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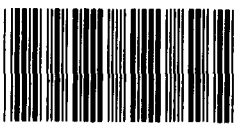
Report to Congressional Requesters

March 1991

NAVY OFFICE SPACE

Cost Estimate for Consolidating the Naval Systems Commands May Be High



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United States
General Accounting Office
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General Government Division

B-243108

March 8, 1991

The Honorable John Warner
United States Senate

The Honorable Frank Wolf
House of Representatives

This report responds to your request that we review costs estimated by the General Services Administration (GSA) for Naval Systems Commands offices to be located in Northern Virginia. You questioned whether the $240 million the House and Senate agreed to appropriate for the facility and an additional $10 million for contingencies was sufficient to cover construction and land acquisition costs. GSA estimated it would cost $273.8 million to construct 1 million square feet of occupiable space, including purchase of the land.

Results in Brief

Although the estimating process is not precise or entirely scientific, partly because estimates of future costs are based on judgment and assumptions made for unknowns such as land sites and building features, we believe that GSA's cost estimate of $273.8 million for 1 million square feet of occupiable space could be high. Our estimate for the proposed facility is $257.8 million. Our construction cost estimate was $34.8 million lower than GSA's, while our land cost estimate was $19.3 million higher than GSA's.

One indicator we considered in concluding that GSA's estimate could be high was that GSA cost estimates for 10 recent construction projects, which followed an estimating process similar to that used for the Navy project, were 9 percent higher overall than the eventual contract awards. Further, GSA's estimated cost per square foot for the proposed Navy project exceeded the agency's general cost guidelines. Also, current real estate development market conditions are such that offerors may be willing to accept lower than normal overhead costs and profits.

GSA's specifications for the Navy project contain minimum required standards that must be met and certain desirable features that do not have to be provided. Although GSA's and our estimates were based on expected costs of meeting desired standards for the project, the government may receive proposals for amounts considerably lower because offerors may submit proposals based on GSA's lower minimum standards. The contract cost of the Navy project will not be known until GSA awards the contract.

Background

In April 1990, GSA requested from Congress authority to construct an office facility with 3 million square feet of occupiable space with a total cost of $821.5 million. As estimated by GSA, the facility included six buildings, 42 acres of land, and a separate heating plant. It was to provide office space for about 17,000 Naval Systems Commands employees currently housed in 20 leased buildings, primarily in Crystal City, Virginia.

After Congress indicated that it would fund construction of a 1-million-square-foot building and a lease for another 1 million square feet, GSA estimated the cost of a 1-million-square-foot facility by dividing the $821.5 million estimate by three and arrived at $273.8 million. A more complete chronology of events regarding the estimate is contained in appendix I.

GSA based its cost estimate on building specifications contained in the Solicitation for Offers (SFO), which was drafted by GSA and the Navy and issued on October 4, 1989. The SFO, which had been amended 13 times by February 1991, contains specifications regarding building size, minimum required standards, and certain desirable features, such as increased space between columns and extra floor strength. The SFO does not specify a site, but it does restrict the location to Northern Virginia, no more than 1.5 miles outside the Capital Beltway. In response to the SFO, GSA received six proposals to construct on sites all located in Arlington and Alexandria, Virginia. GSA prepared its estimate by obtaining unit prices of materials and services from previous GSA projects, private contractors and suppliers, and GSA mechanical and electrical specialists and multiplying these prices by estimated quantities.

Objective, Scope, and Methodology

Our objective was to determine whether GSA's cost estimate was reasonable. We reviewed GSA's cost estimate and related documents, including recent GSA contract awards and estimates for construction work, GSA Central Office general guidelines for construction costs, building standards and estimating procedures, and selected GSA cost estimate sources. In addition, we interviewed GSA personnel involved with the cost estimating process.

We also hired expert consultants to assist in our review of GSA's construction and real estate cost estimates. Our construction cost consultant was Mr. Douglas Mitten, President of Project Management Services, Inc., Rockville, Maryland. Mr. Mitten has 20 years of construction experience and 6 years of independent cost estimating experience for such clients

as GSA and the Department of Defense. Our real estate consultant was Mr. John D. Dorchester, Jr., President of Real Estate Sciences International, Inc., Winnetka, Illinois. Mr. Dorchester has over 30 years' experience in the real estate appraisal area for numerous federal agencies and others. We did our work in accordance with generally accepted government auditing standards from November 1990 to March 1991. We discussed our facts and conclusions with GSA officials and included their comments in this report.

