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Report to Congressional Requesters

April 2005

SMITHSONIAN INSTITUTION

Facilities Management Reorganization Is Progressing, but Funding Remains a Challenge

GAO-05-369

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Highlights

Highlights of GAO-05-369, a report to congressional requesters

Why GAO Did This Study

The Smithsonian is the world's largest museum complex and research organization, with 18 museums and galleries, 10 science centers, and a zoological park. The age of the structures, past inattention to maintenance needs, and high visitation have left its facilities in need of revitalization and repair. Currently, the Smithsonian estimates $2.3 billion in costs for revitalization, construction, and maintenance projects between 2005 and 2013. This report addresses (1) how the current condition of the Smithsonian's facilities has affected access to the collections, and the collections themselves; (2) what changes the Smithsonian has made to its organization, practices, and prioritization processes to improve its facilities management; and (3) the estimated costs and status of the Smithsonian's facilities projects and their funding sources.

What GAO Recommends

We are recommending that the Smithsonian establish a process for exploring funding options with the Administration and the Congress, leading to the development and implementation of a strategic funding plan to address the Smithsonian's revitalization, construction, and maintenance needs. In commenting on our report, the Smithsonian concurred with our findings and recommendation.

www.gao.gov/cgi-bin/getrpt?GAO-05-369.

To view the full product, including the scope and methodology, click on the link above. For more information, contact Mark Goldstein at (202) 512-8022 or goldsteinm@gao.gov.

What GAO Found

To date, facilities-related problems at the Smithsonian have resulted in a few building closures and access restrictions and some cases of damage to the collections. For example, structural deterioration has caused closure of the 1881 Arts and Industries Building on the National Mall pending major repair and revitalization, as well as some facilities at the National Zoo. Concern over asbestos in a number of storage buildings has led to restricted access to the items within them. Some artifacts, such as two historic aircraft, have been damaged by water leaks from deteriorated pipes and roofing elements. Stopgap measures, such as draping plastic sheeting over artifacts in areas experiencing leaks, have prevented or minimized damage in other cases. Maintaining desired humidity and temperature levels for conserving the collections is a pervasive problem in some older Smithsonian facilities. These problems are indicative of a broad decline in the Smithsonian's aging facilities and systems that pose a serious long-term threat to the collections.

The Smithsonian recently centralized its facilities organization, adopted industry best practices to maximize the effectiveness of its resources, reviewed its operating procedures, standardized its cost-estimating practices, and established processes for prioritizing work and allocating funds. These changes resulted from an internal review and a 2001 report by the National Academy of Public Administration, which recommended that the Smithsonian centralize its then highly decentralized approach to facilities management and budgeting in order to promote uniform policies and procedures, improve accountability, and avoid duplication. The Smithsonian created the Office of Facilities Engineering and Operations (OFEO) in 2003 to assume responsibility for all facilities-related programs and budgets--formerly divided among four administrative offices and the individual museums and centers. Most of the museum and center directors were either positive or neutral about the effectiveness of the reorganization so far. Overall, the reorganization appears to be moving in the right direction, though it has been hindered by reductions in OFEO's staffing and budget.

The Smithsonian currently estimates that its planned capital and maintenance projects for 2005 through 2013 will cost about $2.3 billion, though this could grow because it is largely based on preliminary assessments. Of 13 revitalization and construction projects active during our review, most were on time and within budget. The Smithsonian's annual operating and capital program revenues come from its own trust fund assets and its federal appropriation (totaling $904.0 million in fiscal year 2004, with $184.4 million for facilities). Funding at this level would not be sufficient to cover the facilities projects planned for the next 9 years. Ensuring credible, long-term budget planning for sustaining and modernizing facilities involves the Smithsonian, the Office of Management and Budget, and the Congress in examining viable funding options. While Smithsonian officials have discussed funding options internally and with various stakeholders, no consensus has emerged on how to deal with this funding challenge.

