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REPORT BY THE

# Comptroller General

OF THE UNITED STATES

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## New Senate Office Building: Escalated Costs And Delayed Completion

The Senate Office Building Commission asked GAO to review the costs of the Hart Office Building and the factors in the delay and to determine whether the:

- Architect's timetable and fast-track construction proposal were realistic and properly carried out.
- Associate architect's delay resulted in increased fees to him.
- The Architect's procedures were standard ones that adequately protected the interests of the taxpayers.

The Architect estimates the cost of designing and constructing the Hart Building and related construction at \$122,647,000. GAO estimates that constructing the project as presently designed will cost much more than that. Several factors are contributing to the cost overruns and time delays.



LCD-78-333  
AUGUST 14, 1978



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

B-145899

The Honorable John Sparkman, Chairman  
The Honorable Henry Bellmon,  
Ranking Minority Member  
Senate Office Building Commission  
United States Senate

In accordance with the Commission's February 28, 1978, motion, here is our report reviewing the costs and delays involved in construction of the Hart Office Building.

We are sending this report to the other Commission members. As agreed, we are sending copies to the Architect of the Capitol, the associate architect, and various Senators who have expressed an interest in our review. Copies will be made available to others upon request.

A handwritten signature in black ink, which appears to read "Thomas B. Atkins". The signature is written in a cursive, flowing style.

Comptroller General  
of the United States

COMPTROLLER GENERAL'S REPORT  
TO THE SENATE OFFICE  
BUILDING COMMISSION

NEW SENATE OFFICE BUILDING:  
ESCALATED COSTS AND DELAYED  
COMPLETION

D I G E S T

The Hart Office Building project being constructed differs considerably from that envisioned by the authorizing legislation. It includes:

- The office building itself, including office space, galleries, an atrium, a dining room, automated systems for handling materials and mail, and environmental control and life-safety systems.
- A two-story multimedia room and a physical fitness facility in the expanded central wing of the adjacent Dirksen Building.
- A 500-car parking garage beneath the Dirksen and Hart Buildings.
- Expansion of the north cafeteria and construction of food carryout services in the Dirksen Building.
- Extension of the Capitol subway to the Hart Building. (See pp. 7 to 14.)

Currently, the superstructure is being built. The contract for the interior and related work--estimated at \$55.5 million--is about to be let out for bid. (See pp. 14 to 16.)

To date, \$85,147,000 has been appropriated. The Architect of the Capitol is seeking an additional \$37.5 million. (See pp. 17 to 19.)

GAO believes that, as presently designed, the project cannot be completed for \$122,647,000. GAO found that:

- The \$55.5 million estimate for the interior contract is understated. (See pp. 20 and 21.)

--Allowances for contingencies are insufficient.  
(See pp. 21 and 22.)

--The low bid price on the interior contract could exceed available funds, including the additional \$37.5 million being sought.  
(See pp. 22 to 24.)

--The inclusion of "deductible alternatives" in the bid package for the interior contract is intended to increase flexibility in awarding the contract, rather than to reduce the scope and cost of the project.  
(See pp. 24 and 25.)

--The \$122,647,000 estimate does not include certain indirect costs. (See p. 25.)

Delays are due to preliminary planning and design program development, congressional review and approval, the degree of perfection required in the contract documents, and design changes. (See pp. 26 to 28.)

A realistic timetable for the project is probably not feasible. Also, "fast-track" construction is not being used. (See pp. 28 and 29.)

No evidence suggested that the associate architect purposely or intentionally delayed the project. (See pp. 29 and 30.)

The Architect of the Capitol's procedures deviated from standard practices of other Federal agencies concerning selection of the architectural firm, lack of written policies and procedures, and inadequate project control systems. (See pp. 30 to 32.)

Problems with cost and time overruns have also been experienced on other Capitol Hill construction projects. (See p. 33.)

Both the Architect of the Capitol and the associate architect agree that GAO's report accurately depicts the circumstances surrounding the design and construction of the project. (See p. 34.)

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## ABBREVIATIONS

AOC	Architect of the Capitol
A/E	architect/engineer
GAO	General Accounting Office
JCWA	John Carl Warnecke and Associates

## CHAPTER 1

### INTRODUCTION

Public Law 92-607 (Supplemental Appropriation Act, 1973), approved October 31, 1972, appropriated \$47,925,000 for construction of an extension (eastern half) to the existing New Senate Office Building (to be known as the Philip A. Hart Office Building 1). Later supplemental appropriation acts raised the project's spending limit to \$85,147,000 by December 27, 1974. On January 23, 1978, the Architect of the Capitol (AOC) asked the Senate Office Building Commission to increase the project's authorization to \$122,647,000.

On February 28, 1978, the Commission unanimously adopted a motion directing us to review

- the project's costs,
- the factors in the delay,
- whether the AOC's timetable and the "fast-track" (phased construction) proposal were realistic and properly carried out,
- whether the associate architect's delay resulted in his receiving higher fees, and
- whether the AOC's procedures were standard ones that adequately protected the interests of the taxpayers.

We were to report as soon as possible, so that the Commission could complete its deliberations about possible additional construction costs before the scheduling of Appropriations Committee hearings. (See app. I.)

On May 17 we briefed the Commission members and other interested parties on our review results to that date. At that time the Commission took the following action.

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1/Senate Resolution 525, August 27, 1976, provides that the building assume that name upon its completion.

Q "The Senate Office Building Commission approves the request of the Architect of the Capitol contained in his letter of January 23, 1978, to the Chairman, for authorization to seek an increase amounting to \$37.5 million in additional funds for the Philip Hart Senate Office Building for inclusion in the next Supplemental Appropriation Bill. The Commission approves the request of the Architect of the Capitol that in advertising for bids for Phase 5 of the construction of the Philip Hart Senate Office Building, separate and alternative bids for appropriate items in section 1 and 2 are listed--as listed in estimates of possible cost reduction items dated May 17, 1978, be requested for consideration by the Commission prior to the approval of a contract award for Phase 5."

#### SCOPE OF REVIEW

Our review was made at the offices of the AOC and the architectural firm commissioned to design the project (associate architect). We reviewed project records, spoke with appropriate officials, and examined the AOC's contracting techniques to determine their adequacy and conformance to standard Federal practices.

We focused on the issues raised in the Commission's February 28 motion. In addition, we evaluated the reasonableness of the AOC's estimates relating to proposed construction contracts and total project costs.



## CHAPTER 2

### PHILIP A. HART OFFICE BUILDING

#### AND RELATED CONSTRUCTION

The original plans for the New Senate Office Building (later named the Everett M. Dirksen Office Building 1/), approved in 1949, provided for an "E"-shaped building, with the central wing containing committee hearing rooms and a senatorial dining room. In 1954 the central wing was eliminated from the construction plans as an economy measure, except for the lower portion containing a restaurant and a garage. However, the structural columns and footings were built in a manner that would facilitate future enlargement of the structure.

