter of May 5, 1975, requested that we compare the cost of conventional construction and phased construction. Subsequently your request was modified to include the use of construction managers in conjunction with phased construction.

This report discusses the Federal agencies' problems and accomplishments in the initial applications of construction managers and phased construction and the improvements needed in agencies' guidelines for the use of those techniques.

As arranged with your Committee we are sending copies of this report to the Honorable Ray Roberts. Subsequent distribution of this report will be made to other interested parties 1 day from the date of the report. Copies will be made available to others upon request.

Sincerely yours,

R.F. Keller

ACTING Comptroller General
of the United States

COMPTROLLER GENERAL'S REPORT TO THE SUBCOMMITTEE ON PUBLIC BUILDINGS AND GROUNDS HOUSE COMMITTEE ON PUBLIC WORKS AND TRANSPORTATION

USE OF NEW CONSTRUCTION METHOD ON FEDERAL PROJECTS AT THREE AGENCIES CAN BE IMPROVED

D I G E S T

GAO compared routine, conventional construction and phased construction at the Department of Health, Education, and Welfare (HEW), the General Services Administration, and the Veterans's Administration (VA). The agencies use phased construction in different ways and have inadequate controls to make sure construction managers are properly selected.

Under conventional construction, the Federal agency hires an architect to design the building. Once the design is completed, a general contractor is hired to construct the building. The agency's in-house staff supervises the design and construction.

Under the construction manager and phased construction method, a construction manager is hired as a consultant on the design and as the manager of the construction. To reduce the design and construction time, construction contracts are awarded as phases of the building are designed rather than after all design is completed.

In 1975 the three agencies completed a combined total of 10 projects and were working on 33 projects which had been or were using the construction manager, phased construction method. GAO compared nine of these projects, estimated to cost $272 million, with seven conventionally constructed projects, estimated to cost $207 million. The General Services projects selected were Federal office buildings. HEW's were schools, and VA's were hospitals.

Because of differences in projects' purposes, designs, locations, economic conditions at the time and place of construction, and other

factors, a direct comparison of the construction methods would not prove which was less costly. (See p. 5.)

How was the comparison made? GAO developed data on the planned and actual costs of site acquisition, design, and construction and on the planned and actual times for completing the 16 projects. (See apps. V to XX.) Further, GAO attempted to determine benefits and problems in using the new method and reviewed the agencies' management procedures and practices when using construction managers and phased construction.

Federal agencies' use of the new method started in the 1970s. It has been used longer in private industry, although views on the success of the method there vary. (See p. 4.)

General Services, HEW, and VA used different criteria for determining which projects should use the construction manager, phased construction method. These agencies were using construction managers without evaluating their effect on workloads. (See p. 6.)

The three agencies have had mixed success with the new method. Design and construction time was reduced on three of the nine construction manager, phased construction projects reviewed and reduced somewhat on one other. However, for the remaining projects, design and construction overlapped little and, therefore, caused little or no time savings. (See p. 7.)

The agencies claimed value management (systematic effort to achieve more economical and effective project design) savings on several projects. The savings may or may not be attributable to the construction managers. On four projects, possible savings were reduced because the construction managers were hired after design was partially completed. (See p. 13.)

Construction authorities in the Government and private industry generally agree that selecting

qualified construction managers is crucial to projects. The three agencies' procedures for selecting construction managers were not consistent. Construction managers were selected on the basis of varying professional and experience criteria, limited background evaluation, and minimal checks on prior Federal performance. (See p. 19.)

General Services has a program for evaluating and documenting construction managers' performances, but these procedures were not always followed. HEW and VA had no such programs. (See p. 23.)

The use of construction managers and phased construction can result in savings sometimes. However, because of risks, care must be taken in deciding which construction projects will use this technique.

Federal agencies should be working together, rather than independently, to develop and use criteria for selecting and using construction managers. Federal agencies will not achieve the most effective use and benefits of construction managers until standard policies and procedures on selecting and using construction managers are developed and implemented through the Federal Procurement Regulations.

GAO recommends that the Administrator of General Services, with HEW, VA, and other agencies using construction managers and phased construction, develop procedures to be included in the Federal Procurement Regulations. Such guidelines should show how to identify the (1) projects most suitable for the use of phased construction and (2) criteria to use in selecting and evaluating construction managers. (See p. 26.)

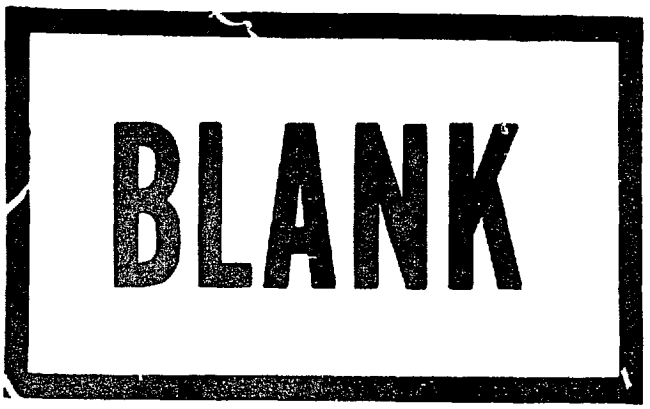
The agencies generally agreed with the conclusions and recommendation in the report. (See apps. II, III, and IV.)

BLANK

Contents

ABBREVIATIONS

FOB	Federal office building
GAO	General Accounting Office
GSA	General Services Administration
HEW	Department of Health, Education, and Welfare
VA	Veterans Administration


BLANK

CHAPTER 1

INTRODUCTION

The Chairman, House Subcommittee on Public Buildings and Grounds, Committee on Public Works and Transportation, requested us to review the General Services Administration's (GSA's) construction costs. Specifically, he requested a comparison of the costs of routine, direct Federal construction and "fast track," or phased construction. Subsequently, the subcommittee asked us to expand our review to cover Federal agencies' use of construction managers in conjunction with phased construction.

In developing the data needed to make a comparison of routine and phased construction, we found that many problems existed which precluded our making a valid quantitative comparison of the costs of direct Federal construction and phased construction. Such problems included differences in planned uses of buildings, design features, geographical locations, climate, building sites, and national and local economic conditions.

As a result, we subsequently agreed with the subcommittee to review 16 Federal building projects managed by GSA; the Department of Health, Education, and Welfare (HEW); and the Veterans Administration (VA); to provide detailed information concerning the

--scheduled time for design and construction, the project's current progress, and estimated or actual completion dates;

--costs related to the site, design, agency overhead, construction contracts, and the construction manager;

--selected agencies' management practices and procedures in using construction managers and phased construction; and

--use of construction managers and phased construction in the private sector.

BACKGROUND

In the late 1960s, with costs escalating, Federal construction agencies encountered a serious cost-budgetary squeeze. Efforts were increased to find new and better ways to enhance the efficiency and effectiveness of the construction process. Prior to the 1970s Federal agencies used the

conventional lump-sum method of contracting for the construction of buildings. Under this method, they would contract with architects to completely design the buildings, including preparation of detailed prescriptive specifications. Construction contracts were formally advertised and normally provided for the submission of lump-sum bids by general construction contractors for each entire building. The buildings were constructed in accordance with the architects' detailed specifications.

During this period agencies began looking for ways to improve their contracting. For example, GSA's Public Buildings Service, which is responsible for the design and construction of most civilian Federal buildings in the United States, undertook a study of its existing construction contracting procedures and practices. The GSA study report, issued in 1970, indicated that the Public Buildings Service did not follow a course of action comparable to that taken by private industry and commercial builders who had attacked the problem of rising costs by adopting new practices which supposedly reduced design and construction time and maxized the use of other cost-saving techniques. The study report also stated that the sequential method of contracting, then being used by GSA, was resulting in an inordinate amount of time for designing and constructing major building projects compared to similar projects in the private sector.

The recommendations made in the report included the use of a construction manager system (including phasing) for multistory office buildings, complex design projects, and other projects expected to cost over $5 million.

The construction manager system entails two major changes from the traditional approach. These are the

--overlapping of the planning, design, and construction in phases; and

--use of a construction manager as an agent of the owner.

Generally, we found that the Federal agencies employing these techniques utilized them jointly. We were informed, however, that their joint use is not necessary and our sample of 16 projects included a project where phasing was used without having a construction manager on the project.

Construction management

The essence of the concept of construction management centers around the introduction of a construction manager as the owner's agent and manager of the entire building process. This approach, involving the combined and coordinated efforts of the construction manager, architect, and owner, is sometimes referred to as the "team approach." Under this approach. resources are available which allow the architect to foresee the cost consequences of his design decisions. At the same time, the owner is made more aware of the cost and aesthetic trade-offs.

According to a GSA publication the construction manager will

--furnish the architect with information and recommendations on construction technology and market conditions to insure that the design stays within the budget;

--control project scheduling;

--manage the procurement effort;

--superintend and inspect the construction;

--provide a wide range of project support services; and

--provide value management. also known as value engineering, service.

Since the construction manager has overall project management responsibility, there is no general contractor on the project.

Phased design and construction

When the conventional design and construction process is used, an entire building is designed before construction begins. Under the phased design and construction process, phases of a project are designed and construction starts on these phases while other phases are still under design. Thus the principal claimed benefits accrue from the overall time savings from the start of design to completion of construction with a parallel reduction of costs. Cost reduction, according to GSA, accrues from the

--reduced project exposure to escalating market costs and

--significant savings in interim rental and financing costs.

Application in the non-Federal sector

We inquired into the use of construction managers and phased construction in non-Federal public and private construction. We contacted public officials on the State and local levels, private owners, architect-engineers, construction managers, contractors, subcontractors, and professional and trade organizations. We discussed with appropriate officials their organizations' experience with building construction using either the construction manager and phasing method or the traditional method.

Our discussions revealed that the use of construction managers and phasing is not new; however, its definition and application, in particular, are subject to widely divergent views. The results of our discussions indicated that the use of construction managers and phasing as a management concept is undergoing an evolutionary period in which each user adopts and adapts a version the user believes is suitable to user needs. We have incorporated the results of our discussions where appropriate in the body of this report.

SCOPE OF REVIEW

Our review at GSA, VA, and HEW was directed toward determining each agency's experience with the use of construction managers and phasing. We reviewed project records on 16 projects and held discussions with appropriate agency officials. We examined the contracting techniques and information used by the Federal agencies in applying the technique.

We also gathered data from several State and local governments, professional organizations, private construction firms, architect-engineers, construction managers, and private owners pertaining to the use of construction managers and phased construction.

CHAPTER 2

RESULTS OF USE OF CONSTRUCTION MANAGERS AND PHASED CONSTRUCTION ON SELECTED PROJECTS

We found that because of differences in construction projects' purposes, designs, geographical locations, economic conditions at the time and place of construction, and other factors, a direct comparison of the cost of conventionally constructed buildings and those constructed using construction managers and phased construction would not prove which of the methods was least costly. However, in view of the subcommittee's interest, we reviewed how HEW, GSA, and VA were deciding which construction method to use and the benefits obtained, or problems encountered, in using the construction manager and phased construction method.

We found that GSA, HEW, and VA used different criteria for determining which projects should be acquired through the use of the construction manager, phasing method. Further, these agencies were using construction managers without evaluating the effect such use had on their workloads.

Our review indicated that the three agencies have had mixed success with the construction manager, phased construction method. Design and construction time was reduced on three of the nine construction manager, phased construction projects reviewed, and reduced somewhat on one other such project. However, for the five remaining projects, the agencies experienced little or no overlapping of design and construction and therefore little or no time savings. Further, the agencies claimed value management savings on a number of these projects. However, we were unable to determine whether the savings were attributable to actions of the construction manager.

PROBLEMS IN PROJECT-TO-PROJECT COMPARISONS WHICH PREVENT DETERMINING LEAST COSTLY METHOD

A quantitative cost comparison of the construction manager phasing approach versus the conventional approach of building construction will not prove which approach is the least costly because of the

- --differences in functional purposes and uses of buildings (e.g., hospitals versus office buildings);
- --differences in the makeup and design of buildings (i.e., concrete versus steel. and single story versus multistory), and the geographical sources of materials used;

--national and local economic conditions existing at the time of construction and their related effect on competition, availability of materials, and price of materials;

--differences in geographical locations and climate which affect building design and construction operations;

--differences in building sites and in access to building sites which may ease or hinder construction operations;

--differences in the length of time spent on any given project awaiting funding; and

--general lack of agency records showing specific overhead costs applied to individual construction projects.

AGENCIES' CRITERIA FOR USING CONSTRUCTION MANAGERS

Within the Government, the agencies have established different criteria for using a construction manager on a specific project. GSA permits their use on all building projects estimated to cost $5 million or more. Generally, HEW uses a construction manager on new, direct, federally funded projects as well as on repairs and renovations to existing facilities. The decision to use a construction manager is based on the characteristics of each project without regard to specific dollar criteria. VA does not have formally established criteria. Generally, a construction manager is used only during design and serves primarily as a consultant.

Agencies have not determined effect on internal workload

The agencies have not fully determined the effect on their administrative staff when a construction manager is used instead of awarding a conventional construction contract. Generally, the use of a construction manager requires additional effort on the part of agency administrative staff because of the increased number of contracts which require preparation of contract packages, processing payments, and processing change orders.

GSA officials claimed that the use of construction managers results in some agency manpower savings. Without the

construction manager's services they estimated at least several additional GSA engineers would have been required at the job site to administer the project.