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Abbreviations

CII	Construction Industry Institute
COTS	Commercial Off the Shelf
CPPB	Capital Program Planning Board
ERP	Enterprise Resource Planning
FONZ	Friends of the National Zoo
FY	Fiscal year
HVAC	Heating, ventilation and air conditioning
Maintenance	Minor repair and maintenance
Mall	National Mall
NAPA	National Academy of Public Administration
National Zoo	National Zoological Park
NHPA	National Historic Preservation Act
NMAH	National Museum of American History
NMNH	National Museum of Natural History
NRC	National Research Council
OFEO	Office of Facilities Engineering and Operations
OMB	Office of Management and Budget
OPP	Office of Physical Plant
PC	Priority Code
PFITS	Capital program cuff system
PT&I	Predictive testing and inspection
RCM	Reliability Centered Maintenance
RR&A	Renovation, repair and alteration
S&E	Salary and expenses
SAO	Smithsonian Astrophysical Observatory
SFS	Smithsonian Financial System
Smithsonian	Smithsonian Institution
VERITAS	Very Energetic Radiation Imaging Telescope Array System

GAO
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United States Government Accountability Office
Washington, D.C. 20548

April 25, 2005

The Honorable Bill Shuster
Chairman, Subcommittee on Economic Development,
Public Buildings, and Emergency Management
Committee on Transportation and Infrastructure
House of Representatives

The Honorable Eleanor Holmes Norton
Ranking Democratic Member, Subcommittee on Economic Development,
Public Buildings, and Emergency Management
Committee on Transportation and Infrastructure
House of Representatives

In January 2004, the Smithsonian Institution (the Smithsonian) closed its 1881 Arts and Industries Building to the public over concern about its deteriorating roof structure. During 2003, the roofs of two historic buildings of similar age and design had partially collapsed under heavy snowfall.[1] Arts and Industries—used most recently for special exhibits and administrative offices—will need major renovation and revitalization work, including the replacement of its aging electrical, plumbing, and heating and cooling systems, before it can be returned to service. The failing condition of this National Mall (the Mall) landmark is the most extreme example of what a Smithsonian official has characterized as a "broad decline" in its extensive physical plant.

This decline can, paradoxically, be linked to the Smithsonian's remarkable success in carrying out its mission: "the increase and diffusion of knowledge among men." In the years since its founding in 1846, the Smithsonian Institution has preserved—and shared—our nation's most precious objects and become an international leader in scholarship and scientific discovery. From its original building on the Mall (commonly known as "the Castle"), the Smithsonian has evolved into the world's largest museum complex and research organization, with 18 museums and galleries, 10 science centers, a zoological park, and various other facilities—in total, more than 660 owned and leased buildings and other structures, with an estimated replacement value of about $4.7 billion for owned space as of June 2004. About 143.7 million objects and specimens

[1]The roofs of the B&O Railroad Museum in Baltimore, Maryland, and the O Street Market in Washington, D.C., collapsed under the weight of a heavy snowfall in February 2003.

are safeguarded, studied, and displayed within its facilities, including research collections in natural history and biology, as well as icons of our national history such as the Fort McHenry "Star Spangled Banner" and the Apollo 11 command module.[2] Two of the Smithsonian's museums on the Mall are the most visited in the world, with a third rivaling visitation at the British Museum and the Louvre.