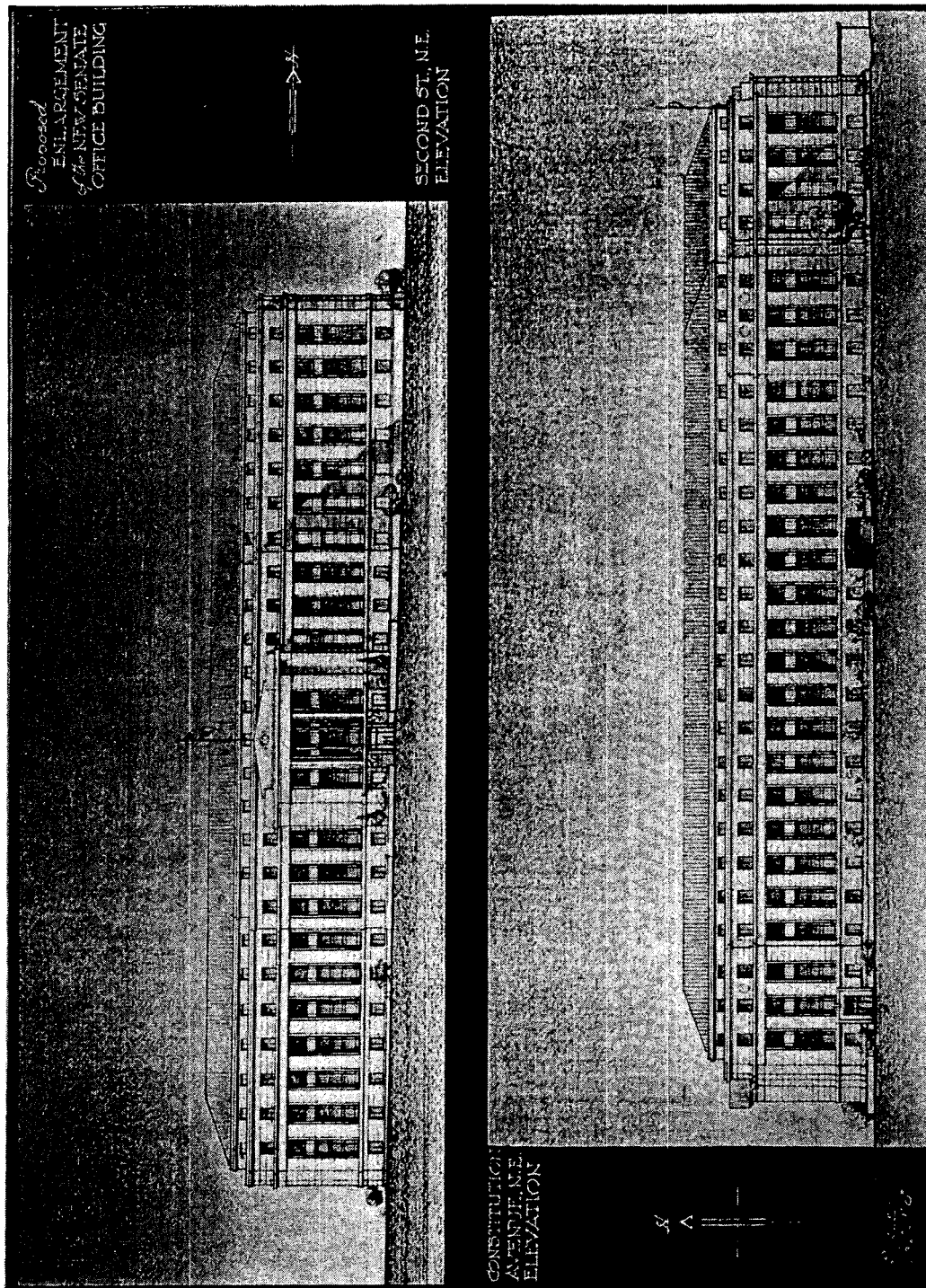
From 1966 to 1972 various alternatives were considered to alleviate the shortage of Senate office and parking space. The project authorized pursuant to Public Law 92-607 envisioned completing the Dirksen Office Building with a replica of the existing office building. (See page 4.) The proposed 654,800-square-foot extension would have provided essentially the same number of office and multipurpose rooms as the existing Dirksen Office Building. The proposed extension contained no additional hearing rooms. The \$47,925,000 appropriated for the proposed project was for the costs of constructing and equipping the building, exclusive of the costs of furniture and furnishings and the cost of expanding the Capitol Power Plant to service the proposed project.

Public Law 92-607 provided that the AOC would work under the direction of the Senate Office Building Commission and that the Commission and the Senate Committee on Public Works (now the Committee on Environment and Public Works) would have approval authority over the building plans. In addition, the law provided that:

"\* \* \* during each fiscal year, the Senate Committee on Public Works shall examine the progress and costs of construction of such building and

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1/Senate Resolution 296, October 11, 1972.



TOP RENDERED ELEVATION SHOWS FRONT VIEW (SECOND ST., N.E., ELEVATION) OF PROPOSED STRUCTURE.  
 BOTTOM RENDERED ELEVATION SHOWS SIDE VIEW OF EXISTING DIRKSEN BUILDING AND PROPOSED  
 STRUCTURE. (CONSTITUTION AVE. ELEVATION).

take such steps as are necessary to insure its economical construction." 1/

#### ASSOCIATE ARCHITECT

On February 6, 1973, the Senate Office Building Commission met to consider selecting an associate architect to provide architect/engineer (A/E) services for the proposed project. The AOC submitted a list of 10 firms he felt were qualified to the Commission for consideration. The Commission directed the AOC to narrow the list to three firms. By the Commission's March 22, 1973, meeting, the AOC had reduced his list of potential associate architects to four firms. However, the Commission postponed final selection.

On March 29, 1973, the AOC gave the Commission a list of the three firms he considered best qualified to serve as associate architect on the project. On April 9, 1973, the Commission interviewed representatives of the three firms, and on April 11, in accordance with the AOC's recommendation, unanimously accepted John Carl Warnecke and Associates (JCWA).

On April 12 the Commission Chairman announced that the Commission had authorized the AOC to negotiate with JCWA for A/E services for the proposed project. Contract negotiations were completed on August 1, 1973, although the contract was dated May 1, 1973, the date on which JCWA, pursuant to a request from the AOC, began preparatory work on the project pending the award of a formal, definitive contract.

Pursuant to the contract, JCWA is to provide, under the direction of the AOC and in accordance with criteria furnished by him, all A/E services required for the design of, solicitation of competitive bids and awards of contracts for, and construction and equipment of the Hart Office Building and related construction. The contract also provides that:

--The project be personally directed by John Carl Warnecke.

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1/This responsibility was transferred to the Senate Committee on Rules and Administration by Senate Resolution 4, February 4, 1977.

--JCWA maintain an office in Washington, D.C., adequately and properly staffed for servicing the project through completion of all construction work.

--JCWA be responsible for general observation and inspection of all construction work for the project.

For its services JCWA is to receive an amount equal to 6 percent of the total cost of all construction, plus additional amounts for extra services as authorized and performed and for extra expenses incurred under the contract.

#### DESIGN DEVELOPMENT

The Hart Office Building being constructed is not the same as envisioned when the project was authorized. Even before the authorizing legislation was signed, the Senate Committee on Public Works avored more flexible space/assignments than those allowable using the suite concept in the Dirksen Building. The Commission also requested the AOC to investigate alternatives for maximizing the amount of space that could be obtained on the site without adversely affecting the architecture.

The AOC and JCWA concluded that providing additional space within the confines of the original design would be aesthetically and functionally inappropriate. During the first (schematic) phase of the design process, JCWA studied the space needs of the Senators and their staffs, developed a detailed program defining all space requirements and special design considerations for the project, and developed two design concepts: (1) an internal arrangement based on a replica of the existing Dirksen Building and (2) a functional internal arrangement based on a significantly larger structure.

In October 1973 the Senate Office Building Commission and the Subcommittee on Public Buildings and Grounds, Senate Committee on Public Works, unanimously approved the new functional design concept. On January 7, 1974, the AOC formally notified JCWA that the functional schematic design had been approved and that additional funds had been provided to expand the project to include

--a 45-percent increase in use of the authorized building site;

- extension of the Senate subway system;
- construction of additional floors on the rear center wing of the Dirksen Building;
- changes to the Dirksen Building and the Richard B. Russell Building (the original Senate Office Building) to provide improved circulation to, in, and through those buildings and the Hart Building; and
- other changes required to properly correlate use of the three buildings.