However, HEW's region 9 supplied us specific information on the differences in agency administrative requirements between the construction manager, phasing method and the conventional method. The work models for the two methods showed that the construction manager, phasing method projects required 57 percent more staffing, as follows:

Type project	Manhours (note a)
Conventional	1,724
Construction manager	2,712

[a/] Based on projects with an average cost of $7.5 million.

An HEW official said many project work elements performed by HEW staff for conventional projects increase on construction manager projects because they are more complicated than conventional projects.

Some HEW officials commented that the use of a construction manager requires more fieldwork in the form of site visits, job conferences, and other coordination activities among the construction manager, architect-engineer, and agency.

TIME SAVINGS NOT ALWAYS OBTAINED

We examined 10 projects which employed phased construction to determine whether the planned design and construction overlaps had been realized. On one of these projects, the VA hospital in Los Angeles, no construction manager was employed, but a significant overlap of design and construction occurred. Three of the nine projects on which construction managers were used achieved substantial overlap of design and construction. However, for five of the projects, the time overlap was minimal or zero since construction did not start until after the design was completed. The remaining project had some overlap but the construction manager was employed only during design.

The following table sets out the information obtained on the 10 projects.

Overlap of Design and Construction on Selected Projects

	Date construction started	Date design finished	Time overlap (note a)	Total project design and construction	Percent of overlap to total project time (note b)
			(months)	(months)	
Ann Arbor Federal Building (note c)	8-11-75	12-31-74	0	41	0
Columbus	3-17-75	10-29-74	0	42	0
Winston Salem	4-23-74	8-2-74	3	67	4
Federal Home Loan Bank Board Building	1-28-75	11-75	9	44	21
Topeka	6-26-75	2-17-76	7.5	30	25
Ft. Huachuca School	8-29-72	7-12-72	0	38	0
Ft. Rucker School	7-5-72	7-72	0	24	0
Bronx Hospital	7-10-74	2-1-75	7	66	11
Loma Linda Hospital (note d)	6-4-74	2-26-75	9	64	14
Los Angeles Hospital (note e)	7-10-73	6-25-74	12	53	23

a/ Construction overlap only. Does not include time saved by the advertising of the bid packages and preparing the contracts.

b/ Total time frame is the period from design start to construction completion.

c/ Construction manager's contract was terminated after it became apparent design and construction would not overlap.

d/ Construction manager was used only during design.

e/ Phased construction was used although no construction manager was employed.

Lack of authority to build on site prevents phased construction

Early access to the project site is a most important criterion for any project employing phased construction. Delays in initial construction phases result in reductions in the design and construction overlaps and the resultant time savings. Delays in site access can be the result of widely divergent causes, some of which are discussed below.

Delays encountered in obtaining authority to build on the sites for the GSA projects at Columbus, Ohio, and Ann Arbor, Michigan, eliminated the planned overlap between design and construction. As a result, no savings in project time materialized.

Ann Arbor, Michigan

GSA planned to use the construction manager, phasing method approach on the Ann Arbor project. However, GSA terminated the construction manager contract on February 6, 1974, and gave as the reason:

> "***the estimated site availability is now later than the scheduled completion of all design documents, which eliminates the advantages of fast tracking by separate contracts (i.e., phasing construction) that we had envisioned at the time of award of this contract."

The site acquisition was delayed significantly by a decision to expand the site, court-ordered delays in evicting occupants on the property, and delayed submission of an environmental impact statement. Problems were created by court-ordered delays to allow occupants on acquired land to find suitable living quarters. Condemnation action for this land was filed on October 24, 1974, and the court ordered the occupants to vacate the site by June 14, 1975. GSA obtained the site on June 16, 1975. The design was completed on December 30, 1974, about 6 months prior to GSA's obtaining possession of the site. Delays were also encountered in preparing an environmental impact statement. The causes of the delay in preparing the statement were not stated. The overall delay for site acquisition was 16 months.

Columbus, Ohio

On the Columbus project, the construction manager told GSA that the anticipated time savings from using phased construction would be about 2 months and that the site

acquisition date, assumed to be August 15, 1974, was critical. The actual site acquisition date was March 5, 1975, or 6-1/2 months later. The delay on site acquisition prevented any time savings from phased construction as the design was completed on October 29, 1974. The site acquisition delay was caused primarily by the time required for the environmental impact statement. GSA could take no formal action to award construction contracts sooner then 30 calendar days after the final statement had been submitted, on September 20, 1974, to the Council on Environmental Quality. This delay insured that construction could not begin until at least 2 months after the assumed site acquisition date, and the projected 2-month savings from phased construction was impossible to attain.

On October 21, 1974, GSA advised the occupants to vacate the property. GSA did not receive legal title until March 1975, and construction began the same month.

GSA retained the construction manager although the advantages of phased construction were lost.

GSA also used the construction manager, phasing method on the construction of the Federal Home Loan Bank Board Building in Washington, D.C. However, GSA had to terminate the original construction manager because a lawsuit delayed the start of construction. The lawsuit, which attempted to save a historical building located on the construction site, lasted for 6 months. GSA determined that termination was the least costly approach and terminated the contract on June 3, 1974, or about 3 months after the lawsuit began. A second construction manager was hired on October 5, 1974.

Late decision to use phasing reduces benefits

Because GSA's decision to use the construction manager, phasing method was not made until late in the project, construction and design did not significantly overlap on the Winston-Salem project.

Design began on the building in October 1970. On April 19, 1973, the Assistant Commissioner for Construction Management requested authority to use the construction manager, phasing method. The request stated that the project was part of the purchase contract program and use of the phased construction and construction management techniques was requested to save time and cost. The request was approved on April 20, 1973, and on the same day, GSA's region 4 was authorized to issue invitations for preliminary proposals for construction management services.

According to a region 4 official, there was no need for construction manager services on the project because the design phase had been substantially completed prior to award of the construction manager's contract. The construction started in April 1974, and final design was completed in August 1974. The use of phasing resulted in an amendment to the architect-engineers contract of about $95,000 for redesign to permit multiple construction contracts. Thus, a 7-month design delay was caused partly by hiring the construction manager.

Use of guaranteed maximum price inhibits phased construction

On the HEW projects there was no overlap between design and construction primarily because HEW requires a guaranteed maximum price from the construction manager. HEW requires the guaranteed maximum price to assure that the construction costs will not exceed the budget and to place responsibility for cost overruns on the construction manager. The guaranteed maximum price is established as of a specific date for then-approved design drawings and specifications. Generally, design work has progressed enough to allow the construction manager to determine the bid packages and obtain bids on enough of the work to provide a guaranteed maximum price proposal.

The guaranteed maximum price is similar to the general contractor's lump sum contract price for construction. Both are a total price for construction agreed to by a party responsible for managing the construction. The price may be revised by change orders and include contingency amounts. Since the guaranteed maximum price is not established until the design is almost complete, it reduces greatly the possibility for phased construction time savings. The construction manager would have to add a large contingency factor if the price were established early in the design process.

The guaranteed maximum price for the Fort Huachuca school was not established until June 22, 1972, when the design was 80-percent complete. As the design was completed by July 12, 1972, the maximum amount of overlap possible between design and construction was about 1 month. Construction did not start until August 29, 1972. An HEW report on cost reduction stated that because a construction manager was used, construction was started 5 months sooner than it would have been under conventional methods. This report did not specifically identify how the time was saved.

The guaranteed maximum price for the Fort Rucker School was not established until June 26, 1972, when the design was over 90-percent complete. The plans and specifications were completed and construction started July 5, 1972.

On both of these projects, the primary time savings would appear to be the advertising for bids and completion of administrative work in getting the guaranteed maximum price while the design was being completed. Construction could begin only after the guaranteed maximum price was established.

CONCLUSIONS

We believe that the early project planning of any agency anticipating use of phased construction should systematically evaluate the factors which will affect the realization of the theoretical benefits. Even if the initial decision to use phasing is based on a realistic analysis and comparison, subsequent events can change these relationships. Therefore, we believe that the following are some of the factors whose uncertainty should be of concern when plans are made to employ phasing.

Based on GSA's experience with the Federal Office Buildings at Ann Arbor, Michigan, and Columbus, Ohio, we believe that either the site should be acquired and authority to construct be obtained or the project be subjected to, and project records reflect, an analysis identifying potential delay factors before the final decision is made to use a construction manager and phased construction. As we have pointed out, time savings obtainable from phased construction may be eliminated by delays in site acquisition and removing occupants from a planned site or in obtaining final approval of the environmental impact statement.

Moreover, because of the multiplicity of other factors which may have an impact on the timely completion of design and site acquisition, particular consideration must be given to their possible impact on the use of phased construction. For example, the requirements to conform to urban renewal plans, preserve historic buildings, or changes in the tenants plans for the building could all significantly have an impact on phasing.

We believe the guaranteed maximum price, as employed by HEW, precludes the full benefits of phased construction. In return, however, HEW has some assurance that the construction manager, because of his financial liability, will strive to complete the project on time and within the budget. In

our opinion, this assurance differs little from that of a general contractor.

EXTENT OF VALUE MANAGEMENT SAVINGS DUE TO CONSTRUCTION MANAGERS UNKNOWN

A primary reason for using a construction manager during the early design phase is to encourage the manager to suggest changes in the design to eliminate or modify any requirements found to be in excess of actual needs as well as to assure that the latest developments and techniques available to industry are used in the design.

The construction manager is also expected to undertake a continuous value management effort in all phases of the construction project. The principal goal of a value management project requirement is to realize the potentialities of value management at a time when it will do the most good, that is, in the initial stages of the planning, design, and construction cycle.

GSA claimed significant savings from value management over the past 2 years, but did not identify who was responsible for such savings. GSA records show that the value management contributions for projects are generally made during workshops attended by both the construction manager and the architect-engineer. We found it impossible to determine whether the construction manager or the architect-engineer was responsible for the savings. The following is GSA's total claimed value management savings attributable to the joint efforts on the GSA projects we examined.

Project	Savings
Ann Arbor, Michigan, Federal Office Building (FOB)	$ 199,900
Columbus, Ohio, FOB	732,200
Topeka, Kansas, FOB	1,119,700
Winston Salem, N.C., FOB	860,300
Federal Home Loan Bank Board Building, Washington, D.C.	3,637,800
Total	$6,549,900

HEW could identify value management savings on only one project. A cost reduction of $404,200 on the Fort Huachuca School was attributed to construction manager instigated changes and an additional savings of $107,000 was attributed to joint efforts by HEW, architect-engineer, and construction manager. An HEW report attributed the

$404,200 reduction in cost to various changes in types of materials. The $107,000 reduction was not described in detail.

Late start by construction managers may reduce value management contributions

On several projects the construction manager was not employed until the design had been underway for some time, thereby inhibiting his opportunity to contribute during the early design period. Both GSA and HEW believe that a construction manager should be employed at the beginning of design in order to attain the most benefit. According to the GSA publication "Using Construction Management For Public and Institutional Facilities,"[1/] "Construction management yields its greatest benefits when it is initiated at or even before the start of the design phase."

HEW's technical handbook states that "The Construction Manager should be employed at an early state of a project * * *" and "The most appropriate time for selection of the Construction Manager is simultaneously with the selection of the project architect or immediately afterwards."

VA uses a construction manager only during the design phase to provide technical expertise.

As discussed below, we found on four of the nine projects reviewed that the construction manager was hired after the design phase had been underway for 11 to 34 months.

Winston-Salem Federal Office Building

On this project, the construction manager was not hired until the design plans were basically complete. The construction manager was hired on July 25, 1973, while the architect-engineer started the design on October 13, 1970, about 34 months earlier. In an April 1973 request to use a construction manager, GSA stated that the use of phased construction and construction management techniques would save time and cost.

GSA could not identify any dollar savings attributable to the construction manager but project records indicated the construction manager saved 3 weeks on pile installation by recommending the use of a certain type of cement.

[1/] Public Technology Inc., March 1976, p. 25.

As discussed on page 10, the use of a construction manager and phased construction after the design was underway may have contributed to the 4-month overlap between design and construction. However, the overlap of design and construction was more than offset by the 7-month design delay caused partly by hiring a construction manager. In addition, about $95,000 in added architect-engineer costs resulted from the phasing.

Fort Rucker School

HEW did not originally plan to use a construction manager because construction funds were not expected to be available for a year or more. In March 1972, construction funds unexpectedly became available and had to be obligated before the end of the fiscal year. HEW decided that using a construction manager was the only feasible way to get a construction contract signed. The construction manager was hired on May 16, 1972, about 11 months after the architect-engineer began design on June 22, 1971.

HEW officials stated that the design effort, which was at the schematic and basic floor plan stage when construction funds became available, was not far enough advanced to preclude benefits from the construction manager's value management. They believe the construction manager made significant value management contributions regarding materials availability and costs and in formulating bid packages, but could not provide estimated savings.

Loma Linda Hospital

The construction manager was hired for the Loma Linda VA Hospital in June 1974 when the design, which had started in May 1972, was about 75 percent completed. The design was completed in February 1975.

The architect-engineer initially considered using a construction manager; however, VA believed the in-house staff was adequate. Subsequently, VA officials hired a construction manager as a consultant during the design phase.

VA did not use the construction manager's suggestions, although considered good by VA officials, because the design was virtually complete. According to a VA official, the construction manager did not reduce project costs or time.

CONCLUSIONS

Agency officials believe the construction managers have provided many value management benefits to the projects. However, on seven of the nine construction manager projects, neither the agency officials nor the records showed specific examples of value management contributions by the construction managers. However, the potential for value management contributions may have been minimized because the construction managers were hired after designs were partially completed on four of the projects.