How Our Construction Cost Consultant Prepared His Cost Estimate

Our construction consultant estimated the cost of an office facility with 1 million square feet of occupiable space at $187.3 million, $34.8 million less than GSA's $222.1-million estimate, excluding land and design costs. Our consultant, like GSA, included in his estimate the cost of desirable, rather than minimum, materials and services on the basis of his understanding of current industry practices and SFO requirements.

Our consultant used historical cost per square foot data from six federal and state office buildings and eight federal and state courthouses for contracts awarded in various locations between 1975 and 1990 and multiplied those costs by estimated required quantities for each building system.[1] Our consultant computed historical costs for each building system.[2] He then adjusted the historical data to reflect general price changes from the actual construction dates to January 1991 and locality differentials compared to Washington, D.C., using indexes provided by R.S. Means, a national building construction cost data service. In addition, our consultant modified the historical data to reflect the SFO's requirements regarding the size of buildings and desired features for the Navy facility.

How We Estimated Land Costs

Estimating the cost of land is even more uncertain than estimating construction costs, particularly when the specific site for a facility has not been selected. Our real estate consultant said that in spite of the variations among (1) possible locations for sites in Northern Virginia; (2) possible site configurations; (3) floor-to-area ratios (the amount of buildable space per unit of land) that the relevant local communities (Arlington

[1]There are 12 building systems in GSA's cost estimating system: foundation; substructure; superstructure; exterior closure; roofing; interior construction; conveying systems (elevators); mechanical; electrical; general conditions, overhead and profit; equipment; and sitework.

[2]Our consultant obtained this data from GSA, the Navy, and from his own files. The database included buildings that, although smaller than the Navy building, were built to government standards and included data on as many buildings as the consultant could obtain in the time available.

and Alexandria, Virginia) would allow; and (4) overall land requirements for the project, GSA's land cost estimate of $47.3 million appeared reasonable, with two exceptions. First, although there has been a substantial reduction in market activity recently, there are indications that general price ranges for land in Northern Virginia have decreased 15 to 30 percent since GSA prepared its estimate. Second, although GSA said its land estimate included an unspecified provision for some off-site infrastructure costs, our consultant said it was not sufficient for a large-scale development such as that envisioned for the Naval Systems Commands.

To estimate the costs of land for this project, we adjusted GSA's figures to account for these factors. The result was an estimate of $66.6 million, $19.3 million higher than GSA's. An explanation of our calculations follows.

1. We divided our estimated 1,333,333 gross square feet needed to provide 1 million square feet of occupiable space by 2.38, the floor-to-area ratio used by GSA (and confirmed as reasonable by our consultant), to determine that 560,224 square feet of land would be needed.

2. We multiplied the 560,224 square feet times $78 per square foot (the figure used by GSA) times .85 (to reflect a conservative 15-percent reduction in price resulting from the recent market decline). This yielded $37.1 million.

3. We then added $29.5 million to $37.1 million—our estimate of off-site infrastructure costs. GSA's environmental impact statement for the originally planned 3-million-square-foot facility estimated that off-site infrastructure costs would be between $59 million and $162 million, depending on the site. We used the lower value because, as explained below, a higher land cost would not be commercially justified. We also assumed that developers would allocate their costs to the first two million square feet equally, since Congress has not authorized the third million square feet. This resulted in an estimate of $66.6 million for land costs.

Our real estate consultant also said that, generally, land to project costs (the cost of land as a percentage of total project costs) for large scale developments have recently ranged from 15 percent to 20 percent in Alexandria and from 18 percent to 24 percent in Arlington. GSA's land to project cost computed to 17 percent, whereas ours computed to 26 percent. Thus, it seems unlikely that a higher land cost, or the resulting land-to-project ratio, would be commercially justified.

We also assumed that GSA would own the land for the first million square feet. The SFO, however, is unclear as to how much land, including parking, will be owned by the government when the first 1 million square feet are purchased.

Comparison of GSA and GAO Estimates

A comparison of the two estimates is shown in table 1.

Table 1: Comparison of GSA and GAO Consultants' Cost Estimates

Dollars in Millions[a]

	GSA	GAO consultants	Difference
Building construction	$222.1	$187.3	$34.8
Land	47.3	66.6[b]	(19.3)
Reservations (i.e., artwork, window blinds)	4.4	3.9	.6
Total[c]	**$273.8**	**$257.8**	**$16.0**

[a]Some figures may not add due to rounding.

[b]As we estimated and explained above.

[c]We did not include design costs for the project because Congress appropriated design funds to GSA for the Navy project separate from the appropriation for construction, land, and contingencies.