Under the original concept, the building would have been comparable to a typical commercial office building in materials and methods of construction. However, as work on the design progressed, the quality of both construction methods and materials was continually upgraded to the point that the Hart Building now conforms to the monumental criteria typical of Capitol Hill structures.

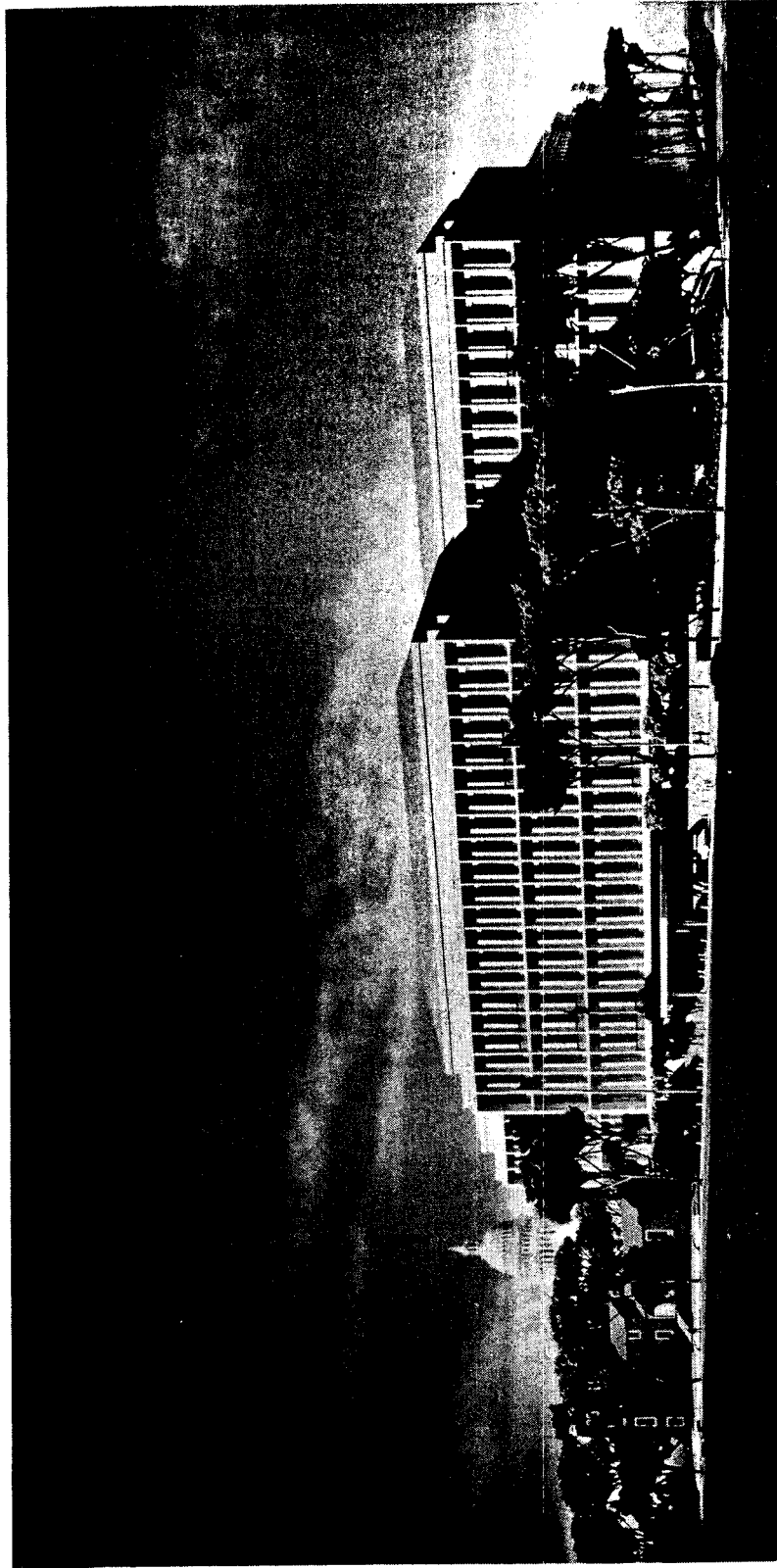
#### HART BUILDING

In designing the Hart Building, JCWA strove for a structure that was contemporary in its exterior appearance, but architecturally consistent with the existing buildings on Capitol Hill. (See p. 8.) The Hart Building will have a higher elevation than the Russell and Dirksen Buildings (see p. 9) and, unlike those structures, will have no open courtyards (see p. 10). Instead, the Hart Building will have an interior atrium <sup>1/</sup> and galleria spaces surmounted by skylights. (See p. 11.) The exterior will feature a 3-inch marble veneer wall system rather than the block marble traditional to Capitol Hill.

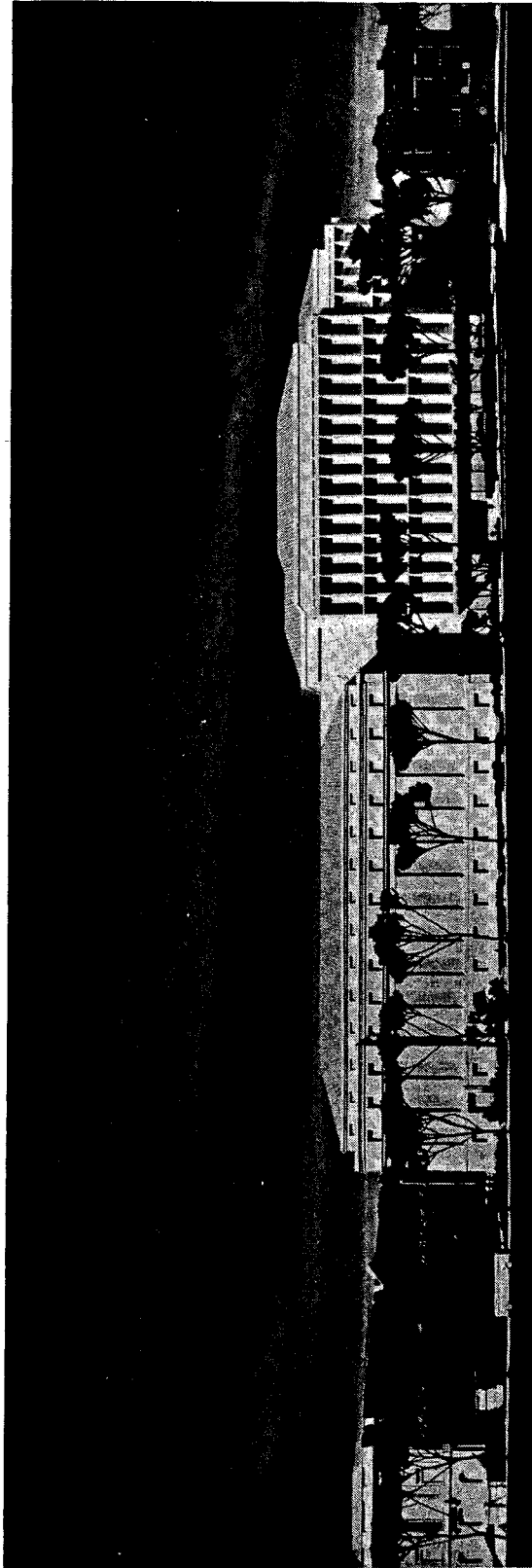
The building will provide space for 50 Senators and their staffs in two-level suites, plus auxiliary support functions. The Senators' private offices will have 16-foot ceilings, while the staff space will have 8-1/2-foot ceilings. Interior staircases will connect the two levels of each suite. Demountable partitions will provide flexibility in the staff and auxiliary spaces. Each suite will have its own washrooms.