With this tremendous physical expansion and popularity, however, have come related facilities problems that include the structural deterioration of aging buildings; heating, cooling and electrical systems that are well past their normal life expectancy; leaks from roofs and pipes that jeopardize the collections; inadequate exhibition and storage space; and maintenance levels that have not kept pace with the wear and tear from millions of visitors each year. A 2001 report by the National Academy of Public Administration (NAPA)—based on a review requested by the Congress—highlighted the need for major changes in the Smithsonian's facilities management practices to help address these problems. In response to NAPA's recommendations, as well as its own internal review, the Smithsonian has been transforming its approach to facilities management. The NAPA report also found that, prior to 2000, the Smithsonian underestimated its revitalization needs, which were significantly larger than were identified in its budget requests. The Smithsonian has updated its funding requirements and has a 9-year estimate for the revitalization of its older buildings, new construction, and minor repair and maintenance (maintenance)[3] work that now stands at about $2.3 billion.[4]

In light of ongoing concerns over the state of its facilities, you asked us to review the Smithsonian's facilities management. Accordingly, we addressed the following questions:

[2]In addition, the Smithsonian has approximately 166.3 million archival items, such as 50,000 cubic feet of paper documents and 7 million photographs, as of 2003.

[3]Minor repair and maintenance includes the upkeep of property and equipment necessary to realize the originally anticipated useful life of a fixed asset. It does not materially prolong the design life of property or equipment, or add to the asset's value.

[4]This number includes estimates for projects that have not been through a design phase. According to the Construction Industry Institute, these types of estimates can vary by plus or minus 30 to 50 percent. Therefore, the Smithsonian's overall $2.3 billion estimate should be viewed only as an approximation based on the best current information.

- How does the current condition of the Smithsonian's facilities affect public and scientific access to the collections, and the collections themselves?

- What changes to its organizational structures and practices has the Smithsonian put in place to manage its facilities, and how does the Smithsonian now prioritize its revitalization, construction, and maintenance projects?

- What are the estimated costs and status of the Smithsonian's major revitalization, construction, and maintenance projects, including those that have been deferred, and what are the funding sources for these projects?

In addition, you asked us to provide information on how the Smithsonian uses its trust fund resources and federal appropriations to fund its operations, as well as information on the basic legal authorities under which the Smithsonian runs its revitalization, construction, and maintenance programs. This information is included as appendix I of this report.

To address these issues, we visited 11 Smithsonian facilities to view and discuss problem areas with staff from the Smithsonian's Office of Facilities Engineering and Operations (OFEO) and the directors of the individual facilities. The Smithsonian identified these facilities as having significant facilities-related problems. Several facilities that we visited consisted of multiple buildings, such as the National Zoological Park (the National Zoo), which has more than 40 buildings. We interviewed the OFEO director and other appropriate OFEO staff, project executives, and project managers, as well as the Smithsonian's chief financial officer, associate general counsel, and 16 directors of museums, galleries, the National Zoo, a program and a research center (all internal customers of OFEO). We reviewed a variety of Smithsonian handbooks and guidance related to facilities project management, prioritization criteria, decision-making processes, and best practices. We also reviewed the NAPA report, the Smithsonian inspector general's reports, and other appropriate reports. We researched the Smithsonian's enabling legislation, the statutes under which it currently operates, including appropriations acts and numerous statutes authorizing Smithsonian Institution facilities from the 1950s. We also reviewed the Smithsonian's congressional budget requests and audited financial statements for fiscal years 2002, 2003, and 2004. The information we gathered was sufficiently reliable for the purposes of our review. We

conducted our work between April 2004 and April 2005 in accordance with generally accepted government auditing standards. See appendix VII for a more detailed explanation of our scope and methodology.