Reasons for Differences Between Construction Cost Estimates

Our construction cost consultant cited several reasons for the differences between his and GSA's estimate, including occupiable space, inflation, and different unit costs.

Occupiable Space

One of the main reasons concerns how much space actually could be used for office space, or is "occupiable." Nonoccupiable space, for example, would be restrooms and corridors.

GSA's estimate for the Navy project assumes that 71 percent of the built space could be occupied, which translates to a building or buildings of 1,411,000 gross square feet. GSA officials said many federal buildings have a 70 to 71 percent occupiable ratio. By contrast, our consultant estimated that 75 percent of the built space could be occupied, which translates to 1,333,000 gross square feet. Consequently, our consultant's conceptual buildings would have 78,000 less gross square feet than GSA

estimated, resulting in lower construction costs. At an estimated construction cost of $100 per square foot this difference amounts to $7.8 million.

Our consultant based his 75 percent occupiable rate on his knowledge of current construction industry practices and federal building standards. Buildings recently purchased by GSA have had occupiable ratios between 80 and 85 percent. GSA cost estimate guidelines require that estimates for office space be based on a 70 to 80 percent occupiable rate. GSA officials acknowledge that a 75 percent occupiable ratio is reasonable for budget purposes, but added that in practice, tenant agencies generally prefer GSA to plan headquarters buildings using a lower and more spacious ratio.

Inflation

GSA escalated its construction costs by 4-percent inflation per year from the time the estimate was prepared, August 1989, to the expected midpoint of construction. Our consultant included $16.8 million less for inflation than GSA did. GSA's inflation estimate was based on the amount of time needed to construct a 3-million-square-foot building. On the basis of his knowledge of the building industry, our consultant assumed that it would take 7 months less than GSA assumed to build 2 million square feet. Our consultant's work also was done later than GSA's. As a result, our consultant's analysis estimated 3 years of inflation, whereas GSA's contained 5 years. Our consultant also applied the 4 percent annual inflation rate to a lower base amount because of his higher estimated ratio of occupiable to gross square feet.

Unit Costs

In addition to the cost differences attributable to the different assumptions made on occupiable square footage and inflation, our consultant's database often had unit costs different from GSA's estimate. Consequently, our consultant estimated costs for some building systems lower than GSA's estimate and higher than GSA for others. Overall, however, our construction cost consultant estimated lower costs for interior construction, mechanical, and electrical items than did GSA. Also, our consultant always used smaller quantities of materials because his building concept was smaller than GSA's.

Major Items

Some of the major items for which our consultant's estimate was lower than GSA's estimate included:

- $10.7 million less for heating and air conditioning equipment, because less is needed for a smaller building and because some of those items were overstated by GSA;
- $2.6 million less for a parking garage to realize savings gained by the consultant's proposal to construct the first floor at ground level, as opposed to underground, as GSA did, and to exclude fire-sprinklering of the garage, which neither the SFO nor building code requires; and
- $3.5 million less for incorporating heating equipment in the buildings, not as a separate building, as GSA assumed.

Our consultant's estimate was higher than GSA's for some items, such as

- $409,000 more to include the estimated cost of a child care facility, required by the SFO but absent from the GSA estimate;
- $99,000 more to include the estimated cost of a fitness facility, which the SFO requires but which is not included in GSA's estimate;
- $201,000 more for the cost of elevators, which was higher than GSA's after our consultant used his cost estimating process based on historical data, plus adjustments; and
- $215,000 more for roofing costs, which were higher than the GSA estimate after our consultant used average historical data from federal office buildings and courthouses.

We also noted minor mathematical errors in GSA's estimate, which amounted to a $467,500 overstatement of estimated costs.

Recent Contract Awards Have Been Lower Than GSA Estimates

Recent GSA estimates for construction work generally have been higher than contract awards. Total contract awards on 10 projects undertaken by GSA's National Capital Region from June 1990 to January 1991 were 9 percent lower than GSA's total estimates. The 10 contract awards and estimates are listed in table 2.

Table 2: Comparison of GSA Estimates to Contract Awards for 10 Recent Projects

Dollars in Millions

	GSA estimate	Contract award in millions
Sprinkler installation, HUD Building	$8.3	$6.9
Building renovation, Ariel Rios Building	13.6	11.9
Exterior renovations, GSA Building	1.8	1.3
Site preparation and utilities, National Foreign Affairs Training Center	3.7	3.4
Superstructure, Archives II Building	150.8	139.3
Boiler renovation, Central Heating Plant	18.0	14.6
Foundation work, Archives II Building	1.1	.8
Landscape and sidewalk improvements, Old Executive Office Building	.6	.6
Repair of plaza stairs and sidewalk, Federal Building 10A	.7	.7
Child development centers, Department of Energy, Forrestal Building and Germantown, Md.	1.7	2.1
Totals	**$200.3**	**$181.6**

Total contract awards for these 10 projects were $18.7 million, or 9.3 percent, lower than GSA's estimates.