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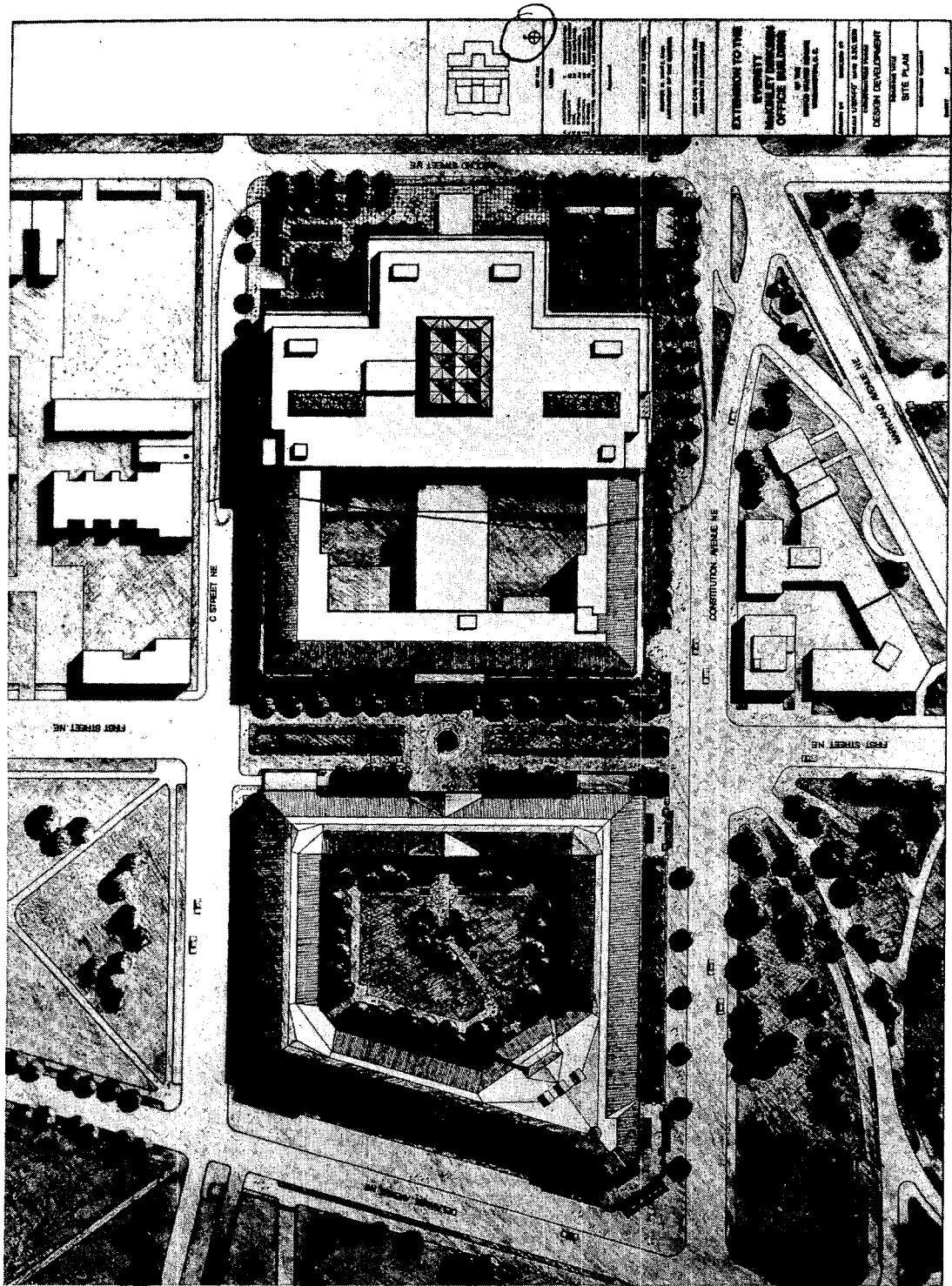
<sup>1/</sup>It is proposed that the atrium feature an Alexander Calder sculpture. (See p. 11.)



FRONT PERSPECTIVE (SECOND ST., NE., ELEVATION) OF PHILIP A. HART OFFICE BUILDING.



RENDERED ELEVATION OF RUSSELL (LEFT), DIRKSEN (CENTER), AND HART (RIGHT) BUILDINGS FROM CONSTITUTION AVENUE.



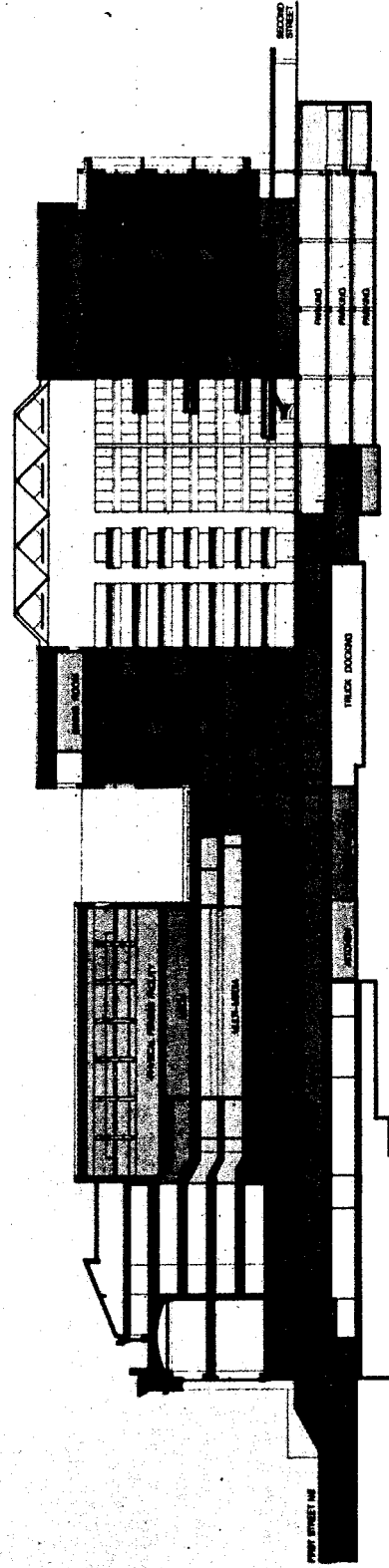
AERIAL VIEW OF SITE PLAN SHOWING RUSSELL (LEFT), DIRKSEN (CENTER), AND HART (RIGHT) BUILDINGS.





**Rendering of the atrium showing the Calder sculpture.**

Courtesy of John Carl Warnecke and Associates, and the Architect of the Capitol



Cross section of the Hart Senate Office Building. Senatorial suites and offices are shown in red, special purpose facilities in blue, passage ways in yellow, and mechanical spaces in brown. Courtesy of John Carl Warnecke and Associates, and the Architect of the Capitol

The color-keyed, cross-sectional drawing on page 12 highlights the major internal features of the Hart Building and the additions to the central wing of the Dirksen Building.

# OVERALL PROJECT

As currently programed, the overall project provides for developing 1,148,205 gross square feet of new construction and renovation of existing areas, as shown below.

<u>Description</u>	<u>Gross area</u>	<u>Net usable area</u>
	(square feet)	
Office space, including atrium and gallerias	612,241	394,504
Parking and receiving	221,144	211,485
Maintenance, data processing, storage, and miscellaneous	74,411	60,266
Food service facilities	21,578	21,578
Multimedia center and physical fitness facility	57,764	42,986
Subway extension	21,659	19,224
Truck access tunnel	9,000	8,000
Mechanical and electrical equipment rooms	<u>75,378</u>	<u>-</u>
	1,093,175	758,043
Contiguous areas	<u>55,030</u>	<u>-</u>
Total (new construction and renovation)	<u>1,148,205</u>	<u>758,043</u>

In addition to the office space, gallerias, and atrium in the Hart Building, the overall project's major aspects are:

- A two-story multimedia hearing room in the expanded central wing of the Dirksen Building, complete with built-in television lighting capability and observation booths for media coverage.
- A dining room, seating 100, on the ninth floor of the Hart Building.