Results in Brief

Facilities-related problems at the Smithsonian have resulted in a few building closures and access restrictions, and some cases of harm to the collections. The problems range from major structural deterioration to chronic leaks that have damaged a few collections and threatened others. While the impact of these problems thus far has been limited, ongoing deterioration continues to present serious long-term risks to the collections' accessibility and safety. A few facilities have deteriorated to the point where access must be denied or limited. The 1881 Arts and Industries Building on the Mall was closed to the public in 2004 for an indefinite period, pending repair of its weakened roof panels, renovation of its interior (which has been damaged by water intrusion), and replacement of aging systems such as heating and cooling. Another example is the National Zoo, where deterioration has led to closures, such as the sloth bear facility and the flight cage for birds of prey, and problems with major systems could jeopardize the operation of other zoo facilities. In addition, concern over asbestos in some Smithsonian storage buildings has led to restrictions on access to the collections kept inside them. Water leaks caused by deteriorated piping and roofing elements, along with humidity and temperature problems in buildings with aging systems, pose perhaps the most pervasive threats to artifacts in the museums and storage facilities. For example, leaks have damaged two historic aircraft at the National Air and Space Museum. Quick action by staff and stopgap measures, such as draping plastic sheets over materials exposed to leaks, has helped to prevent or minimize damage in other cases. For example, Smithsonian Institution Archives staff told us that they have had to deal with 19 "water emergencies" since June 2002; some of their materials have been damaged by mold.

The Smithsonian has taken steps to improve its facilities management in response to recommendations by NAPA in 2001 and its own internal review. At that time, the Smithsonian's facilities management was highly decentralized, with a complex, multilayered management structure and multiple budgets. Noting that this decentralization had a direct and sometimes adverse impact on effective management, NAPA recommended that the Smithsonian centralize its facilities-related functions, including the budgets for capital (revitalization and new construction) and maintenance programs in order to promote uniform policies and procedures, improve

accountability, and avoid duplication. In 2001, the Smithsonian began developing OFEO, which assumed responsibility for all facilities-related programs and budgets previously divided among four administrative offices, individual museums and science centers and the National Zoo. This office is also adopting a variety of recognized industry best practices for managing facilities projects, such as the use of benchmarking and metrics recommended by the Construction Industry Institute and leading capital decision-making practices.[5] In addition, the office has assigned responsibility for prioritizing projects to two offices under its direction—one for capital projects and the other for maintenance projects. Each of these offices follows a defined, consistent priority-setting process for projects under its jurisdiction at all Smithsonian facilities. Because the newly centralized facilities management organization has been in place with its own budget for only about a year, it is too early to assess its full impact. However, the process appears to be moving in the right direction. Of the 16 directors of museums, galleries, research centers, the National Zoo, and a program office that we contacted (all internal customers of OFEO), 5 said that facilities services had substantially improved, and 9 others were generally positive or neutral about the reorganization. Two directors said that services had deteriorated since the reorganization. Various directors, including the 2 who expressed negative views noted that OFEO's funding and staffing have been reduced due to budget constraints and a Smithsonian-wide staff "buy out," thereby hindering full implementation of the reorganization. Also, several directors, including some with positive reactions to the reorganization, noted that communications from OFEO to its internal customers could be improved.

The Smithsonian currently estimates that it will need about $2.3 billion through fiscal year 2013 for its currently identified revitalization, construction, and maintenance programs. This estimate exceeds NAPA's 2001 estimate of $1.2 billion because it reflects more recent and comprehensive assessments of the Smithsonian's revitalization needs, covers new construction (including about $103 million to address security requirements),[6] and incorporates more complete information about the maintenance projects. The Smithsonian is also standardizing its cost estimation process. Estimated costs could increase, since they are largely

[5]GAO, *Executive Guide: Leading Practices in Capital Decision-Making*, GAO/AIMD-99-32 (Washington, D.C.: December 1998.)

[6]NAPA's estimate did not cover new construction because the Congress did not ask NAPA to review the Smithsonian's construction program.