The Chief Engineer in GSA's Design and Construction Division said that GSA generally estimates high to ensure that appropriations will be sufficient to cover the cost of contract awards, precluding the need to ask for supplemental appropriations.

Favorable Current Market Conditions

Our construction cost consultant said that with current depressed market conditions in the real estate development industry, building contractors are bidding lower overheads and profits, and materials costs are lower than they would have been assumed in an estimate prepared in 1989. As a result, the government may be able to contract for office space at prices lower than what the consultant and GSA estimated.

GSA Estimate Exceeds General Guidelines

GSA publishes an annual internal guide to costs of constructing new federal buildings. This guide is intended for use during early phases of planning. GSA's estimated cost per gross square foot for the Navy project, computed as $109.50, exceeds the guide's range of construction costs for federal buildings as of October 1989, which ranged from $88 to

$104 per square foot. Our estimate of $94.84 per gross square foot falls within the GSA guidelines.

Value Engineering Issues

In reviewing the SFO, our consultants noted several possible areas for reducing the costs of the Naval Systems Commands consolidation project. To identify possible savings, GSA would have to use value engineering for the project, a process whereby building design alternatives are independently evaluated to identify less costly concepts. Because of cost and timing constraints, our consultants were not able to identify the value of all of these items, but they were able to estimate possible cost reductions for some concepts. Examples of their ideas follow.

- Substituting a cellular floor system for the access floors specified in the SFO could save $12 million initially.[3] Corporate office buildings, such as IBM's headquarters and other federal buildings, such as the Naval Intelligence Center, have used the less costly cellular flooring.
- The 7.5 watts per square foot electrical load specified in the SFO is higher than GSA requirements and adds $2 million in electrical construction costs and $3.9 million in mechanical costs.
- The desired 35-foot spacings between columns add about $4.3 million to construction costs over normal spacings and exceed the dimensions of most government and private office buildings.

Applying value engineering to these or other concepts could be used to possibly reduce the cost of the Navy project. Our real estate consultant said, for example, that better value might be achieved if the SFO's minimum standards and desirable standards were merged into one standard that expresses what is wanted and in more detail. He also said that another possible cost saving concept would be for the government to acquire the optimum site for the facility and then advertise for competition in the design and construction of the buildings.

Conclusions

We recognize that construction cost estimating, particularly land costs, should not be expected to be precise and is subject to differences based on the assumptions used for many unknowns. As a result, neither our estimate nor GSA's should be taken as definite. However, on the basis of our estimate and other indicators we reviewed, we believe GSA's estimate

[3]A cellular floor system is a method of embedding electrical, telephone, and computer wires within a floor and providing service outlets at predetermined intervals, such as every 5 feet. All wires are contained within the thickness of the structural slab of the floor.

for the first million square feet of occupiable space may be high. Until offers are received and evaluated by GSA late in 1991, the contract costs will remain unknown.

Agency Comments

We discussed the facts and conclusions in this report with GSA officials on March 6, 1991. They expressed concern that the report might be interpreted as a criticism of GSA's cost estimating process, and we assured them this was not the report's message. GSA officials said that both their cost estimate and our cost estimate were reasonable and not far apart, given the different times they were prepared and the imprecise nature of the cost estimating process. GSA officials said they reserved comment on the specifics of our cost estimate until they could review it in further detail. They also emphasized that GSA will not agree to many off-site infrastructure demands made by respective localities.

We are sending copies of the report to the Administrator of GSA, the Secretary of the Navy, the Director of the Office of Management and Budget, interested congressional committees, and other interested parties.

Major contributors to this report are listed in appendix II. If you have any questions, please call me on (202) 275-8676.

L. Nye Stevens
Director, Government Business
Operations Issues

Chronology of Events Regarding Proposals to Consolidate the Naval Systems Commands

1918-1970—Navy personnel located in "temporary" World War I quarters on Constitution Avenue on the Mall in Washington, D.C.

1968-1970—Navy moves from the Mall into offices in Crystal City, the Pentagon, and the Navy Annex. Most of the employees move to Crystal City.