- A physical fitness facility in the expanded central wing of the Dirksen Building.
- A 500-car parking garage beneath the Dirksen and Hart Buildings.
- Seating for an additional 400 people in the north cafeteria of the Dirksen Building.
- Food carryout services in the Dirksen Building.
- Extension of the Capitol subway to the Hart Building.
- Automated systems for handling materials and mail in the Hart Building.
- Environmental control and life-safety systems for the Hart Building.

#### CONSTRUCTION CONTRACTING

For designing and constructing the project, JCWA recommended the "fast-track" approach. Conventional design and construction involves a sequential process, whereby the entire project is designed before construction begins. With fast-tracking, the project is divided into phases. Construction begins on some phases while others are still being designed. When properly executed, fast-tracking, by overlapping the design and construction efforts, can significantly shorten the overall design/construction cycle of a project.

According to JCWA documentation, the AOC's investigation of JCWA's recommendation "proved" that fast-tracking was too risky for a custom designed and built structure requiring a flexible design and a life span of over 100 years. Instead, the AOC and JCWA decided to use a modified version of the conventional process. Although the project would be designed sequentially, it would be built in segments. 1/

The current program envisions six contracts 1/ (five construction contracts and one material procurement contract) for the project, as shown below.

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1/The AOC and the associate have designated each segment (contract) as a "phase" of the project.

<u>Contract number</u>	<u>Nature of contract</u>	<u>Status</u>
I	To provide temporary access to the Dirksen Building, by constructing a dock, receiving facilities, and access to the garage, until the total project is completed.	Contract awarded to Beiro Construction Company on May 20, 1975. Work was completed on November 17, 1975, and final payment was made on October 31, 1977.
II	Excavation and foundation construction for the Hart Building, including construction of (1) a truck tunnel to provide future delivery access to the basements of the Dirksen and Hart Buildings and (2) a tunnel connecting the existing subway system to the Hart Building.	Contract awarded to Hyman Construction Company on December 11, 1975. Final inspection by the AOC completed on August 16, 1977. Final payment awaiting resolution of change orders, claims, and appeals.
III	Furnishment, delivery, and storage of the exterior stone for the project, including all labor, equipment, and materials necessary to perform the work.	On February 9, 1977, the contract was awarded to Vermont Marble Company, the sole bidder. Under the contract, all stone is to be supplied by August 26, 1978.
IV	Construction of the superstructure of the Hart Building and the central wing of the Dirksen Building.	Contract awarded to Baltimore Contractors, Inc., on October 25, 1977. Construction is to be completed by April 14, 1980.
V	Interior and all related work for the Hart Building and central wing of the Dirksen Building, including interior partitions, finishes, mechanical and electrical systems, and installation of building transportation systems.	The AOC and JCWA are developing bid packages.
VI	Demolition and renovation of specific areas of the existing Dirksen and Russell Buildings and the Russell courtyard.	Various proposals have been developed by JCWA and reviewed by the AOC. Further work will not proceed until additional appropriations are available and the contract V bids received.

### CURRENT STATUS

As of June 1978 the contractor for the superstructure contract was about a month behind schedule. Part of the delay was apparently due to problems resulting from the excavation and foundation construction. The excavation and foundation contractor incorrectly installed some anchor bolts needed to secure the structural steel to the foundation. Although corrective action was taken, the superstructure contractor questioned the structural integrity of some of the corrected anchor bolts. In February and March 1978, the superstructure contractor was authorized to make the necessary corrections.

Procurement of the stone under contract III was also experiencing problems as of June 1978. The contractor was ahead of schedule for some categories of stone but was behind schedule in most categories. The contractor has notified the AOC that actions were being taken to accelerate progress to meet the schedule.

The estimate of \$55.5 million for the interior contract was based on the AOC receiving bids on that contract by July 13, 1978. As of July 26, the bid package had not been finalized. As discussed in chapter 4, the low bid price for the interior contract could significantly exceed the AOC's \$55.5 million estimate.

### CHAPTER 3

#### ESTIMATED PROJECT COSTS

Since the initial authorization of \$47,925,000 in October 1972, the project's estimated cost has escalated. At the time of our review, the AOC was seeking a supplemental appropriation that would increase the project's authorization to \$122,647,000. As discussed in chapter 4, we do not believe that amount will be sufficient to construct the project as currently envisioned.

#### APPROPRIATION HISTORY

To date, \$85,147,000 has been appropriated for the overall project, with an additional \$37,500,000 now being sought by the AOC.

#### Project Appropriations

<u>Authorizing legislation</u>	<u>Amount appropriated</u>	<u>Cumulative appropriations</u>
Public Law 92-607 (Oct. 31, 1972)	\$47,925,000	\$47,925,000
Public Law 93-245 (Jan. 3, 1974)	20,900,000	68,825,000
Public Law 93-554 (Dec. 27, 1974)	16,322,000	85,147,000

As discussed previously, the original \$47,925,000 was to construct a replica of the existing office building. The two increases authorized in 1974 (totaling \$37,222,000) were primarily a result of the increased scope and quality of the project as well as inflation.

#### PROPOSED INCREASE

The proposed increase of \$37,500,000 in the project's authorization is justified by the AOC as follows.

Proposed Increase in Project Authorization

Additional inflation	\$15,445,400
Design, quality, and value improvements (note a)	10,635,400
Increased scope of project	446,000
Unforeseen market or field conditions	791,500
Inaccurate estimates	<u>4,757,900</u>
 Total additional construction costs	 32,076,200
 Additional allowance for construction con- tingencies	 2,055,800
Additional A/E fees	1,924,600
Additional administration and miscellaneous related expenses	<u>1,443,400</u>
 Total proposed increase	 <u><u>\$37,500,000</u></u>

a/Includes such items as increased structural strength to compensate for thicker marble and additional toilets, improvement in quality of materials in the atrium, carpeting, additional Senators' toilets, and improved temperature and lighting controls.

According to data supplied by the AOC, the \$37,500,000 is needed to defray cost increases that have occurred and are occurring in contracts I through IV and to meet anticipated increases for contracts V and VI.



Sources of Increase  
In Estimated Project Costs

Increases related to contracts I through IV:

Inflation	\$ 6,196,100
Design, quality, and value improvements	4,965,500
Increased scope and area of project	465,400
Unforeseen conditions and change orders	791,500
Inaccurate estimates	<u>2,686,000</u>

15,104,500

Projected increases for contracts V and VI:

Inflation	9,249,300
Design, quality, and value improvements	5,669,900
Increased scope and area of project	-19,400
Inaccurate estimates	<u>2,071,900</u>

16,971,700

Other increases:

Contingencies	2,055,800 <sup>06409</sup>
A/E fees	1,924,600
Administrative costs	<u>1,443,400</u> <sup>0450</sup>

Total increases

37,500,000

OVERALL PROJECT ESTIMATES

The following table summarizes the overall project estimates from October 1972 to June 30, 1978.

<u>Contracts</u>	<u>October</u> <u>1972</u>	<u>January</u> <u>1974</u>	<u>December</u> <u>1974</u>	<u>June 30,</u> <u>1978</u>
I			\$ 198,000	\$ 211,000
II			4,438,000	5,850,000
III			2,384,000	5,808,500
IV			23,925,000	34,180,000
V			39,657,000	55,516,700
VI			<u>2,904,000</u>	<u>4,016,000</u>
Total costs	\$43,000,000	\$59,700,000	73,506,000	105,582,200
Contingencies	625,000	2,625,000	4,005,000	6,060,800
A/E fees	2,580,000	3,582,000	4,327,000	6,251,600
Administrative costs	<u>1,720,000</u>	<u>2,918,000</u>	<u>3,309,000</u>	<u>4,752,400</u>
Total project estimates	<u>\$47,925,000</u>	<u>\$68,825,000</u>	<u>\$85,147,000</u>	<u>\$122,647,000</u>

## CHAPTER 4

### COSTS TO COMPLETE PROJECT

We do not believe that the project, as presently designed, can be constructed for \$122,647,000. The AOC's estimate is questionable because it underestimates the probable bid price of the interior contract and does not make adequate allowances for contingencies and change orders. In our opinion, the additional \$37,500,000 being sought by the AOC could be insufficient, when combined with the existing unobligated funds available for the project, to meet the low bid price for the interior contract.