CHAPTER 3

NEED FOR IMPROVED PROCEDURES FOR SELECTING AND EVALUATING CONSTRUCTION MANAGERS

A program for construction of a facility requires that the agency provide a design professional, usually a contract architect-engineer, and a management professional, either in-house staff or a contract construction manager. The procedures for Federal agencies to use in selecting the design professional have been established through both public law and Federal Procurement Regulations. However, the procedures for selecting the management professional have been established independently by agencies.

The Associated General Contractors has stated that selecting an experienced professional construction manager is crucial for a successful project. For the Federal Government, the following three key elements are involved in the selection and use of construction managers.

--There must be a sufficient number of construction management firms under consideration for the project to assure adequate competition.

--Precontract selection and evaluation procedures must be adequate so as to provide the agency assurance that a qualified construction manager is selected.

--Performance evaluation procedures must be established to provide the agency with assessments of the construction manager's performance.

We found that consistent procedures for selecting construction managers did not exist among the agencies we reviewed. As a result, the agencies were selecting construction managers on the basis of (1) varying criteria, (2) varying background checks of potential contractors and potential project employees, (3) varying requirements for project staffing and (4) minimal records of prior work on Federal projects.

CONSTRUCTION MANAGER COMPETITION APPEARS ADEQUATE

The agencies we reviewed used similar methods to solicit firms interested in providing construction manager services

on specific projects. After initial responses to solicitations are received, the firms are requested to submit information on their backgrounds and qualifications as the first step in the selection process.

The responses to agency requests on the projects we reviewed were as follows:

	Response to "Commerce Business Daily" advertisement or other solicitation	Response to request for background and and qualification information
HEW		
Fort Huachuca School (note a)	40	not available
Fort Rucker School (note a)	50	20
VA		
Bronx Hospital	30	11
Loma Linda Hospital	16	3
GSA		
Federal Home Loan Bank Building	90	22
Winston-Salem FOB (note b)	12	7
Topeka FOB	53	13
Columbus FOB	121	23
Ann Arbor FOB	124	29

a/ May include responses to local advertisements or contacts as well as "Commerce Business Daily" advertisements.

b/ This project was initiated when GSA was using a master list of construction manager firms. Instead of advertising in the "Commerce Business Daily," 480 firms on the master list were sent invitations. Twelve firms responded and seven of these were ultimately requested to submit price proposals.

We believe that a definition of adequate competition for a project is a matter of subjective judgment but that the number of firms competing for awards on the projects we tested was sufficient in our view to provide adequate competition.

CONSTRUCTION MANAGER SELECTION PROCEDURES

Because the construction manager is furnishing professional advice and management, the qualifications and abilities of personnel such as the construction executive and construction superintendent are crucial to the success of the project. An Associated General Contractors publication states that the construction manager should be selected on the

- --basis of an objective analysis of his professional and general contracting qualifications,
- --applicant's record for completing projects on time and within budget,
- --applicant's in-house staff capability and the qualifications of personnel who will manage the project, and
- --applicant's demonstrated ability to work cooperatively with the owner and the architect-engineer throughout the project and to display leadership and initiative as a member of the construction team.

Agencies use of two-step contracting not uniform

HEW, GSA, and VA use a two-step process in selecting a construction manager. In the first step, the agencies ask the firms responding to the solicitation for offers to provide information on prior project experience and qualifications of key personnel for the proposed project.

Generally, the agency chooses a review team of three to five personnel qualified in construction or design to evaluate the firms' qualifications. HEW also includes the owner/user, which may not be HEW, and the project's architect. The team membership usually varies from project to project so that the same personnel are not rating construction manager applicants for all projects. The teams determine the firm's basic eligibility.

The second step varies somewhat by agency. GSA asks several of the most qualified firms to submit price proposals.

These firms are interviewed by the review teams. GSA combines interviews, price proposals, and the original qualifications' rating by a weighting process resulting in the firm with the highest score generally being selected for the contract.

VA's review team interviews at least three of the top-rated firms to obtain information on the firm's approach to the project. After the team evaluates the firm and the staffing, the firm considered best qualified is selected for price negotiation.

HEW requests the top-rated construction manager firms, usually about five, to submit price proposals. The firm submitting the lowest overall price is selected for contract.

We have previously recommended that price be a competitive consideration in the selection of architect-engineers. The scope of this review did not encompass the role of price as a competitive factor in the agencies' procedure for obtaining construction managers' services. However, it appears the procedures employed by GSA and HEW were compatible to our recommendation regarding architect-engineer selection, while VA's procedures were not. Should the use of construction managers continue and expand, we may consider further analysis in this area of the selection process.

Agencies do not always verify construction manager qualifications

Until April 1975, GSA did not require that records be kept to document telephone contacts when references were checked. In April 1975, GSA required that the review team verify, by telephone, references supplied by each firm submitting qualification data and record the findings.

Neither HEW nor VA have a requirement that information supplied by construction manager firms be verified independently and apparently very little, if any, actual verification is made.

VA officials said that verifying a construction manager firm's prior experience is quite difficult and time consuming since owners and architect-engineer firms are reluctant to openly and objectively assess performance.

HEW review teams do not verify the information furnished by construction managers because (1) of a shortage of staff,

(2) construction managers are required to certify to the truthfulness and accuracy of data submitted, and (3) HEW believes its field engineer and the architect-engineer firm can substantiate construction manager submissions.

Agencies' criteria for evaluating construction manager's proposals are inconsistent

HEW, GSA, and VA furnished their proposal review teams areas of qualifications and experience to consider when evaluating the firms submitting proposals.

However, each agency provides somewhat different criteria and has included different definitions of the key elements to be considered. We have grouped these questions into general categories to illustrate the variance between agencies.

Type of information evaluated	GSA	HEW	VA
Construction experience:	Yes		
Private industry	Yes		
Government	Yes		
In specific labor area		Yes	
From design inception to construction completion			Yes
Construction experience in phased design and construction	Yes		Yes
Construction management experience or potential	Yes	Yes	
Construction consultant experience or potential			Yes
Coordination with professionals	Yes		
Experience of personnel to be assigned	Yes		Yes
Number of experienced personnel		Yes	
Other (including, but not limited to surety, financial resources, insurance, workload, references, joint ventures, and associations, depending on the agency)	Yes	Yes	Yes

Using the information outlined above, the GSA review team rates each of the nine categories on a scale of one

to four points. This score is multiplied by an importance factor. After each member separately rates each applicant, average scores are computed.

HEW rates each construction manager's proposal, using a preestablished rating system for five areas. In the San Francisco region, no points were assigned, but a firm was rated either qualified or unqualified in each area. In the Atlanta region, the team assigned points for qualifications.

VA also assigns point scores to individual factors, which are then multiplied by a weighting factor.

Agencies' evaluation of project staffing is not always adequate

Neither GSA's or HEW's evaluation of project staffing was always comprehensive. On the Columbus and Ann Arbor Federal Office Buildings, data in documents furnished by the construction managers before the contract awards failed to describe the personnel's duties and qualifications. The Columbus construction manager subsequently furnished additional data which appears to adequately describe the staff's qualifications. However, the Ann Arbor construction manager did not subsequently furnish the data.

The HEW region which managed the Fort Rucker School required that the names and qualifications of the proposed staff members be shown on the questionnaire submitted during the initial examination. However, the region apparently did not use the information in evaluating the capabilities of the construction manager applicants prior to contract award.

The HEW region which managed the Fort Huachuca School project evaluated the construction manager's staff informally after the contract award because:

--HEW does not have the contractual right to tell the construction manager who to assign to a project, but has the right of rejection.

--The construction manager is responsible for completing a project with staff of the construction manager's choosing if HEW agrees with their qualifications.

--HEW does not contract for individual staff members, but the firm as a whole, and does not concern itself with the number of staff assigned.

--The construction manager's past performance is evaluated rather than proposed staffing.

CONCLUSIONS

We believe the selection of the construction manager is a critical element in contributing to the success of a project. Because we believe the agencies are contracting for professional services, selection is based primarily, if not completely, on capabilities and experience.

For successful construction management, the firm selected for that role must have both a good record of qualifying experience and the commitment to provide a well-qualified staff to the job. We believe that HEW, GSA, and VA could improve their screening of qualifying experience and the verification of information provided by the firms. In our opinion, GSA and HEW also did not give adequate consideration to the proposed staffing of the candidate firms.

EVALUATION OF CONSTRUCTION MANAGERS' PERFORMANCE SHOULD BE MADE

Prior to November 1975, GSA did not have a formal system for evaluating and recording data on construction managers' performance on projects. In November 1975, GSA established an evaluation program for construction manager firms currently under contract to establish a reliable record of prior performance. The GSA program requires three ratings; at the completion of design, overlap between design and construction, and construction. The rating form has various categories which may be rated as excellent, average, poor, or not applicable, and provides for recommendations for future projects.

The evaluation procedures, however, were not being followed on all projects. On the Federal Home Loan Bank Board Building, the project manager decided not to rate the construction manager until the project was completed. Further, the GSA Chicago Regional Office was not aware of the program at the time of our review in mid-1976, but planned to develop its own procedures if none were received from GSA headquarters.

VA, which has not yet completed its first construction manager project, is considering an evaluation program. HEW, however, has not established an evaluation program because of staff shortages and the constantly changing nature of the construction manager industry.

Internal audit

The agencies' construction manager contracts provide for subsequent audits. However, the agencies had not always audited the contracts to verify that only authorized reimbursable expenses had been paid.

Reimbursable costs are established in the contract, usually with a maximum limit on the total reimbursement, and include salaries, travel expenses of construction manager personnel, and minor items for the construction site. The construction manager receives payment by certifying to the correctness of the listings. Auditing these payments verifies that only authorized items have been paid and that total payments have not exceeded the contract limitations.

On the GSA construction manager projects we reviewed, audits of reimbursable expenses had been conducted. We did not analyze the audits to determine whether they included all the construction manager reimbursable expenses on particular projects. Also, the Office of Audits was reviewing the implementation of construction manager techniques in GSA with emphasis on the selection of projects, the award and administration of construction manager contracts, and the Construction Management Control System.

VA internal auditors had not reviewed the construction manager projects. We were told that the auditors were starting a review of construction management contracts to determine whether internal audit had been notified of all change orders in excess of $100,000.

The HEW region 9 engineer requested HEW's internal auditors to examine reimbursable costs on the Fort Huachuca School on August 17, 1973, but no audit was ever made. HEW internal audit personnel stated that construction projects are given a low priority for audit but they will consider auditing them in the future.

CONCLUSIONS

Internal audits, particularly of reimbursable costs, were not performed on all construction manager projects. We believe internal audits of all reimbursable costs are desirable to insure that payments are in accordance with agency regulations and contract provisions.

Further, we believe a program designed to evaluate the performance of the construction manager on specific Government projects would be beneficial. Within the agency, a firm's prior performance could be used in evaluating and selecting the firm for future projects. Moreover, information

on performance developed by one agency could be made available to other agencies seeking to hire a construction manager.

CHAPTER 4

CONCLUSIONS, RECOMMENDATION, AND AGENCY COMMENTS

CONCLUSIONS

Although the use of construction management and phased construction is not new in the private sector, its use by the Federal agencies is relatively recent. As a result, the Federal agencies use of these techniques is still evolving.

We believe that the use of construction managers and phasing, in suitable circumstances, may achieve a saving in project time. However, other contracting techniques, as recognized by GSA's 1970 study of its contracting practices and procedures, can be equally effective.

Our examination indicated that each Federal agency using construction managers and phasing is adopting techniques from the private sector and attempting to develop them to fit their own particular construction needs. The result is different interpretations, techniques, and uses for the construction management, phasing method. Further, the agencies have not developed adequate program controls to insure, as much as possible, the selection of quality construction managers for projects identified by an objective analysis as appropriate for use of the construction manager, phasing method, and to document the benefits achieved by the use of this method.

We believe that it is understandable that the agencies early use of construction managers would result in inconsistencies and inadequacies. However, the agencies should now have gained sufficient experience to permit the identification of the best techniques and should initiate development of uniform guidance.

RECOMMENDATION

We recommend that the Administrator of General Services, in coordination with HEW, VA, and other agencies using construction managers and phased construction, develop procedures to be included in the Federal Procurement Regulations to provide Federal agencies uniform guidance as to the use of construction managers and phased construction. Such guidelines should be directed to how to identify the projects most suitable for the use of this technique and to the criteria to use in selecting and evaluating construction managers.

AGENCY COMMENTS

The agencies generally agreed with the conclusions and recommendations contained in the report. All three specifically concurred in the need to develop and implement uniform guidance through the Federal Procurement Regulations and said they would support efforts in this regard.

In its comments, GSA pointed out that any interagency guidelines must have some flexibility since construction management is still in the developmental stage. VA felt that the findings were somewhat inconclusive because of the wide variety of projects studied, the many differences in the applications of the construction manager and the phased construction techniques applied to those projects. HEW supported its inclusion of a guaranteed maximum price in construction management contracts, citing this as essential to the construction manager's effective control over the various separate contractors working on the project.

The GSA and VA comments include several suggested revisions to statistical data which reflect events subsequent to our audit work. Because we could not verify the accuracy of this data it has not been included in the report.