based on preliminary needs assessments and early design documents. A big "unknown" is the timing and cost of the recently authorized National Museum of African American History and Culture, which is likely to cost hundreds of millions of dollars.[7] Recent additions to the Smithsonian's building inventory—the National Museum of the American Indian and the Steven F. Udvar-Hazy Center—and the planned 2006 reopening of the revitalized Patent Office Building will add to the Smithsonian's annual maintenance costs. Of 13 major revitalization and construction projects (those in excess of $5 million) being funded at the time of our review, most were on time and within budget. Finding the funding needed for the full range of planned capital and maintenance projects is an imposing challenge for the Smithsonian. The institution's annual operating and capital programs revenue, which comes from a percentage of its trust assets and its federal appropriation, amounted to $904 million in fiscal year 2004,[8] with about $184.4 million of this total for facilities. Revenues at this level would not be sufficient to cover the $2.3 billion in estimated costs for the institution's planned facilities projects and maintenance needs over the next 9 years. Officials told us that various funding approaches and options have been discussed by the staff, the Board of Regents, and with congressional leaders, but that no consensus for dealing with this issue has emerged. It remains unclear at this time the extent to which the Smithsonian will secure the funding to carry out all of its planned facilities projects.

We are recommending that the Secretary of the Smithsonian establish a process for exploring options for funding its facilities needs and engaging the key stakeholders—the Smithsonian Board of Regents, the Administration, and the Congress—in the development and implementation of a strategic funding plan to address the revitalization, construction, and maintenance projects identified by the Smithsonian. We provided a draft of this report to the Smithsonian for comment. The Smithsonian concurred with our findings and recommendation and offered some technical comments and updates that were incorporated where appropriate.

[7]The founding Council of the Smithsonian's National Museum of African American History and Culture held its first meeting on February 8, 2005, and adopted bylaws and discussed possible collections for the Museum. Building costs will be equally divided between congressional appropriations and privately raised funds.

[8]The $904 million is based on the Smithsonian's audited financial statements for fiscal year 2004.

Background

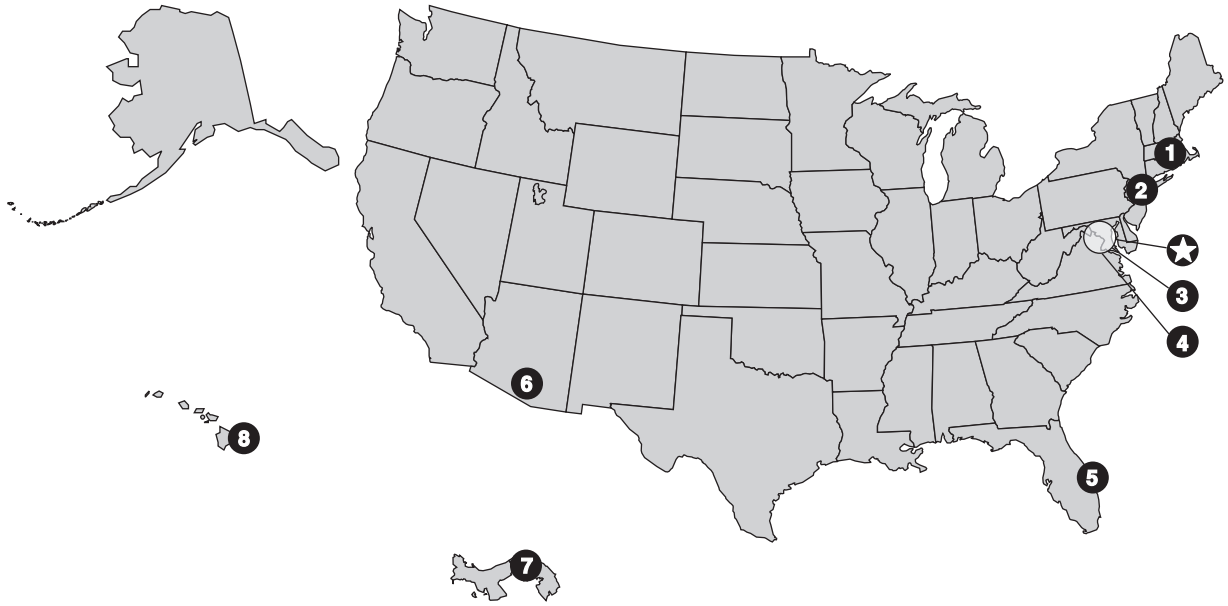
The Congress established the Smithsonian Institution in 1846 to administer a large bequest left to the United States by James Smithson, an English scientist, for the purpose of establishing in Washington, D.C., an institution "for the increase and diffusion of knowledge among men." In accepting Smithson's bequest on behalf of the nation, the Congress pledged the "faith of the United States" to carry out the purpose of the trust.[9] To that end, the act establishing the Smithsonian provided for the administration of the trust, independent of the government itself, by a Board of Regents and a Secretary, who were given broad discretion in the use of the trust funds. The board was composed of both private citizens and members of all three branches of the federal government, in order to ensure "the wise and faithful use" of the Institution's funds.[10] The trust funds were permanently loaned to the Treasury to be maintained in a separate account; and the principal was to be maintained and the interest from that money used for the operation of the Institution. Although the Smithsonian has grown greatly since its founding nearly 160 years ago, it retains its essential character as a trust establishment of the United States.