Also, we do not believe that the inclusion of "deductible alternatives" in the bid package for the interior contract will significantly reduce the scope and cost of the project. Further, the AOC's \$122,647,000 estimate involves only the costs of designing and constructing the project and does not encompass certain indirect costs associated with the overall project.

### INTERIOR CONTRACT

The current estimate of \$55,516,700 for the interior contract is understated because of an error in the unit prices for interior marble and delays in putting the package out for bid. Additionally, the estimate has a built-in margin of error of plus or minus 10 percent.

In the requirements for the interior contract, we found apparent inaccurate estimates of the unit prices for the marble for the stairs and ceilings. Our findings were confirmed by both the staff of the AOC and the associate architect's consultant responsible for preparing the estimate. Revised estimates by the AOC's staff and the consultant indicate that the unit prices for interior stone are understated by \$1 million to \$1.5 million. As of July 5, 1978, the AOC had not corrected the estimate for the interior contract.

The estimate of \$55,516,700 was predicated on bids being received by July 13, 1978. At the time of our review, the AOC's schedule precluded bids being received earlier than the middle of September 1978. Assuming this date is met, the estimating consultant believes that the 2-month delay would add at least \$1.1 million to the bid prices (based on an inflation factor of 1 percent per month). Any additional delays beyond a September 15 bid date will further escalate the inflation in the bid prices.

The consulting estimator stated that, like the estimates for the other segments of the project, the interior contract estimate has a plus or minus 10-percent margin of error factor. Recent experiences with contract awards for the project have shown that the low bids are likely to exceed the estimates. The sole bid on the stone procurement contract (\$5,810,444) exceeded the estimate (\$4,862,000) by more than 19 percent. The low bid on the superstructure contract (\$34,180,000) exceeded the estimate (\$31,500,000) by more than 8.5 percent.

### CONTINGENCIES

The AOC's current estimate of \$122,647,000 contains allowances of \$6,060,800 for contingencies, which is supposed to cover:

- The increased cost of awarding contracts V and VI if the low bids exceed the current estimates of \$55,516,700 and \$4,016,000, respectively.
- Any additional A/E fees beyond the current estimate of \$6,251,600.
- Unanticipated administrative costs beyond the current estimate of \$4,752,400.
- All change orders and claims on contracts IV, V, and VI.

Even if no additional costs are incurred for the first three categories of contingencies, the \$6,060,800 is an insufficient allowance, in our opinion, for probable change orders and claims on the final three construction contracts. That figure represents about 6.5 percent of the estimated cost of \$93,712,700 for contracts IV through VI. This allowance is lower than the estimates of the AOC and the associate architect for potential claims and change orders on contracts IV through VI.

For contract I, claims and change orders exceeded 20 percent of the original contract amount. For contract II, the final resolution of all claims and change orders could increase the original contract amount by about 6 percent.

Contracts IV and V, which comprise about 85 percent of the estimated construction cost of the project, involve the most complex, detailed construction requirements. For contract IV, the AOC's staff said they anticipate change orders

of at least 10 percent. The associate architect's estimator predicts between 10 and 15 percent for change orders on contract V.

INSUFFICIENT FUNDS TO  
AWARD INTERIOR CONTRACT

At the time of our review, the AOC and the associate architect were preparing the bid package for the interior contract. Even with the additional \$37,500,000 being sought by the AOC, we believe the low bid on contract V could exceed the available funds. Such a situation occurred about 3 years ago on the Library of Congress James Madison Memorial Building now under construction.

The final construction contract for the Madison project was for the interior and related work. Recognizing that limited funds were available, the AOC requested bids in packages having a base bid plus a number of options for financial flexibility. <sup>1/</sup> However, when the bids were opened on July 23, 1975, the lowest base bid exceeded both the available funds and the authorized cost of the project. The AOC requested all bidders to extend their bids. On February 27, 1976, the Congress raised the authorization from \$90,000,000 to \$123,000,000 by appropriating an additional \$33,000,000 to complete the project (Public Law 94-219). Currently, the AOC is seeking an additional \$10,000,000 increase in the project's cost limitation and appropriations, primarily for claims and change orders.

With respect to the overall Hart Building project, the AOC's records showed \$52,778,870 in costs or obligations incurred through May 31, 1978.

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<sup>1/</sup>Like the Madison situation, contract V of this project is for interior and related work, and the bid package will contain optional items (deductible alternatives).

Contract I	\$ 211,032
Contract II	5,794,009
Contract III	5,730,074
Contract IV	34,181,883
Miscellaneous	<u>160,723</u>

\$46,077,721

Insurance and indemnities claims	450
Administration	2,159,699
A/E fees	<u>4,541,000</u>

.0469

Total

\$52,778,870

To date, \$85,147,000 has been appropriated for the project. Reducing this by the \$52,778,870 in costs and obligations incurred through May 31, 1978, about \$32.4 million in unobligated funds remains, exclusive of additional costs and obligations incurred since May 31. The \$37,500,000 additional request will increase this amount to about \$69.9 million.

The AOC's current estimate for the interior contract is \$55,516,700. As discussed previously, this estimate is understated by \$2.1 to \$2.6 million (\$1 million to \$1.5 million error in the unit prices of the interior marble and \$1.1 million in inflation because of the 2-month delay in bidding). These two factors increase the estimated bid price of the contract to about \$58 million, assuming the rest of the prices and quantities in the bid price estimate are accurate. The built-in margin of error anticipates the possibility that the low bid price will exceed the estimate by as much as 10 percent, as occurred on contracts III and IV. A 10-percent increase would add almost \$6 million, raising the potential low bid to about \$64 million. Further delays in the estimated bid opening date, errors in the bid package estimate similar to that involving the unit prices for interior marble, an especially tight construction market at the time of bidding, or other unforeseen factors could cause the low bid price to further increase, even to the point of exceeding the available funds.

In any event, any contract award in excess of \$55,516,700 can only be met by using funds already designated for other purposes. Using the contract VI funds (\$4,016,000 for renovations to the Russell and Dirksen Buildings), as has been suggested by the AOC, would raise the amount available for the interior contract award to about \$59.5 million, assuming

that contract VI is eliminated without any corresponding reduction in the \$122,700,000 estimate. If the low bid exceeds \$59.5 million, the award could only be made using the designated funds for administration, A/E fees, or the already inadequate (in our opinion) allowances for contingencies.

Another approach would be to accept some or all of the deductible alternatives in the interior contract. Although this approach would reduce the award price of the interior contract, it would not, as discussed below, reduce the cost or scope of the project.

#### DEDUCTIBLE ALTERNATIVES

The February 28, 1978, motion of the Senate Office Building Commission directed the AOC to provide the Commission with at least one alternative plan for completing the project at or near \$85 million. This was superseded by the Commission's May 17, 1978, action requiring the bid package for the interior contract to contain separate and alternative bids for possible cost reduction items. In response to the May 17 action, the AOC included 13 deductible alternative items, estimated to cost about \$10 million, in the interior bid package.