COPY

CONGRESS OF THE UNITED STATES

HOUSE OF REPRESENTATIVES

Room 2165, Rayburn House Office Building

Washington, D.C. 20515

Telephone Area Code 202 225-4472

May 5, 1975

Mr. Elmer B. Staats
Comptroller General of
the United States
Government Accounting Office
Washington, D.C. 20548

Dear Mr. Staats:

As Chairman of the Subcommittee on Public Buildings and Grounds of the House Public Works and Transportation Committee, in accordance with the Reorganization Act of 1974, I am writing to request the Government Accounting Office undertake an investigation of General Services Administration construction costs.

Specifically, I would like a comparison of the difference in costs of routine direct Federal construction versus the "fast track" or phased construction.

Your cooperation in this matter is appreciated.

Respectfully,

/s/ Teno Roncalio

Teno Roncalio
Chairman
Subcommittee on Public
Buildings and Grounds

COPY

APPENDIX II

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20201

JUN 27 1977

Mr. Gregory J. Ahart
Director, Human Resources
Division
United States General
Accounting Office
Washington, D.C. 20548

Dear Mr. Ahart:

The Secretary asked that I respond to your request for our comments on your draft report entitled, "Improvements Needed in the Use of Construction Managers and Phased Construction on Federal Projects." The enclosed comments represent the tentative position of the Department and are subject to reevaluation when the final version of this report is received.

We appreciate the opportunity to comment on this draft report before its publication.

Sincerely yours,

Thomas D. Morris
Inspector General

Enclosure

COMMENTS OF THE DEPARTMENT OF HEALTH, EDUCATION AND WELFARE ON THE GENERAL ACCOUNTING OFFICE DRAFT REPORT, "IMPROVEMENTS NEEDED IN THE USE OF CONSTRUCTION MANAGERS AND PHASED CONSTRUCTION ON FEDERAL PROJECTS

GENERAL

The office of Facilities Engineering and Property Management is developing Department-wide procedures for use in the award and administration of Construction Management (CM) contracts. Until recently, there has not been sufficient experience in the direct Federal contracting area for formalizing the CM process. The procedures under development will incorporate the selection of Construction Managers (C.M.). The selection procedures will be uniform for all HEW-awarded CM contracts.

HEW fully supports the recommendation that the Federal agencies should be working together and would welcome a coordinated effort to develop Federal Procurement Regulations to provide Federal agencies uniform guidance as to the use of C.M.s.

We offer the following specific comments that you may wish to consider in finalizing this report:

Page 15 - Use of Guaranteed Maximum Price Inhibits Phased Construction

We disagree with the report's conclusion that the assurance of a Guaranteed Maximum Price (GMP) differs little from that of a general contractor. One of the major problems in the CM procedure without a GMP emanates from the fact that the award of the separate contracts is made with the Government through the contracting officer, which we believe dilutes the effectiveness of the C.M. in controlling the performance of the separate contractors on the project. Under the GMP contract, the Government has a single contract to administer with the C.M. The C.M. makes the separate contract awards which in fact are subcontracts. The C.M. performs in a similar manner to a general contractor in his relationship with the subcontractors on the job. We believe it is essential for the C.M. to have full contract authority over the separate contractors.

It is true that the GMP contract differs little from the authority contained in a lump sum general contract. However, additional advantages accrue to the Government over that of a general contract. These advantages are:

a. The C.M. as the contractor of the project provides construction expertise, cost control, and project scheduling during the design stage, which is not possible under the general contract method.

b. The work is separated into bid packages and bidding is competitive to give the Government the benefit of the best price for the construction of the facility. The Government pays only the amount resulting from the sum of all the separate contracts awarded on the projects.

Note a: Page references in this appendix refer to the draft report and may not agree with the page numbers in this final report.

APPENDIX II

c. Through separate bid packages, we are able to get more competition in bidding, including responses from minority firms that are unable to bid the entire general contract.

d. The C.M. is selected on the basis of his financial ability to complete the project as well as his ability to manage.

While these factors are difficult to quantify and compare with conventional lump sum general contract bids, we are convinced that projects can be completed within prescribed budgets and on time by using qualified C.M.s with GMP contracts.

Page 27 - Agencies' Evaluation of Project Staffing is Not Always Adequate

The GAO report states in its conclusions on page 28 that "consideration should be given to the qualifications of the professional staff the C.M. plans to assign to the project." HEW procedures now under development will include in the evaluation data a consideration of the qualifications of the C.M.'s professional staff.

APPENDIX III

UNITED STATES OF AMERICA
GENERAL SERVICES ADMINISTRATION
WASHINGTON, D.C. 20405

July 19, 1977

Honorable Elmer B. Staats
Comptroller General of the United States
General Accounting Office
Washington, DC 20548

Dear Mr. Staats:

The General Services Administration has reviewed your draft report entitled "Improvements Needed in the Use of Construction Managers and Phased Construction on Federal Projects." We believe that the report constitutes a fair appraisal of the construction manager-phased construction method insofar as it applies to GSA.

We concur with your primary recommendation that interagency guidelines be established relative to the application of construction management and the selection of construction managers. Such guidelines are essential to ensure that construction management will be effective. However, these guidelines must have some flexibility since construction management is still in the developmental stage.

Enclosed for your consideration are our definitive comments on the draft material. If you have any questions, we would welcome the opportunity to discuss them with you.

Sincerely,

Joel W. Solomon
Administrator
Enclosure

GENERAL SERVICES ADMINISTRATION COMMENTS ON DRAFT REPORT ENTITLED "IMPROVEMENTS NEEDED IN THE USE OF CONSTRUCTION MANAGERS AND PHASED CONSTRUCTION ON FEDERAL PROJECTS"

RESULTS OF USE OF CONSTRUCTION MANAGERS AND PHASED CONSTRUCTION ON SELECTED PROJECTS

Agency criteria for using construction managers, page 9.

Careful comparison of the savings, if any, to be achieved through the use of construction management is a vital prerequisite for making an appropriate decision to use construction management instead of the conventional sequential construction approach. The elements of administrative overhead and agency manpower savings certainly should be considered in the decisional process. However, these elements may well be dwarfed when the savings to be achieved through the utilization of the construction manager-phased construction approach are considered as a whole.

On page 9, the second sentence of the third paragraph should be corrected to read as follows:

> Without the construction manager's services, they estimated that several additional GSA engineers would have been required at the jobsite to administer the project. [See note b, p. 40.]

Time savings not always obtained, page 10.

The recommendation made at page 16 of the draft is that the site should be acquired before making a decision to use the construction manager-phased construction approach. In general, GSA adheres to the rule that, prior to the employment of a construction manager or the commencement of design, the site must have been acquired or the Government must have obtained a firm and binding agreement concerning the price to be paid for the site or, in the case of condemnation actions, a deposit has been made in the courts. We believe that this approach is more flexible than that recommended and enables GSA to realize further cost savings through an earlier design-construction start up. The alternative recommendation made on page 16--that an advance analysis be made of potential delays in the site acquisition process as a precursor to deciding on the use of construction management--is in accord with our views, and is now being done by elements of GSA.

Extent of value management savings due to construction managers unknown, page 17.

On page 17 of the report, GAO concludes that it was not possible to determine whether it was the construction manager or the architect-engineer who was responsible for value management (VM) savings. However, an important element in the success of VM is the team approach. The team consists of GSA personnel, the architect-engineer, and the construction manager, and they act in concert through the VM workshops. Therefore, we believe that it is more pertinent to an evaluation of the effect of construction management on VM savings to compare such savings accruing on construction management projects with those obtained on conventional construction projects than to measure the contribution of individual members of the team.

The last sentence on page 18 makes an inaccurate citation of a GSA publication. We are unable to identify the proper title from the information given. [See note b, p. 40.]

NEED FOR IMPROVED PROCEDURES FOR SELECTING AND EVALUATING CONSTRUCTION MANAGERS

Construction manager selection procedures, page 24.

The last sentence on page 24 should be corrected to read, in pertinent part, "solicitation for offers" not "bids." [See note b, p. 40.]

The table presented on pages 26 and 27 of the draft report should be modified by inserting "Yes" in the GSA column for each of the following entries:

From design inception to construction completion

Number of experienced personnel

On page 27 the first sentence should be revised to read as follows:

Using the information outlined above, the GSA review team rates each of the 10 qualification categories on a scale of 2 to 7 points determined by relative importance.

Conclusions, page 28.

The second sentence in the paragraph headed "Conclusions" is not accurate in the case of GSA. Our construction manager contracts are not negotiated as contracts for professional services but as contracts for construction management services, pursuant to Sections 302(c)(10)--i.e., for property or services for which it is impracticable to secure competition by advertising--and 307 of the Federal Property and Administrative Services Act of 1949, as amended. Construction manager contracts are not considered to be professional services contracts because they consist of a hybrid of such services as management and construction contracting for certain general condition construction activities. [See note b, p. 40.]

CONCLUSIONS AND RECOMMENDATION

Recommendation, page 31.

We are in accord with your recommendation that uniform guidelines should be developed and promulgated through the Federal Procurement Regulations for the purpose of guiding agencies in identifying projects most suitable for the utilization of the construction manager-phased construction approach and in establishing criteria for evaluating and selecting construction managers. However, since construction management is still in the developmental stage, it is essential that such guidelines be flexible.

APPENDICES

On page 34 change the figure $3,984,827 on the last line to $4,547,800 and change any other figures changed thereby.

On page 36 the phrase in the last paragraph "lack of contracting authorization" is not clear. [See note b, p. 40.]

On page 39, in the next-to-last line, change 2-18-77 to the actual date of 3-4-77.

On page 47, in the last line of the data, insert 23 as the planned total construction in months. [See note b, p. 40.]

APPENDIX IV

VETERANS ADMINISTRATION
OFFICE OF THE ADMINISTRATOR OF VETERANS AFFAIRS
WASHINGTON, D.C. 20420

JULY 19 1977

The Honorable
Gregory J. Ahart
Director, Human Resources Division
U. S. General Accounting Office
Washington, DC 20548

Dear Mr. Ahart:

We have reviewed the draft report, "Improvements Needed in the Use of Construction Managers and Phased Construction on Federal Projects," LCD-77-348, sent us for comments on May 26, 1977.

We generally agree with the conclusions and recommendations it contains but feel that the findings are somewhat inconclusive because of the wide variety of projects studied, the many differences in the applications of the construction manager and the phased construction techniques applied to those projects. The report does conclude with a belief that these techniques, in suitable circumstances, may achieve a saving in project time. It also expresses a need for consistency in procedures and recommends that guidelines be developed and published in the Federal Procurement Regulations.

We fully agree with the belief stated in the report section, "Evaluation of the Construction Managers Performance Should be Made," that internal audits of all reimbursable costs are desirable. We will insist on this requirement during the development of procedures to provide Federal agencies with uniform guidance on the use of construction managers and phased construction. We also feel that a pre-award contract audit is necessary to insure that the fee proposed by the contractor is equitable. Since the fee portion of a cost plus fixed-fee contract represents a percentage of estimated costs and is fixed at time of negotiation, this amount can be adjusted only by a pre-award audit of the acceptability of the estimated costs.

The Assistant Administrator for Construction has provided me with corrected cost data for the Bronx, Loma Linda, and Los Angeles hospital projects. I am enclosing it for your use. I feel this data will have no effect on your conclusions but is needed for reporting accuracy.

APPENDIX IV

The Honorable
Gregory J. Ahart
U. S. General Accounting Office

We will be pleased to cooperate and assist the Administrator of the General Services Administration in implementing the final recommendations of your report.

Sincerely,

Deputy Administrator - In the absence of
MAX CLELAND
Administrator

Enclosures

APPENDIX IV

UNITED STATES GOVERNMENT

Memorandum

DATE JUN 13 1977

TO Assistant Administrator for Construction (08)
THRU: Deputy Assistant Administrator for Construction (08-1)

FROM Project Director (081A)

SUBJ: GAO Report - Improvements Needed in the Use of Construction Managers and Phased Construction on Federal Projects - Replacement Hospital, Bronx, New York

The following are our specific comments pertaining to Pages 76 through 80 of the GAO Report as it pertains to the Bronx Replacement Hospital.

Page 76

Our total estimated cost is $115,242,000 in lieu of the $114,500,000 shown in the report.

Pages 76 & 77

The first design contract cost including modifications is $783,704 in lieu of the $850,595 shown in the report.

The second design contract cost including modifications is $3,843,391 in lieu of the $4,013,256 shown in the report.

The third design contract cost including modifications is $996,379 in lieu of the $997,202 shown in the report.

Total design cost to date is $5,623,474 in lieu of the $5,861,724 shown in the report.

Page 77 Construction Manager

The second contract is still $2,434,509 in lieu of $4,703,742 shown there have been no modifications. There have been reimbursables which amount to $2,269,233.35 to date.

[See note b, p. 40.]

Pages 77 & 78 Construction

Our estimated construction cost for the 702 bed Building at the time of this report was $79,817,900 in lieu of the $86,026,000 shown. The total should be $92,883,500 in lieu of the $99,091,600 shown.