1981—Navy considers relocating from Crystal City to a proposed Southeast Federal Center at the Washington Navy Yard. Initiative is cancelled due to congressional opposition to the transfer of Navy personnel from Virginia.

1981-1990—Navy considers various sites for consolidating the Naval Systems Commands, including federal land at Franconia and Alexandria, Virginia.

November 1987—An architectural/engineering firm contracted to assess Navy's office space requirements determines that the Navy needs 2.7 million square feet of occupiable space to accommodate 17,193 Systems Commands and related employees.

September 29, 1988—The President signs the fiscal year 1989 Department of Defense (DOD) authorization bill, which directs GSA and the Navy to issue a solicitation to acquire office space for the Navy within the Washington, D.C., area.

August 1989—DOD advises GSA that the Navy needs 426,000 more square feet of occupiable space to accommodate space for 3,160 civil service employees to replace contractor personnel who had been working for the Navy. The total number of employees the Navy expects to house in its new facilities rises to 20,353.

August 1, 1989—The Senate Appropriations Committee includes language in the fiscal year 1990 DOD appropriations bill directing GSA to submit a prospectus for consolidating the Naval Systems Command.

August 10, 1989—GSA estimates that $821.5 million is needed for an office facility with 3 million square feet of occupiable space, including $141.9 million for the purchase of land.

October 4, 1989—GSA issues the Solicitation for Offers to construct an office facility with 3 million square feet of occupiable space.

March 29, 1990—The President sends Congress an amendment to the fiscal year 1991 budget proposing to construct an office facility with 3 million square feet of occupiable space for the Navy for $863 million. This includes $679.6 million for construction, $141.9 million for land, and $41.4 million for design and construction management.

April 25, 1990—GSA sends the Public Works Committees a Report of Building Project Survey, recommending that the government construct an office facility for the Navy consistent with the SFO and the President's budget amendment. Excluding design and construction management costs, the prospectus states that a facility with 3 million square feet of occupiable space can be constructed for $821.5 million, including $679.6 million for construction and $141.9 million for land.

June 1990—GSA receives six detailed proposals in response to the SFO.

July 10, 1990—The Senate Appropriations Committee issues a report recommending appropriations for GSA's Federal Buildings Fund without including any money for the Navy project.

July 13, 1990—The House of Representatives authorizes the Navy project and appropriates $679 million for it during fiscal year 1991. The $679 million includes the cost of constructing a 3-million-occupiable-square-foot facility, but it excludes the cost of land because a developer offered to donate the land to GSA if awarded the contract.

July 23, 1990—Due to possible staffing reductions in the fiscal year 1991 DOD appropriations act, GSA amends the SFO obligating GSA to obtain a minimum of 2 million square feet of space for the Naval Systems Commands.

September 11, 1990—The Senate passes fiscal year 1991 Treasury, Postal Service, and General Government Appropriations Bill without appropriating or authorizing any money for the Navy project.

September 23, 1990—Developers submit bids on downsized project to GSA.

October 1990—GSA estimates the first million square feet of occupiable space can be purchased for $300 million ($821.5 million / 3 = $273.8 million, plus 10 percent for contingencies), including land costs but not design and construction management.

October 3, 1990—The GSA Deputy Administrator writes to Senator Warner, stating that $300 million is needed to purchase the first 1 million square feet of occupiable space for the project.

October 4, 1990—Senator Metzenbaum, a member of the Senate Environment and Public Works Committee, proposes that funding for the Navy project be held to $240 million for a 1-million-square-foot office facility.

October 20, 1990—The House-Senate Conference Committee recommends appropriating $273 million for the Navy project.

October 24, 1990—Congress authorizes the construction of a 1-million-square-foot office facility for the Navy to be owned by the federal government. It agrees to appropriate $240 million and an additional $10 million for contingencies, subject to congressional approval. Acquiring more than 1 million square feet of space, either through purchase or lease, is also subject to approval by Congress.

November 5, 1990—The President signs a bill appropriating $273 million for the Navy project. However, the $273 million is not what the House and Senate agreed upon. We understand that a technical amendment will be introduced to change the figure to $240 million during the next session of Congress.

November 5, 1990—The President signs the DOD authorization bill for fiscal year 1991, directing the Secretary of Defense to reduce the defense headquarters and acquisition workforce by 20 percent by fiscal year 1995.

July 1991 (estimate)—GSA expects bidders to submit their best and final offers.

December 1991 (estimate)—GSA plans to award a contract for the Navy project. Delivery of the first million square feet of occupiable space is expected 2-1/2 years after award.

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