Our analysis, confirmed by the AOC's staff, shows that these items are deductible only from the interior contract, not from the overall project. Eleven <sup>1/</sup> of the 13 items are classified by the AOC as transfers, work that has to be done before the building can be occupied. The AOC believes that, if necessary, these items can be funded from a source other than the interior contract.

For the other two items, the AOC considers the Hart Building's first floor security station (\$50,000) as an item that could be delayed but that eventually will be necessary to make the building completely functional. The AOC considers only 1 of the 13 items--wood paneling in the Senators' private offices (\$1.5 million)--as something that could be "deferred indefinitely."

The inclusion of deductible alternatives in the interior contract is not an effort to reduce the scope and cost of the project. Rather, it is a means of giving the AOC increased

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<sup>1/</sup>Includes carpeting, demountable wall partitions, window blinds, and the automatic materials distribution system.

flexibility in awarding the interior contract if the additional \$37.5 million is authorized. The deductible alternatives will allow the AOC to reduce the contract award, by as much as an estimated \$10 million, if the low bid exceeds the available funds.

#### TOTAL COSTS

The AOC's estimate of \$122,647,000 applies only to design and construction costs. Certain other indirect costs are associated with this project, including

- the furniture and furnishings for the Hart Building and the new central wing of the Dirksen Building;
- the \$728,000 cost to renovate the Dirksen Building kitchen (the funds for this project were appropriated by Public Law 94-440, Oct. 1, 1976);
- overhead costs of the Office of the Architect's management and support staff involved with, but not specifically assigned to, the construction project;
- alterations to the Capitol Power Plant to supply the new structure; and
- relocation of employees to the new structure.

In addition, when the Hart Building is completed and employees are relocated to it, the Russell and Dirksen Buildings will have to be renovated to accommodate the approximate one-half reduction in their current populations. Such alterations could be quite costly, especially if the new accommodations in those two buildings are to be comparable to the Hart Building. In this connection, Public Law 95-94, August 5, 1977, appropriated \$380,000 for the preliminary planning effort to renovate the two buildings.

CHAPTER 5  
CONSTRUCTION PROCEDURES  
AND PRACTICES

In addition to the costs, the Commission requested us to review four other aspects relating to construction of the project.

FACTORS IN THE DELAY

In April 1973 the associate architect informed the Commission that, once the program for the project was established, the building would be ready for occupancy in 4 years. The AOC's latest estimate is that construction will be completed by June 1, 1981. There are, in our opinion, four primary causes for the delays.

Preliminary planning and  
design program development

When the associate architect was selected in 1973, a definitive design program detailing the Senate's needs had not been developed. Generally, a detailed program is developed before a design firm is selected and frequently before any funds are requested for a project. In this instance, the AOC's preliminary planning was primarily related to supporting the need for the additional space.

The programing effort was made part of the A/E contract, which stipulates that:

"The Associates [JCWA] shall consult with the Architect [AOC] concerning the space requirements of the Senate, perform such research and studies as may be necessary, and develop and present to the Architect, for his approval, a detailed definitive program for the Project. In their preparations for development of the program, they shall evaluate all available data and details as to space requirements and shall be guided by any program requirements by the Architect."

The detailed programing effort extended from May 1973 through the preparation of the documents for each contract. In effect, the design program was developed and expanded as the project progressed.



### Congressional review and approval

In mid-1973 the AOC informed the associate architect that the Senate Office Building Commission and the Senate Public Works Committee would probably need more than 2 months to review and approve the schematic drawings, and at least that amount of time for design development review and approval. Both the Commission and the Committee exceeded these parameters.

There was also a 6-month delay, in 1974, concerning congressional approval of the design and supplemental funding for the project (Public Law 93-554). This delayed the start of contract-drawing preparations, since the AOC maintained he could not authorize the work without sufficient funding to put the documents out for bid.

### Contract documents and reviews

The degree of perfection the AOC requires in the contract documents and the reviews necessary to obtain such perfection have also contributed to the delays. Originally, the AOC was to make only one review of the drawings and specifications for each contract. In practice, however, the AOC's staff has reviewed the associate architect's submissions for each contract at least twice, and generally three times. As shown below, the AOC's reviews, along with the time expended by the associate architect to make corrections in the contract drawings and specifications, have far exceeded the original estimates.

#### Reviews of Contract Documents

<u>Contracts</u>	<u>Original AOC estimate</u>		<u>Actual experience</u>	
	<u>Number of reviews</u>	<u>Total time (note a)</u>	<u>Number of reviews</u>	<u>Total time (note a)</u>
		(months)		(months)
I	1	1.5	2	5.5
II	1	2	3	4.5
III	1	2	3	8
IV	1	3	2	11
V	1	3	4	b/9.5
		11.5		40.5

a/Includes time expended by associate architect to make corrections.

b/Based on an invitation to bid date of July 15, 1978.

### Design changes

The project has been designed as the contract documents for the segments are developed. This has resulted in delays while the AOC reviews options and provides direction to the associate architect. Throughout the project's development, the design has been changed, sometimes even after the final drawings for a contract have been approved and signed by the AOC. The AOC relates many of these changes to the need to maintain flexibility in the structure.

For example, in September 1976 the AOC directed the associate architect to add an additional 100 private toilet rooms in the 50 senatorial suites. The associate architect estimates that this change required an additional 3 weeks, to allow the documents for the superstructure contract to be completed, reviewed, and corrected.

Other design changes, and the associate architect's estimate of the additional time required to make them, include:

- Increase in thickness of exterior marble from 1.5 to 3 inches (3-1/2 months).
- Extension of fire stair in the expanded central wing of Dirksen Building to provide access to future rooftop tennis court (2 weeks).
- Change in floor design of multimedia room to allow committee hearings to be conducted at either end of the room and to accommodate television coverage from outside the room (3 weeks).

### AOC'S TIMETABLES AND FAST-TRACKING

To date, none of the AOC's timetables for the project have proven realistic. Further, the delays in putting contract V out for bid, the problems being encountered on contracts III and IV, and the question of additional funding raise doubts about the reasonableness of the current estimated completion date of June 1981. In our opinion, a realistic timetable may not be feasible, primarily because of:

- The quality of construction needed to build a project having a lifespan of more than 100 years, which negates using the methods of time estimating prevalent in the construction industry.

- The degree of perfection required in the contract documents, including the review and correction processes.
- The impact of congressional review and approval on project design, construction, and funding.
- The continuing changes to the project's design.

As discussed in chapter 2, this project is not being designed and constructed using the fast-track method. Instead, it is being designed sequentially, while construction is being done in segments. This method eliminates two of the major benefits of fast-tracking:

1. There is no significant overlapping of the design and construction efforts, and thus no shortening of the overall design/construction cycle.
2. The use of segmented construction contracts did not, in our opinion, reduce the project's exposure to escalating market costs, since contracts IV and V--which involve the major construction costs of the project--were not put out for bid in the early stages of the design/construction cycle.

#### A/E FEES

Under the A/E contract, the associate architect will be paid an amount equal to 6 percent of the total cost of all construction work, plus any additional amounts authorized for (1) preparation of an environmental impact statement, if required by the AOC, (2) extra services performed and extra expenses incurred resulting from changes ordered by the AOC, provided the changes are not adequately compensated for through increases in construction costs, and (3) services of experts, including expert witnesses in any litigation. Since the basic fee is based on the total construction costs, any delay that causes the construction costs to increase, automatically increases the compensation to JCWA, provided the delay did not result from an error or omission by JCWA.

Under the contract, the basic fee to JCWA has increased from the original estimate of \$2,580,000 to the current estimate of \$6,251,600. Further, some increases in the project's construction costs can be directly related to inflationary increases resulting from delays. However, no evidence suggested that the associate architect, or any of his consultants, purposely or intentionally delayed the project. It

should be noted that the same inflationary and delay factors which have caused the project's construction costs to increase have also caused higher operating costs for JCWA. Our architectural consultant noted that it is not unusual for everyone to lose financially on a large and complex project, especially one that had no clearly defined design program to implement from its beginning.