A. C. BERGLUND
Project Director

UNITED STATES GOVERNMENT

memorandum

DATE: June 14, 1977

REPLY TO ATTN OF: Project Director (0810)

SUBJECT: GAO Report - Improvements Needed in the Use of Construction Managers and Phased Construction on Federal Projects

TO: Assistant Administrator for Construction (08)

1. I am responding to your May 27, 1977 Reference Slip forwarding a copy of the GAO Report.

Page 81 - Site: GAO $659,978
VA $578,000

Page 81 - Design: GAO Working Drawing Contract $1,841,000
Modifications 1,106,994
$2,947,994

VA Working Drawings Contract $1,420,000
Modifications 352,388
$1,772,388

Page 83 - Square Foot Costs - GAO - 793,972 (Gross Square Feet)

VA - 734,513 (Gross Square Feet)

Page 83 - Project Time Frames:

Design:	GAO	Start	5/08/72
		Finish	2/26/75
	VA	Start	1/15/73
		Finish	1/03/75
Construction:	GAO	Start	6/04/74
		Finish	8/25/77
	VA	Start	6/04/74
		Finish	7/22/77 (Estimated)

HERBERT L. DEAN

APPENDIX IV

MEMORANDUM FOR THE RECORD: June 13, 1977

SUBJECT: GAO Draft Report, "Improvements Needed in the Use of Construction Managers & Phased Construction on Federal Projects"

1. Our review of the subject report indicates there are several errors that should be corrected on the Los Angeles 820-bed Replacement Hospital (Pages 85 through 88).

a. Page 85 - Last Paragraph: The last cost figure in the third sentence should be $679,848.

b. Page 86 - First Paragraph: The last cost figure in the second sentence should be $2,577,669 with "through May 1, 1976" added at the end of the sentence.

c. Page 86 - Last Paragraph: The second sentence should read "The project budget as of June 25, 1976, included $7,383,000 for contingencies."

d. Page 87 - Last Paragraph: In the tabulation the actual construction completion date was November 17, 1976, which makes the construction duration 40 months.

For and in the absence of

W. D. FOTE
Project Director
(081C)

Note b: Report revised to reflect agency comments.

FEDERAL OFFICE BUILDING--AKRON, OHIO

This five-story structure of reinforced-concrete with a granite exterior includes four below-ground parking levels. The project was designed to integrate with future development of the Urban Renewal area where the building is located. GSA used the conventional, general contract construction method.

COSTS

The original planned project cost was $16,957,000. The latest estimated project cost is $16,671,127, a difference of $285,873, or a decrease of about 2 percent.

Site

The original planned project budget provided $664,650 for site acquisition. Actual site costs were $516,624, a difference of $148,026 or a decrease of 22 percent.

Design

The original planned design cost was $910,350, however, actual cost was $963,084, an increase of $52,734.

Construction

The original planned construction cost was $14,780,000. Actual construction was $14,769,162, a decrease of $10,838. The construction contract, provided $14,191,000 for general construction. Change orders increased the contract value $578,162.

Overhead

The original project budget provided $602,000 for GSA overhead, however, actual cost was only $406,121.

SQUARE FOOTAGE COSTS

The schedule below shows the differences in project and construction costs per gross square foot for the Akron FOB.

	Cost per square foot (note a)		
	Planned	Actual	Increase
Construction	$35.61	$38.59	$2.98
Total project	40.86	43.56	2.70

[a/] Based on an original estimate of 415,000 square feet and as built of 382,759 square feet.

PROJECT TIME FRAMES

A summary of pertinent planned and actual design and construction milestones and dates follows.

	Planned	Actual
Designed		
Start	6-30-69	9-30-69
Completion	10-26-70	1-21-72
Total in months	16	28
Construction		
Start	1-5-73	1-5-73
Completion	7-19-74	12-20-74
Total in months	19	24

Most of the delay in completing the project can be attributed to design approval delays, site problems, strikes, late soil test results, lack of funding, and change orders.

FEDERAL OFFICE BUILDING--ANN ARBOR, MICHIGAN

The four-story structure of steel frame includes north side stepped-back glass walls and skylights for maximum daylight. The other exterior walls are faced with quarry tile with minimum window spaces. GSA used the conventional, general contract construction method.

COSTS

The original planned project cost was $3,766,000. The latest estimated project cost is $5,782,103, a difference of $2,016,103, or increase of about 54 percent. Much of the increase can be attributed to escalation.

Site

The original planned site cost was $1,162,500. Actual cost was $924,914, a decrease of $237,586.

Design

The original planned project budget provided for $145,500 for design. Actual cost for design was $232,353.

Construction

The original planned construction cost was $2,458,000. The latest estimated cost is $3,984,827. Some of the growth over the estimate may have resulted from assignment of duties from the terminated construction manager: i.e., clean-up, security.

The construction contract was awarded on July 23, 1975. The original award amount, $3,862,035, has been increased to $3,984,827 by change orders.

Construction manager

GSA hired a construction manager during the design period. After it became apparent that overlapping design and construction could not be achieved because of delayed site possession, GSA terminated the construction manager's contract. GSA amended the architect-engineers' contract, including construction supervision. The following schedule shows the identifiable increased and decreased costs.

Increased costs:	
Architect-engineers' contracts amendments	
Additional effort because of construction manager	$ 6,709
Value engineering workshop and related services	24,784
Construction supervision	265,614
Construction manager termination fee	7,500
Additional GSA administrative effort (estimated)	4,000
	$ 308,667
Decreased cost	
Construction manager contract fee (excluding reimbursables) (note a)	$ 100,000

[a]Items which would have been reimbursable costs to the construction manager could not be identified in other contracts.

Overhead

The original project budget provided $322,000 for overhead. The latest estimate of project overhead cost is $323,389.

SQUARE FOOTAGE COST

The schedule shows the difference in project cost per gross square foot for the Ann Arbor FOB.

	Cost per gross square foot (note a)		
	Original estimate	Latest estimate	Increase
Construction	$31.39	$51.85	$20.46
Total project	48.10	75.24	27.14

[a/]Based on an original estimate of 78,300 square feet and as built of 76,849 square feet.

PROJECT TIME FRAMES

A summary of pertinent planned and actual design and construction milestones and dates follow.

APPENDIX VI

	Planned	Actual/latest estimate
Design:		
Start	1-22-73	8-2-73
Completion	12-21-73	12-31-74
Total in months	11	17
Construction:		
Start	8-11-75	8-11-75
Completion	4-2-77	4-2-77
Total in months	20	20

Much of the delay can be attributed to site possession delays, project scope changes, and design approval delays.

FEDERAL OFFICE BUILDING--COLUMBUS, OHIO

The project consists of two structures, a seven-story steel frame office building and an adjacent seven and one-half story concrete frame parking facility. Limestone and architectural concrete exteriors harmonize with an adjacent private development.

COSTS

The original planned project cost was $16,966,000. The latest estimated project cost is $16,977,517, a difference of $11,517, or less than 1 percent.

Site

The original planned project budget provided $2,500,000, however, the actual cost was only $1,042,184. The lower price resulted when the seller offered the site, including demolition and grading to street level, for substantially less than its value.

Design

The original planned design cost was $967,000. Actual cost was $582,696. The contract value was increased an additional $32,696 by change orders.

Construction

The original planned construction cost was $12,799,000. The latest estimate cost is $12,710,904. Construction of the project was accomplished by nine separate contracts. A summary of these awards follows.

	Original award	Change orders	Estimated additional costs	Total
Sitework/concrete	$ 1,055,000	$ 24,316	$ 4,149	$ 1,083,465
Limestone	1,210,000	737	29,231	1,239,968
Masonry	128,800	6,789	253	135,842
Structural steel	1,532,803	108,596	2,823	1,644,222
General architectural items	2,612,300	47,607	129,281	2,789,188
Elevators	431,385	-	10,292	441,677
Mechanical	1,570,000	20,035	46,881	1,636,916
Electrical	1,177,000	16,119	37,501	1,230,620
Garage	2,270,200	158,950	79,856	2,509,006
Total	$11,987,488	$383,149	$340,267	$12,710,904

Construction manager

The original prospectus and related available documents did not indicate that GSA planned to use a construction manager for the project. However, a construction manager was employed to (1) provide assurance of compliance with the drawings and specifications, (2) coordinate, schedule, and direct activities during the construction period, and (3) on a reimbursable basis, furnish certain services and items such as watchmen and safety barricades. GSA currently estimates that the construction manager services for the project will cost $1,403,351.

Overhead

The originally planned project budget provided $720,000 for GSA overhead, however, the current estimate of overhead cost is $570,017.

SQUARE FOOTAGE COSTS

The schedule below shows the difference in project and construction costs per gross square foot for the Columbus FOB.

	Cost per square foot (note a)		
	Planned	Actual/latest estimate	Increase
Construction	$25.71	$30.25	$4.54
Total project	34.14	40.41	6.27

[a/] Based on an original estimate of 497,000 square feet and as built of 420,148 square feet.

PROJECT TIME FRAMES

A summary of pertinent planned and actual design and construction milestones and dates follows.

APPENDIX VII

	Planned	Actual/latest estimate
Design		
Start	7-10-73	8-20-73
Completion	7-29-74	10-29-74
Total in months	13	14
Construction		
Start	3-17-75	3-17-75
Completion	9-30-76	2-18-77
Total in months	18	23

FEDERAL OFFICE BUILDING--DAYTON OHIO

The nine-story steel frame structure has a precast concrete and insulating glass facade. GSA used the conventional, general contract method.

COSTS

The original planned project cost was $4,738,000. The latest estimated project cost is $9,797,000, a difference of $5,059,000, or an increase of about 107 percent. Much of the increase in cost can be attributed to escalation, additional items imcluded in the revised prospectus and increases in gross square feet.

Site

GSA acquired the site in a 1967 exchange of comparable valued Government- and city-owned property. The only identifiable costs were $1,500 for the appraisals and $8,000 for demolition as part of the construction contract.

Design

The original planned project budget provided $343,000 for design, engineering, and supervision. Actual design costs were $343,427.

The first contract, awarded on June 12, 1970, provided $33,240 for diagrammatic sketches, but was later canceled in November 1971 when the project was canceled. Payments to the contractor for work performed prior to the termination of the contract totaled $22,091.

The second contract, awarded on November 29,1971, provided $36,000 for the preparation of sketches, including the site plan and floor plan. It also included options for drawings and post construction services totaling $264,000. These options were exercised. Additionally, amendments that increased the contract design cost an additional $21,336.

Construction

The original planned construction cost was $4,395,000. The latest estimated cost is $8,670,020. The construction contract, awarded on August 3, 1973, provided $8,128,000 for construction. The latest estimated cost includes the original award plus approved change orders of $331,378 and pending changes and contingencies totaling $209,842.

Overhead

The original planned budget did not contain an estimate for overhead. Estimated overhead costs at June 30, 1976 for the project were $461,586.

SQUARE FOOTAGE COST

The schedule shows the difference in project costs per gross square foot for the Dayton FOB.

	Costs per gross square foot (note a)		
	Original estimate	Latest estimate	Increase
Construction	$27.08	$52.85	$25.77
Total project	29.19	59.72	30.53

a/Based on an original estimate of 162,300 square feet and as built of 164,056 square feet.

PROJECT TIME FRAMES

A summary of pertinent planned and actual design and construction milestones and dates follow.

	Planned	Actual/latest estimate
Design:		
Start	6-30-69	6-12-70
Completion	8-10-71	3- 1-73
Total in months	25	33
Construction:		
Start	8-23-73	8-23-73
Completion	2-13-75	12- 1-75
Total in months	18	27

Reasons for the delays above were strikes, program changes, and various design and approval delays.

FEDERAL OFFICE BUILDING--LINCOLN, NEBRASKA

The project consists of two structures, a five-story office-courthouse building and a two-level parking facility. The office building is steel with limestone and glass exterior walls. The garage is concrete slab poured on top of precast beams. GSA used the conventional, general contract construction method.

COSTS

The original planned cost was $14,890,000. The latest estimated project cost is $20,132,845, a difference of $5,242,845 or an increase of about 35 percent.

Site

The site was acquired in January 1972 at a total cost of about $1.5 million. Initially, in August 1966, GSA had provided about $1.6 million for site acquisition.

Design

The prospectus provided $817,000 for design, engineering, supervision, and other services. The design contract, dated October 1966, authorized a total fee of $620,000, including $149,000 for construction supervision.

GSA authorized the architect to begin design work in December 1966. After the design was submitted to GSA the decision was made to utilize an entire city block for the parking structure rather than three-fourths of a block as originally planned. As a result, the architect-engineer was instructed to redesign the parking structure. The design contract was amended in February 1969, to cover this work and the architect-engineer was given until August 1970 to complete the design. The architect-engineer completed the design in September 1970.

The architect-engineer was again engaged in the project in March 1972, after GSA decided to proceed with the project. Design contract amendments totaling about $530,000 were issued during May-October 1972 to modify working drawings, design a building heating plant and to provide construction supervision and other services.

GSA paid the architect-engineer about $1.4 million, which includes $620,000 under the original contract and about $798,000 under the 11 contract amendments.

Construction

GSA, in the June 1965 prospectus, estimated the cost of improvements at about $12.5 million. In July 1972 the estimate was revised to $21.3 million. The invitation for construction bids was issued in August 1972 and a low bid of $14.6 million was received. Nine other bids were received which ranged from $15.2 million to $16.7 million.

A GSA official was uncertain as to the reasons why the estimated construction cost was considerably higher than the bids. The October 1972 estimate was based on a cost of $37.98 per square foot for the entire project. The regional contracting officer speculated that this square foot cost probably was applicable to the office-courthouse building (395,000 square feet) but that a lower cost should have been applied to the parking structure (166,000 square feet). GSA had issued 144 construction change orders which it valued at about $1.4 million, which would increase this construction amount to $16.3 million. The construction contractor, however, has unsettled claims which could result in a final construction cost of between $16.9 million and $25.9 million.

The contractor has based much of its claims on "consequential" costs resulting from change orders. GSA, in its evaluation of the claim for these costs, understands that consequential costs include the following:

--Impact--Costs involved for effect of changed work on the unchanged work (e.g., overtime, fatigue, morale, attitude, stacking of trades).

--Extended cost of operations--Costs involved by being required to stay on a project longer than originally scheduled because of change orders (e.g., management and supervisory personnel, offices, utilities, tools, equipment).

--Acceleration--Costs incurred to complete project by an unrealistic date because time extentions were not granted in a timely manner (e.g., additional manpower, overtime, added equipment).

--Escalation--Cost for increases in wages and materials due to work being carried out at a later time than originally scheduled because of change orders.

GSA officials acknowledge that change orders caused delays and other problems in the construction of the project.

One official attributed at least some of the change orders to the fact that there was about a 2-year gap between completion of the design and start of construction--the design was completed September 1970 and construction did not begin until November 1972.

Overhead

The cost estimate included in the project prospectus did not show an amount for agency overhead. The actual overhead charged by GSA is about $960,000. This total consists of about $705,000 charged to design and about $255,000, to management and inspection.

SQUARE FOOTAGE COSTS

The computed square foot costs for the project, based on gross area, are as follows:

	Costs per gross square foot (note a)		
	Original estimate	Actual (note b)	Increase
Construction cost	$19.59	$26.54	$6.95
Total project cost	23.42	32.82	9.40

a/Based on an original estimate of 635,700 square feet and as built of 613,466 square feet.

b/Does not include contractor's unsettled claims.

PROJECT TIME FRAMES

A summary of pertinent planned and actual design and construction milestones and dates follows:

	Planned	Actual/latest estimate
Design		
Start	N/A	12-28-66
Completion	6-17-68	9-17-70
Total in months	-	45
Construction		
Start	11-21-72	11-30-72
Completion	10-74	7-21-75
Total in months	23	32

APPENDIX IX

APPENDIX IX

Project time delays were attributed to unusal weather, strikes, high water table during winter, pile driving, and a lack of funds.

FEDERAL OFFICE BUILDING--NASHVILLE, TENNESSEE

The project consists of a nine-story annex to the U.S. Courthouse and adjacent five-story parking garage.

The annex has a concrete frame and is faced with precast architectural stone and marble. The annex and garage are connected by an underground pedestrian tunnel and corridors. GSA used the conventional, general contract method.

COSTS

The original planned cost for the project was $8,735,000. The latest estimated project cost is $14,747,348, a difference of $6,012,348 or about 69 percent.

Most of the cost increase can be attributed to inflation and change orders.

Site

The site for the project was acquired on September 27, 1967, at a cost of $431,931.

The purchase price of $431,931 was $42,069 below the original estimate.

Design

The original planned design costs were $349,000. Actual costs were $716,804, an increase of $367,804. Most of the increase can be attributed to redesign and post construction contract services.

Design of the project was accomplished by five separate contracts. A summary of these contracts follows.

Contracts	Award amount	Options (included in contract)	Amendments	Total
First design contract	$ 19,040	$219,345	$ -	$238,385
Second design contract	24,472	-	-	24,472
Third design contract	256,305	-	48,292	304,597
Fourth design contract	25,712	-	16,988	42,700
Fifth design contract	40,253	-	66,397	106,650
Total design costs	$365,782	$219,345	$131,677	$716,804

Construction

The original planned construction cost was $7,311,000. The actual cost of $13,350,801 exceeded the orginally planned costs by $6,039,801. Most of this 83-percent increase was due to inflation between 1965 and 1972.

Another factor which increased the costs of the project were change orders totaling $2,017,547, including one for $1,650,000 which added two floors and an elevator to the parking garage.

Overhead

The recorded agency overhead exceeded the prospectus estimate of $173,000 by $36,108. However, GSA officials advised us that accurate overhead cost for projects initiated prior to July 1, 1975, cannot be obtained.

SQUARE FOOTAGE COSTS

The schedule below shows the difference in project costs per gross square foot for the Nashville project.

	Costs per gross square foot (note a)		
	Original estimate	Latest estimate	Increase
Construction	$16.52	$27.61	$11.09
Total project	19.74	30.50	10.76

a/Based on an original estimate of 442,600 square feet and as built of 483,477 square feet.

PROJECT TIME FRAME

A summary of pertinent planned and actual design and construction milestones and dates follows.

	Planned	Actual/latest estimate	
Design			
Start	N/A	1-19-66	2-25-72
Completion	4-12-67	2-02-68	3-27-72
Total in months	-	24	1
Construction			
Start	N/A	10-26-72	
Completion	4-23-74	5-1-75	
Total in months	-	30	

a/Design of the annex was first completed in 1967, but construction funds were not available until after June 16, 1972, when the Congress passed Public Law 92-313. Consequently, the design had to be revised and updated.

b/Garage was scheduled for completion on 7-14-66 and annex on 4-12-67.

c/Based on completion of garage design.

d/Completion date of last construction contract-garage.

e/Estimated completion date of both construction contracts.

GSA project files show that the construction contractor was granted time extension of 186 days primarily to redesign the parking garage and add two floors.

FEDERAL OFFICE BUILDING--ORLANDO, FLORIDA

The six-story structure of concrete frame and special floating foundation is faced with precast architectural concrete panels. Onsite parking is provided for 144 vehicles. GSA used the conventional, general contract construction method.

COSTS

The original planned cost was $10,576,000. The latest estimated project cost is $9,991,740, a decrease of $584,260 or about 6 percent. We were unable to determine the reason(s) for the decrease.

Site

The site for the project was acquired on December 10, 1973, at a cost of $493,389. We were unable to determine why actual site acquisition cost was lower than the original estimate.

Design

The original planned design cost was $540,000; however, actual costs were only $374,726. We were unable to determine why the actual costs were lower than the original estimate.

The design contract, awarded on September 9, 1971, provided $35,280 for the preparation of drawings and documents with options for additional design work. These options were exercised and have resulted in 11 amendments totaling $305,146.

A second contract for post construction services was awarded on August 29, 1974. This contract provided $17,000 for post construction services. There were two amendments that increased the contract value to $34,300.

Construction

The original planned construction costs were $7,743,000. The latest estimated construction cost is $8,630,819, a difference of $887,819 or an increase of about 11 percent.

The construcion contract, awarded on January 16, 1974, provided $8,525,000 for the construction. There have been 97 change orders totaling $105,819.

Overhead

The original estimate for GSA overhead was $449,000 compared to recorded cost of $363,419.

SQUARE FOOTAGE COSTS

The schedule below shows the difference in project costs per square foot.

	Costs per gross square foot (note a)		
	Original estimate	Latest estimate	Increase (decrease)
Construction	$40.80	$45.37	4.57
Total project	55.72	52.53	(3.19)

a/Based on an original estimate of 189,800 square feet and as built of 190,217 square feet.

PROJECT TIME FRAMES

A summary of pertinent planned and actual design and construction milestones and dates follows.

	Planned	Actual/latest estimate
Design		
Start	4-26-71	9-9-71
Completion	9-18-72	11-8-73
Total in months	17	26
Construction		
Start	2-1-74	a/2-12-74
Completion	6-22-75	a/1-19-76
Total in months	16	23

a/Date of first occupancy. Estimated completion date for construction is 7-2-76.

FEDERAL OFFICE BUILDING--TOPEKA, KANSAS

The project consists of a combination Federal building, courthouse, and parking facility. The steel frame four-story office has a concrete foundation and two-level parking facility, with a brick exterior.

COSTS

The original planned cost was $18,128,000. The latest estimated project cost is $13,236,879, a difference of $4,891,121 or a decrease of about 27 percent.

Site

Site cost was estimated at about 1.5 million at the time the prospectus was prepared. The site actually selected had an appraised price of $236,000 and was exchanged for GSA-owned property appraised at $167,000.

Design

The prospectus indicated that total project cost would not exceed $18.1 million. This amount was not broken down into the design, construction, and other cost elements; however, a project estimate for the same amount prepared in October 1972 showed design cost would be about $1.0 million.

A contract in the amount of $660,000 was awarded to the architect in September 1974. The total architect-engineer design cost for the project as of the end of April 1976 was $783,808.

Construction

The estimated project construction cost shown in the October 1972 estimate was about $13.4 million plus contingencies and other costs of about $1.2 million. Construction was divided into 17 bid packages and the contracts were awarded during the period June 1975 to April 1976. The total award amount of the 17 packages, which involved 14 different contractors, was about $9.7 million.

The estimated construction cost, as of May 1976, was about $11.2 million, which includes the original construction contract amounts, approved change orders, pending change orders, assigned contingencies, and general condition items.

Construction manager

GSA did not make an original estimate for construction manager services; however, a pre-proposal estimate of $275,000 was made in June 1974. The contract was awarded in November 1974 for a total of $470,000. Subsequent amendments have resulted in an adjusted contract amount of about $443,000.

Overhead

In general, information on project overhead was not readily available at GSA. The only estimate available was for $583,000. About $259,000 had been obligated as of April 30, 1976.

SQUARE FOOTAGE COSTS

The schedule below shows the differences in project cost per gross square foot for the Topeka FOB.

	Cost per square foot (note a)		
	Original estimate	Latest estimate	Decrease
Construction	$37.13	$32.77	$ 4.36
Total project	50.15	38.68	11.47

a/Based on an original estimate of 361,500 square feet and as built of 342,250 square feet.

PROJECT TIME FRAMES

A summary of pertinent planned and actual design and construction milestones and dates follows.

	Planned	Actual/latest estimate
Design		
Start	7-29-74	9-23-74
Completion	8-25-75	2-17-76
Total in months	13	17
Construction		
Start	6-10-75	6-26-75
Completion	12-31-76	3-14-77
Total in months	18	20

FEDERAL HOME LOAN BANK BOARD BUILDING--WASHINGTON, D.C.

The building will house the Federal Home Loan Bank Board and the Federal Home Loan Mortgage Corporation. Parking for approximately 210 cars will be provided below ground. The building will be a reinforced concrete structure with exterior facade consisting of limestone and clear glass windows set in dark bronze annodized aluminum frames. Special areas include a commercial restaurant and ground-level commercial shops. The building will also feature a courtyard with a waitered outdoor cafeteria, sandwich shop, skate shop, and an ice rink that is convertible to a large pool for the summer season.

COSTS

The original planned project cost for the building was $38,456,000. The latest estimated project cost is $42,639,158, a difference of $4,183,158 or an increase of about 11 percent.

Site

The original planned cost was $7,600,000. The site for the project was acquired at a cost of $7,736,970.

Design

The original planned design costs were $1,470,000. Actual costs as of March 31, 1976 were $1,707,474, an increase of $237,474 or about 16 percent.

The contract provided $1,260,000 for design and post-construction contract services. There have been 19 amendments to the contract totaling $447,474.

Construction manager

The original planned project budget included $680,000. Total estimated costs were $1,542,875 as of April 1, 1976. The first contract awarded November 2, 1973, provided $595,000 for construction management services during the design and construction phases. This contractor was later terminated for the convenience of the Government because of uncertainties brought on by a lawsuit. As a final settlement for services rendered, the contractor was paid $50,875.

After settlement of the lawsuit, a second contract was awarded on October 15, 1974. The contract provided $695,000 for construction management services during the design and

construction of the project. Amendments and reimbursables have increased the value of the contract to $1,401,000.

Construction

The original planned construction costs were $27,764,000. The latest estimated cost is $30,805,494, a difference of $3,041,494 or about 11 percent. A total of 18 construction contracts have been awarded. A summary of costs for these contracts follows.

	Award amount	Approved change orders	Pending change orders	Total
A-1 Excavation and foundation	$ 2,589,000	$ 91,470	$ 323,234	$ 3,003,704
B-1 Structural concrete	4,374,000	115,515	871,759	5,361,274
B-2 Elevators	1,426,829	(7,504)	20,000	1,439,325
B-3 Exterior stonework	1,894,282	-	(46,873)	1,847,409
B-4 Architectural metal and glass	897,000	10,309	(4,172)	903,137
C-1 Electrical	914,000	-	434,867	1,348,867
C(1) P(1) switchgear and transformers	384,090	-	119,800	503,890
C(1) P(2) feeder cable	19,188	-	2,000	21,188
C-2 Plumbing	475,000	2,178	465,457	942,635
C-3 HVAC	2,315,000	-	532,548	2,847,548
C(3) P(1) chillers	109,988	-	3,675	113,663
C-4 Fire Protection	249,352	4,477	11,152	264,981
C-5 Master control system	1,179,985	-	50,000	1,229,985
D-1 Hollow metal	36,615	-	3,930	40,545
D-2 Hardware	33,346	-	27,496	60,842
D-4 Roofing and waterproofing	288,629	-	7,500	296,129
E General Work	3,393,000	-	-	3,393,000
E(2) P(1) Brickwork	224,413	-	(19,000)	205,413
Total	$20,803,717	$216,445	$2,803,373	$23,823,535

In addition to the above awards the current estimate includes $5,868,000 for additional awards, $280,000 for reimbursables, and and $833,959 for contingencies. A summary of the $5,868,000 estimate for additional awards follows.

	Amount
Masonry	$ 553,000
Base building painting	65,000
Resilient flooring	7,000
Brickwork (installation)	650,000
Tenant finishes	3,032,000
Landscaping	90,000
Sculpture	145,000
General conditions	1,326,000
	$5,868,000

Overhead

The original planned budget for the project provided $976,000 for agency overhead. The latest estimate contains $1,001,000 for this item.