#### Additional A/E costs

In January 1974 the AOC requested JCWA to provide sheeting and bracing drawings as part of the bid documents for the excavation and foundation contract. Normally, the contractor is responsible for designing the sheeting and bracing in accordance with established practice in the construction industry. The AOC maintained that the requirement that the associate architect design the sheeting and bracing was his standard practice and that he wanted to prevent any failure by making certain that the sheeting and shoring design was adequate to ensure safety.

JCWA contracted for the design as required, and then placed a claim for \$35,000 to cover the costs of the services, which the firm contended were extra services under the contract. The AOC rejected the claim, stating that in the original contract negotiations the AOC and JCWA had agreed to increase the traditional 5- to 5-1/2-percent fee to 6 percent (1) because of the many unknown factors existing at that time and (2) to insure that the professional services JCWA rendered would be absolutely all-inclusive to the extent that the AOC would find necessary and would direct.

No actions on this claim are pending, but the matter has not been resolved. In addition, several other matters could result in additional claims by JCWA for compensation. For example, while contract documents were being prepared, JCWA was asked to investigate and program preliminary schematic space allocations for the possible relocation of the stationery room.

#### AOC'S PROCEDURES

In the procedures the AOC used on this project, we found three major deviations from the standard practices of Federal construction agencies.

### A/E selection

Selection of the associate architect for this project differed in two respects from the Federal procurement policies in effect at that time. First, the project was not publicly announced as required by Public Law 92-582, which declares that it is Federal policy to publicly announce all requirements for architectural and engineering services. Secondly, the AOC did not have any established and published criteria for making the A/E selection on this project as required by the same Public Law. \*

Although the AOC's selection process deviated from standard Federal practice, by law--the Federal Property and Administrative Services Act of 1949, as amended (40 U.S.C. 474)--the AOC is exempt from Public Law 92-582.

As far as we can determine, the selection was made based on demonstrated competence and qualifications, as required by the law. An adequate number of firms were considered, each was given a preliminary interview, and the field was then narrowed down to the three final contenders based on the interviews. However, the AOC's records did not show whether "anticipated concepts and the relative utility of alternative methods of approach for furnishing the required services" were discussed with the firms interviewed, as required by Public Law 92-582.

### No standard policies and procedures

Under normal Federal A/E procurement procedures, most Federal agencies provide their consulting A/Es with detailed programs, manuals, and procedures for the design and construction of new buildings. This material covers such matters as general design criteria, A/E performance standards, instructions on how to prepare drawings and claims, and general operating procedures. The office of the AOC does not have a similar procedure, and each A/E (associate architect) commissioned to do work on Capitol Hill must familiarize itself with how the AOC's office operates through discussions with the AOC's staff. \*

### Inadequate project control systems

Federal agencies have long recognized that the lack of a disciplined approach to the design and construction process is a barrier to the effective control of time and cost on construction projects. A disciplined approach, properly implemented, provides total visibility of the decision processes

during all phases of a project. Any approach used should provide three types of information: (1) schedule and progress data, (2) actual cost data, and (3) budgetary data.

\* The schedule and process control could be a comprehensive critical path method 1/ or similar schedule reporting system capable of producing early and late start criticality and responsibility reports. The AOC does not have, in our opinion, an adequate system for monitoring the progress of the project. Although the AOC does have limited in-house capability to track certain items, namely shop drawings, through a disciplined approach, most schedule and progress reports are either prepared manually by the AOC or generated monthly by the contractors. At the time of our review, for example, the AOC had no viable, detailed, schedule/progress mechanism to relate the impact of contract IV progress on contract V.

\* Regarding cost control, the AOC's system is based on the associate architect's prepared estimates. The AOC rarely alters or adjusts these estimates, and we found no cost control module that would provide project participants with the project's current cost/estimate status versus the budget. The lack of such a module has, in our opinion, contributed to the reliance on outdated estimates.

Neither the AOC nor the associate architect has a formal, centralized, active system for updating project estimates as the scope or quality of the project is increased or as delays are encountered. In fact, the project estimates were not formally updated until the funding situation became critical.

\* Also, the AOC does not maintain a detailed project operating budget, responsive to experience and to periodic revisions as estimates are updated. Funds appropriated for the project are lump sums, and the AOC does not allocate the funds to detailed budget categories. Fund control resides solely at the appropriation level. In our opinion, this has contributed to critical management decisions on project funding being postponed until total funds are inadequate to proceed as planned.

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1/At the time of our review, the AOC was negotiating for certain critical path method services limited to the remainder of the superstructure contract.

## SITUATION IS NOT UNIQUE

The problems being encountered with cost increases and delays have also been experienced on other Capitol Hill construction projects. The two most recent buildings constructed by the AOC--the Rayburn House Office Building and the Library of Congress James Madison Memorial Building--experienced similar problems.

### Rayburn Building

When the Rayburn Building was authorized on April 22, 1955, no architectural plans or estimates had been developed. By May 1956 the A/E had submitted a preliminary estimate of \$64,000,000. A year later, the A/E's final estimate of \$66,500,000 was authorized with a scheduled completion date of early 1961. When completed in January 1965, the final cost of constructing the building was estimated at \$87.7 million. 1, 2/

### James Madison Memorial Building

Construction of the James Madison Memorial Building was authorized by Public Law 89-260, approved October 19, 1965, at a cost limit of \$75,000,000. The cost limit was increased to \$90,000,000 by Public Law 91-214, approved March 16, 1970, and to \$123,000,000 by Public Law 94-219, approved February 27, 1976. Currently, the AOC is seeking an additional \$10 million for the project.

In April 1970 the project was scheduled for completion by January 1975. By October 1973, the scheduled completion date had slipped to July 1977. Currently, the AOC has a scheduled completion date of May 31, 1979, for the final construction contract.

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1/Includes \$3,349,537 for furniture and furnishings.

2/The entire cost of the "Additional House Office Building Project," including the Rayburn Building, extension of the subway from the Capitol to the Rayburn Building, acquisition of other properties for underground garages, construction of underground garages, and remodeling of the Cannon and Longworth Buildings, is estimated at about \$135 million, pending final resolution of outstanding contractor claims.

COMMENTS OF THE AOC AND  
THE ASSOCIATE ARCHITECT

The draft of this report was reviewed and informally commented on by the AOC and the associate architect. They had no major criticisms of our findings, and their comments have been incorporated where appropriate. Both agree that the report accurately depicts the circumstances surrounding the project's design and construction.



## SENATE OFFICE BUILDING COMMISSION

February 28, 1978

The Honorable Elmer B. Staats  
Comptroller General of the United States  
Washington, D C. 20548


Dear Mr. Staats:

The Senate Office Building Commission, at its meeting of this date, unanimously adopted the following motion:

- 1) The Architect of the Capitol is directed to provide at least one alternative plan for completing the Hart Senate Office Building at or near the \$85,000,000 presently appropriated.
- 2) The General Accounting Office is directed to review the costs of the Hart Senate Office Building: the factors in the delay, whether the Architect's timetable and the "fast-track" (phased construction) proposal was realistic and properly carried out, whether the associate architect's delay resulted in increased fees to the architect, and whether the procedures utilized by the Architect of the Capitol were standard ones that adequately protected the interest of the taxpayers.

Accordingly, because of the urgency of this matter, you are hereby requested to commence a review of this project, and report thereon, at the earliest possible date in order that the Commission may complete its deliberations relating to the possible additional cost of construction of the Hart Senate Office Building prior to the scheduling of Appropriations Committee hearings.

Sincerely,

  
John Sparkman  
Chairman

  
Henry Bellmon  
Ranking Minority Member