SQUARE FOOTAGE COSTS

The schedule below shows the difference in project costs per gross square foot.

	Costs per gross square foot (note a)		
	Original estimate	Latest estimate	Increase
Construction	$61.22	$67.93	$6.71
Total project	84.80	94.02	9.22

[a] Based on an original estimate of 453,500 square feet and as built of 453,500 square feet.

PROJECT TIME FRAMES

We were unable to obtain the planned start date. A summary of pertinent planned and actual design and construction milestones and dates follows.

APPENDIX XIII

	Planned	Actual/latest estimate
Design		
Start	N/A	9/14/73
Completion	8/ 7/74	11/75
Total in months	-	26
Construction		
Start	N/A	1/28/75
Completion	5/76	4/29/77
Total in months	-	27

Most of the delay shown above can be attributed to a lawsuit that halted the entire project for 171 days during the design phase. Additionally client requested scope changes, strikes, and delays in approval of design plans delayed the project.

APPENDIX XIV

SOUTH PORTAL BUILDING--WASHINGTON, D.C.

The seven-story office building and parking garage straddles the Interstate 95 Highway. The building houses a 120-foot high ventilation stack and fans for a portion of the highway tunnels. To prevent interference with the highway, the building's steel frame superstructure was suspended from several supporting columns. GSA used the conventional, general contract construction method.

COSTS

The original planned project cost was $28,568,000. Actual project costs were $44,607,022, and increase of $16,039,022 or about 56 percent. Approximately $13.4 million of the increase resulted from increased construction costs, much of which was due to escalation/inflation, and the rest of which was due to change orders and scope changes.

Site

The original estimate of project cost did not contain a separate estimate for site. However, a later estimate put the cost at $725,000. Actual site costs were $717,835.

Design

The original estimate for design was combined with the estimate for site, engineering, and supervision in the original project budget. We were unable to obtain a breakdown of this amount. The contract contained $203,000 for specified design services. Further options valued at $1,121,000 were exercised. Additionally, amendments increased the contract value $594,006.

Construction

The original planned construction costs for the project were $26,272,000. The actual construction cost was $39,627,600, a difference of $13,355,600 or about 51 percent.

The general construction contract was awarded on April 14, 1972. The contract provided $29,403,000 for the construction of the building. The value of the contract has been increased to $37,401,907 by 179 change orders.

The elevator contract provided $1,272,492 for elevators. The contract value has been decreased by $33,682 by four change orders.

GSA agreed to pay the D.C. Government for reinforcement and ventilation of the highway over which the South Portal Building is constructed. The agreement provided $118,680 for this purpose.

Overhead

The original planned project budget contained $867,500 for overhead. Actual overhead costs were $1,065,261, an increase of $197,761 or about 23 percent. We were unable to determine why the increase occurred.

Other

The latest project budget also included $1,278,329 for other costs. These costs were included as part of the construction estimate in the original budget.

SQUARE FOOTAGE COSTS

The schedule shows the difference in project costs per gross square foot.

	Costs per gross square foot (note a)		
	Original estimate	Actual	Increase
Construction	$26.32	$45.16	$18.84
Total project	28.63	50.83	22.20

a/Based on an original estimate of 998,000 square feet and as built of 877,540 square feet.

PROJECT TIME FRAMES

A summary of pertinent planned and actual design and construction milestones and dates follows.

	Planned	Actual
Design		
Start	9-15-67	12-19-67
Completion	5-15-69	10- 1-70
Total in months	20	33
Construction		
Start	5- 4-72	5- 4-72
Completion	5- 5-75	3-31-76
Total in months	36	47

APPENDIX XIV

Reasons for the delay in completing the project were strikes, lack of funding, and a bid protest. Some additional delays were caused by submission of incomplete drawings by the architect-engineer and approval of diagrammetics and tentatives.

FEDERAL OFFICE BUILDING--WINSTON-SALEM, NORTH CARCLINA

The eight-story building including subterranean parking includes concrete framing, precast architectural concrete panel exterior, and flat build-up roof.

COSTS

The original planned cost was $13,792,000. The latest estimated project cost is $14,701,234, a difference of $909,234 or about 7 percent. Most of the cost increases can be attributed to construction change orders, inflation, and GSA's converting the project to a construction manager project.

Site

The site for the project was acquired on September 13, 1973, at a cost of $257,066, about $15,000 below the original estimate.

Design

The original planned design costs were $857,000; however, actual costs were only $547,691. The primary reason for the lower design costs was the use of a construction manager who provided some of the services that had been included in the original estimate for design.

Construction manager

The original planned project budget did not include an amount for a construction manager. The estimated contract cost of $753,358 included $390,901 for design and construction period services plus amendments to the contract and $362,457 for reimbursables.

Construction

The original planned construction costs were $12,144,000. The latest estimated construction cost is $12,778,572, a difference of $634,572 or an increase of about 5 percent. A total of nine construction contracts were awarded, as follows.

APPENDIX XV

Construction phase	Award amount	Change orders	Estimated additional costs	Total estimated costs
Plumbing	$ 274,000	$355,731	$ 3,733	$ 633,464
HVAC	1,532,000	10,416	44,384	1,986,227
Phase I&II, general construction	2,436,147	96,202	300	2,532,649
Phase III, general construction	3,917,000	(25,371)	232,657	4,124,286
Phase IV, general construction	1,779,586	7,927	7,884	1,794,397
Electrical	896,842	144,558	42,740	1,083,540
Carpet	101,153	-	-	101,153
Fine arts	55,000	-	-	55,000
Elevators	485,399	(19,544)	1,801	467,656
	$11,476,327	$569,919	$712,326	$12,778,372

Overhead

GSA's recorded overhead cost was $315,128, or $208,872 less than the original estimate.

SQUARE FOOTAGE COSTS

The schedule below shows the difference in project costs per gross square foot for the Winston-Salem project.

	Costs per gross square foot (note a)		
	Original estimate	Latest estimate	Increase
Construction	$36.58	$39.98	$3.40
Total project	41.54	45.99	4.45

[a] Based on an original estimate of 332,000 square feet and as built of 319,660 square feet.

PROJECT TIME FRAMES

A summary of pertinent planned and actual design and construction milestones and dates follows.

	Planned	Actual/latest estimate
Design		
Start	7-20-70	10-13-70
Completion	10-27-71	8- 2-74
Total in months	15	46
Construction		
Start	12-10-73	[a] 4-23-74
Completion	8-75	[a] 4- 2-76
Total in months	-	23

[a] Date of first occupancy. Full occupancy expected by 3-1-76.

APPENDIX XVI

APPENDIX XVI

Reasons for the delay in completion of the project were (1) redesign of the building to include a Veterans Administration clinic, (2) lack of design funds, (3) selection of the construction manager, (4) change orders, and (5) additional time required to consolidate phase I and II contracts.

FORT HUACHUCA MIDDLE SCHOOL--FORT HUACHUCA, ARIZONA

The project is a single story centrally air-conditioned facility consisting of 15 regular classrooms and other related facilities, including science, home economics, industrial arts, music, special education, and physical education area.

The building was constructed using a reinforced concrete perimeter frame with concrete block fill-in. The roof trusses are both precast concrete and light steel.

COSTS

The original planned project cost was $2,452,200. Actual project costs were $3,064,349, a difference of $612,149 or an increase of about 25 percent.

Site

The project was constructed on federally owned property.

Design

The original planned design costs for the project were $147,200. The architect-engineer contract was awarded for $144,250. The contract contained design costs of $123,250 and costs for inspection and other services of $21,000. Change orders subsequently increased total architect-engineer fees to $190,527.

Construction manager

The School was originally planned to be constructed using the conventional method. Therefore, HEW had not established a cost estimate for construction manager services in its original project cost estimate.

The contract was awarded for $104,000, consisting of design ($8,000) and construction ($96,000).

A change order subsequently increased the contract to $108,052.

Construction

The original planned construction cost was $2,070,000. On June 22, 1972, a Guaranteed Maximum Price contract was awarded for $2,495,821. The actual construction cost was $2,574,969, an increase of $504,969 or 24 percent.

The major reasons for the difference between the original planned cost, Guaranteed Maximum Price, and actual construction costs were the availability of better data on construction cost elements prior to award of the contract and change orders to the contract.

Work performed by construction managers

Current HEW regulations forbid construction managers from bidding on construction projects. However, in the event the low-bid package exceeds the budget item, the construction manager, with the owner's approval, may perform the work for the amount of the budget item. The construction manager was permitted to perform subcontract work valued at $769,499, which was subsequently increased by change orders to $773,410.

Item	Guaranteed Maximum Price bid per regional engineer	Low bid	Difference
1. Structural excavation, concrete work, and related carpentry	$685,499	$802,157	$116,658
2. Demolition and site earthwork	$ 84,000	$ 75,000	$ 9,000

The construction manager was permitted to perform item 1 because it was essential that construction proceed and it was not feasible to re-advertise the work.

The construction manager was also awarded item 2 because the low bidder had stipulated that this bid was valid only if all work bid (items 1 and 2) were awarded to his company.

Overhead

HEW officials informed us that they do not allocate their agency costs to individual projects.

SQUARE FOOTAGE COSTS

The schedule below shows the differences in project and construction costs per gross square foot.

	Per gross square foot (note a)		
	Original estimate	Actual cost	Increase (decrease)
Construction costs	$28.97	$37.05	$8.08
Projects costs	34.32	44.09	9.77

a/Based on an original estimate of 71,459 square feet and as built of 69,507 square feet.

PROJECT TIME FRAMES

According to the regional engineer, no planned time frames were established for this project; the project was started and completed as quickly as possible.

A summary of pertinent planned and actual design and construction milestones and dates are shown below:

	Planned	Actual
Design:		
Start	N/A	6/24/71
Completion	7/ 1/72	7/12/72
Total in months	N/A	12
Construction:		
Start	7/ 1/72	8/29/72
Beneficial occupancy	7/73	1/25/74
Completion	11/15/73	8/16/76
Total in months (note a)	12	17

a/Start to beneficial occupancy.

The regional engineer believed that the slippage in beneficial occupancy was due to design changes, additional site development and architect-engineer change orders.

The construction manager advised us that there were minor delays in the project because of snow; however, there was no way to determine specific reasons for delaying the start and completion of each subcontract.

FORT RUCKER ELEMENTARY SCHOOL--FORT RUCKER, ALABAMA

The project consists of a classroom/administration building and a multipurpose building containing a kitchen/ cafeteria, activity area, and stage/auditorium.

The buildings are one-story, and completely air-conditioned. The classroom building has a light-weight steel frame, a built-up roof, and 2-inch thick insulated exterior walls of prefabricated metal panels. The building has bronze-glazed windows, including large windows at the main entrances. The multipurpose building has masonry walls and does not have windows.

One distinguishing construction technique used on this project was the "systems" concept. The systems concept involved the installation or connection of preconstructed components.

COSTS

The original planned cost was $1,173,900. The actual project cost was $1,772,889, a difference of $598,989 or about 51 percent.

Except for cost increases caused by change orders, we were unable to determine why the project cost increased.

Site

The project was constructed on a federally owned military reservation. The latest per-bid estimate contained $193,854 for site preparation. However, records of site preparation costs were not available.

Design

The original planned design costs were $88,400. The contract, awarded on June 21, 1971, provided $79,700 for the design. Change orders increased the costs $26,485, for a total of $106,185, or an increase of $17,785 over the original plan.

Construction

The original planned construction costs were $1,004,300. Actual costs were $1,602,600, an increase of $598,300 or about 60 percent. The reason for the cost increase was an increase in the scope of the project.

HEW did not make a prebid breakdown of estimated construction costs for each subcontract. However, each of the subcontracts awarded and the maximum contract amount for each, is shown in the schedule below.

Subsystem contract	Maximum contract amount
General construction	$ 308,719
Carpet	32,417
Civil/site work	209,453
Demountable partitions	56,661
Electrical	119,648
Foundations and slabs	122,544
Grassing	19,600
Food service equipment	39,940
Lighting/ceiling	65,000
HVAC and plumbing	292,338
Equipment/casework	11,339
Roofing and related work	36,819
Structure	57,350
Roof deck system	41,259
Exterior wall panels	56,914
Storefront	16,737
Folding walls	16,500
Aluminum canopy	27,994
Total	[a]/ $1,531,232

[a]/Additional payments of $69,370 were made to the construction manager for various reimbursable items, bringing the total costs of construction to $1,602,600.

Construction manager

HEW did not originally plan to use a construction manager on the Fort Rucker project. An HEW official stated that documentation on the prebid estimate of fees could not be located. The regional engineer said he thought the fee estimate was based on 5 percent of the estimated construction costs of $1.45 million, or about $72,500.

The contract was awarded for $58,000. The fee was increased to $64,104 because of project scope increases and work performed in addition to that specified in the contract.

In addition to management services, the construction manager was responsible for general condition items or

reimbursables. The prebid estimate for reimbursables was $60,000, but the contract provided for such costs not to exceed $126,650, plus payment and performance bonds totaling $10,990. Actual costs have been $69,370 including $10,890 for payment and performance bonds.

Overhead

HEW does not include agency overhead in project cost estimates, nor does HEW maintain overhead cost records.

SQUARE FOOTAGE COSTS

The schedule below shows the difference in project costs per gross square foot for the Fort Rucker project.

	Costs per gross square foot (note a)		
	Original estimate	Actual	Decrease
Construction	$22.90	$22.51	$ .39
Total project	26.76	24.90	1.86

a/Based on an original estimate of 43,860 square feet and as built on 71,188 square feet.

PROJECT TIME FRAME

A summary of pertinent planned and actual design and construction milestones follows. Specific beginning and ending dates for design were not set on this project because of the uncertainty of construction funding.

	Originally planned	Actual
Design		
Starting date	N/A	6-21-71
Completion date	N/A	7-72
Difference in months	-	13
Construction		
Starting date	a/7-1-72	b/7-5-72
Completion date	a/12-72	b/6-18-73
Difference in months	5	11

a/Planned completion date was for classroom/administration building only; no date was given for the cafeteria/activity building.

b/Available for beneficial occupancy January 1973.

VA HOSPITAL--BRONX, NEW YORK

The present facilities consist principally of two 5-story buildings built in 1901 and 1903 and a 12-story structure with an administrative wing that was built in 1930. The existing facilities are being replaced by a 702-bed hospital and a research building.

COSTS

The original planned project cost for the hospital was $65,000,000. However, these plans were made without a decision on the size of the hospital. By 1972 VA was estimating that the facility would cost $108,552,900. The latest estimate of costs for the project is $114,500,000 a difference of $49,500,000. VA records show that the reasons for the increase in project costs were escalation, program changes and the addition of the research building, demolition, landscaping and parking.

Site

The project is being constructed on Federal property at the existing VA Hospital. However, the latest estimate contains approximately $1.8 million for site. VA officials stated that this amount is for site development work.

Design

The original planned design costs for the project were $3,679,200. The first contract was awarded for $562,706 for the development of preliminary plans. Modifications have increased the cost of the contract to $850,595.

The second contract was awarded for $3,196,181 for the preparation of contract drawings and specifications. Modifications have increased the cost of the contract to $4,013,256.

A third contract was awarded for $843,126 for construction period services and site visits. Modifications have increased the total contract costs to $997,202.

The total design costs for the project, including modifications have been $5,861,724, an increase of $2,182,524.

Construction manager

The project was the first where the VA used a construction manager. This approach was embarked upon by the VA at

the recommendation of the architect-engineer, and others who were knowledgeable about the construction industry in New York City. Also, New York State law requires a minimum of five contracts for certain types of multi-story construction projects.

Since the decision to use a construction manager was not made until after the first design contract was awarded the VA did not establish a cost estimate in its original project cost estimate.

The first contract was awarded for $192,899 for construction consultant services during the design phase of the project. Modifications reduced the cost of the contract to $191,428.

A second contract was awarded to the same contractor for $2,434,509 for management services during the construction and warranty period. Modifications have increased the cost of the contract to $4,703,742.

Construction

The original planned construction costs for the project using one construction phase were $58,400,700. Revised plans include 11 construction phases for the hospital building and an additional 5 construction phases for the research building. As a result, the VA is currently estimating the costs of construction to be as follows:

702-bed Hospital Building	$86,026,000
Research Building	13,065,600
	$99,091,600

A summary of the contract awards and amendments as of May 1, 1976, follows:

	Award amount	Change orders	Current value
Phase I	$ 4,675,000	$166,925	$ 4,841,925
Phase II	10,431,445	85,494	10,516,939
Phase III	3,545,000	215	3,545,215
Phase IV	196,000	(4,585)	191,415
Phase V	2,563,000	4,700	2,567,700
Phase VI	6,560,000	-0-	6,560,000
Phase VII	1,159,600	72,826	1,232,426
Phase VIII	10,397,000	-0-	10,397,000
Phase IX	5,122,000	-0-	5,122,000
Phase X	9,072,000	-0-	9,072,000
Phase XI	11,387,000	20,000	11,407,000
	$65,108,045	$345,575	$65,453,620

VA records attributed most of the cost increases to escalation and local market conditions.

Other

The original planned project cost included $2,920,100 for unforeseen contingencies. The latest project budget includes $5,806,540 for contingencies. VA officials stated that as of May 1976 change orders are the only amounts that have been taken from the contingency fund. Additionally, the VA has set aside a portion of the current contingency fund for such items as utilities, testing, and equipment.

In addition to the above the latest project budget contains $3,289,600 for demolition. The original project budget did not contain an estimate for this item because VA had not determined, at that time, if the existing structures on the site would be retained.

Overhead

A VA official informed us that they do not allocate overhead costs to specific projects.

SQUARE FOOTAGE COSTS

The schedule below shows the differences in project costs per gross square foot for the Bronx VA Hospital project.

	Costs per gross square foot (note a)		
	Original estimate	Latest estimate	Increase
Construction	$65.43	$121.42	$55.99
Total project	72.83	140.30	67.47

a/Based on an original estimate of 892,500 square feet and as built of 816,096 square feet.

PROJECT TIME FRAMES

A summary of pertinent planned and actual design and construction milestones and dates follows:

	Planned	Actual
Design		
Start	9-1-72	11-27-72
Completion	10-1-74	2-75
Total in months	25	27
Construction		
Start	12-1-73	7-10-74
Completion	11-1-76	5-15-78
Total in months	35	46

Causes of delays have been strikes, design changes, additional rock excavation, and project redesign. Except for the consideration of the five options and project redesign, which occurred during phases III and IV, all other delays occurred during phase I.

VA HOSPITAL--LOMA LINDA, CALIFORNIA

In February 1971, the VA Hospital at San Fernando, California, was destroyed by an earthquake. In August 1971, President Nixon announced plans to construct a replacement hospital containing 630 beds at a cost of $28.9 million. The hospital is being constructed using phasing with the assistance of a construction manager during the design phase.

COST

Although the 1971 announcement indicated that the new hospital would cost $28.9 million the VA's estimate put the cost at $33.5 million. The VA is currently estimating that the project will cost $64.9 million, a difference of $31.4 million or an increase of about 94 percent.

VA records show that the increases in project costs were due to escalation, seismic requirements, the systems integration approach, program changes, market conditions and unusually high utility connection costs.

Site

The original estimate for site cost was $1,000,000. Our review shows that actual site cost to date has been $659,978. The reduction in cost has occurred because land was donated to the VA. This land had an appraised value of $358,250.

Design

The original planned design costs for the project were $1,841,000. Modifications have increased the value to the contract to $2,947,994.

Construction manager

The original budget did not include an amount for a construction manager. However, during the design phase the VA decided to employ the services of a construction manager. The contract provided $75,000 for these services and was later increased to $80,782.

Construction

The original planned construction costs for the project were $27,900,000. The current estimate is $55,297,929 for

construction, an increase of $27,397,929 or 8 percent. A summary of the construction costs as of May 1, 1977, follows.

	Phase I	Phase II	Total
Award price	$14,820,000	$40,373,000	$55,193,000
Amendments	104,929	-	104,929
Change orders	64,855	298,049	362,904
[a]	$14,989,784	$40,671,049	$55,660,833

[a] Bond premium adjustment of $259 not included.

Other

The original planned project cost included $2,790,000 for escalation and unforseen contingencies. The latest project budget includes $2,883,761 for contingencies. Additionally, the budget contains $2,417,000 for the following.

Testing	$ 272,000
Utilities	1,600,000
Consultant for pier drilling	25,000
Purchase of trailer	20,000
Emergency generator	500,000
	$2,417,000

Overhead

We were informed by a VA official that they do not allocate overhead costs to specific projects.

SQUARE FOOTAGE COSTS

The schedule below shows the differences in project cost per gross square foot for the Loma Linda VA Hospital project.

	Costs per gross square foot (note a)		
	Original estimate	Latest estimate	Increase
Construction	$50.02	$69.65	$19.63
Total project	$60.12	$81.74	$21.62

[a] Based on an original estimate or 557,776 square feet and as built of 793,972 square feet.

The increase in gross square footage of 236,206 square feet resulted from program expansions due to fire and safety considerations, space criteria changes, and space for newly developed equipment.

PROJECT TIME FRAMES

A summary of pertinent planned and actual design and construction milestones and dates follows:

	Planned	Actual
Design		
Start	7-3-72	5-8-72
Completion	9-17-73	2-26-75
Total in months	14	34
Construction		
Start	1-17-74	6-4-74
Completion	7-30-76	8-25-77
Total in months	30	39

Reasons given for the time slippage were (1) design changes, (2) delays in obtaining an approved master plan, (3) time lags in obtaining steel, and (4) additional time required to obtain lower bids for phase II of construction.

VA HOSPITAL--LOS ANGELES, CALIFORNIA

The project consists of an 820-bed general hospital building, a research building, and a new boiler plant and laundry.

COST

The original planned project cost was $46,640,000. The latest estimated project cost is $84,718,000, a difference of $38,078,000 or an increase of about 82 percent. The original project cost estimate was for an 820-bed hospital and a 120-bed Nursing Home Care building, however, the latest estimate is only for the 820-bed hospital. Future projects will provide for the 120-bed Nursing Home Care building, the conversion of the present clinic building to research activities and construction of new facilities for additional research space. VA records show that the reasons for the increase in project costs were escalation, structural steel increases to meet seismic requirements, and program changes.

Site

The project is being constructed on Federal property in Los Angeles, California. The latest estimate contains $75,000 for demolition of several small buildings. Demolition of larger buildings was performed prior to the start of construction for the new complex and it was not paid for with funds allocated to the new complex.

Design

The original planned design costs for the project were $2,640,000. The first contract was awarded for $497,970. Modifications have increased the cost of the contract to $774,103.

A second contract was awarded for $2,499,938. Modifications have increased the cost of the contract to $2,577,669 through May 1, 1976.

As of May 1, 1976, the total design cost for the project was $3,449,598.

Construction manager

The hospital was constructed using conventional construction techniques.

Construction

The original planned construction costs for the project were $40,000,000. The VA currently estimates that the facility will cost approximately $71,950,000, an increase of $31,950,000 or about 80 percent.

The facility is being constructed in two phases. A summary of construction costs as of May 1, 1976, follows:

	Phase I	Phase II	Total
Original contract	$12,617,500	$59,333,000	$71,950,500
Change orders	1,883,278	3,671,804	5,555,082
Other	7,533	—	7,533
Total	$14,508,311	$63,004,804	$77,513,115

VA records show that the reasons for most of the increase were escalation, program changes, local market conditions, and seismic requirements.

Other

The original planned project cost included $4,000,000 for unforeseen contingencies and escalation. The project budget as of June 25, 1976, included $7,383,000 for contingencies. It also includes $1,069,000 for supply contracts, $524,000 for testing, $36,000 for utilities, $75,000 for demolition of buildings, and $111,000 for resident engineer purchases.

Overhead

VA officials informed us that they do not allocate overhead costs to specific projects.

Square footage costs

The schedule below shows the differences in project costs per gross square foot for the Wadsworth hospital project.

	Costs per gross square foot (note a)		
	Original estimate	Latest estimate	Increase
Construction	$49.94	$84.17	$34.23
Total project	58.22	99.10	40.88

a/Based on an original estimate of 801,031 square feet and as built of 854,835 square feet.

APPENDIX XX

APPENDIX XX

PROJECT TIME FRAMES

A summary of pertinent planned and actual design and construction milestones and dates follows.

	Planned	Actual/latest estimate
Design		
Start	5-1-72	9-13-72
Completion	10-15-73	6-25-74
Total in months	18	22
Construction		
Start	10-15-73	7-10-73
Completion	10-15-75	2-17-77
Total in months	24	43

Other causes of delays have been strikes, revisions in steel specifications, and replanning of various areas of the buildings.

APPENDIX XXI

PRINCIPAL OFFICIALS RESPONSIBLE FOR THE ACTIVITIES DISCUSSED IN THIS REPORT

	Tenure of office	
	From	To
DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE		
SECRETARY OF HEALTH, EDUCATION, AND WELFARE:		
Joseph A. Califano, Jr.	Jan. 1977	Present
David Mathews	Aug. 1975	Jan. 1977
Caspar W. Weinberger	Feb. 1973	Aug. 1975
Elliot L. Richardson	June 1970	Jan. 1973
GENERAL SERVICES ADMINISTRATION		
ADMINISTRATOR OF GENERAL SERVICES:		
Joel W. Solomon	May 1977	Present
Robert T. Griffin (acting)	Feb. 1977	Apr. 1977
Jack Eckerd	Nov. 1975	Feb. 1977
Arthur F. Sampson	June 1973	Oct. 1975
Arthur F. Sampson (acting)	June 1972	June 1973
Rod Kreger (acting)	Jan. 1972	June 1972
Robert L. Kunzig	Mar. 1969	Jan. 1972
COMMISSIONER, PUBLIC BUILDING SERVICES:		
James Shea	June 1977	Present
Tom L. Peyton (acting)	May 1977	June 1977
Nicholas A. Panuzio	Sept. 1975	Apr. 1977
Walter Meisen (acting)	Oct. 1974	Sept. 1975
Larry F. Roush	Aug. 1973	Oct. 1974
Larry F. Roush (acting)	Jan. 1973	Aug. 1973
John F. Galuardi (acting)	July 1972	Jan. 1973
Arthur F. Sampson	Mar. 1970	June 1972

APPENDIX XXI

VETERANS ADMINISTRATION

	Tenure of office	
	From	To
ADMINISTRATOR OF VETERANS AFFAIRS:		
Max Cleland	Mar. 1977	Present
Richard L. Roudebush	Oct. 1974	Feb. 1977
Donald E. Johnson	June 1969	Sept. 1974
ASSISTANT ADMINISTRATOR FOR CONSTRUCTION:		
Viggo P. Miller	Aug. 1970	Present

(945092)