Over the last 150 years, the Smithsonian's facilities inventory has expanded to include 18 museums and galleries, 10 science centers, a zoo, and other facilities—most located in or near Washington, D.C., with others in Massachusetts, New York, Florida, Arizona, Hawaii, and the Republic of Panama. (See fig. 1.) These facilities include about 660 buildings and structures, owned and leased, ranging from major museum buildings to storage buildings and storage sheds. There are about 8.6 million square feet of owned space and 1 million square feet of leased space. The Smithsonian has estimated the replacement value for owned space at about $4.7 billion as of June 2004. In 2003, an estimated 25 million people visited Smithsonian museums, and researchers made 39,000 visits to use its facilities.

[9]A trust is a fiduciary relationship involving a right of property held by the trustee for the benefit of another.

[10]The specific composition of the board has changed somewhat since 1846 by law, but it is still a mixture of government and private individuals. At present, the board is composed of the Chief Justice of the United States, the Vice President, three senators appointed by the President of the Senate, three representatives appointed by the Speaker of the House, and nine citizens appointed by Joint Resolution of Congress—two from the District of Columbia and seven from the states.

Figure 1: Location of Smithsonian Institution Facilities



1. Smithsonian Astrophysical Observatory (SAO), Cambridge, MA
2. George Gustav Heye Center, New York, NY
   Cooper-Hewitt, National Design Museum, New York, NY
   National Museum of the American Indian Research Branch, Bronx, NY
3. National Zoological Park--Conservation and Research Center, Front Royal, VA
4. Smithsonian Environmental Research Center, Edgewater, MD
5. Smithsonian Marine Station at Fort Pierce, FL
6. SAO Fred L. Whipple Observatory, Amado, AZ
7. Smithsonian Tropical Research Institute, Panama
8. SAO Sub-Millimeter Array, Hilo, HI

Facilities located on the National Mall:
Arts and Industries Building
Freer Gallery of Art
Hirshhorn Museum and Sculpture Garden
National Air and Space Museum
National Museum of African Art
National Museum of American History
National Museum of the American Indian
National Museum of Natural History
S. Dillon Ripley Center
Arthur M. Sackler Gallery
Smithsonian Institution Building

Other facilities in the Washington metropolitan area:
Anacostia Museum for African American History and Culture
Archives of American Art
Patent Office Building housing the:
Smithsonian American Art Museum
National Portrait Gallery
National Postal Museum
National Zoological Park, Rock Creek
Renwick Gallery
Suitland Collections Center, Suitland, MD
Smithsonian Greenhouses at the U.S. Soldiers and Airmen's Home
Smithsonian Institution Support Center
Steven F. Udvar-Hazy Center, Chantilly, VA
Victor Building

Source: Smithsonian Institution.

The major buildings owned by the Smithsonian range in age from about 160 years old to less than a year old, with most of the facilities growth occurring since the 1960s. (See fig. 2.) More than half of these buildings are more than 25 years old, 6 are designated as National Historic Landmarks,

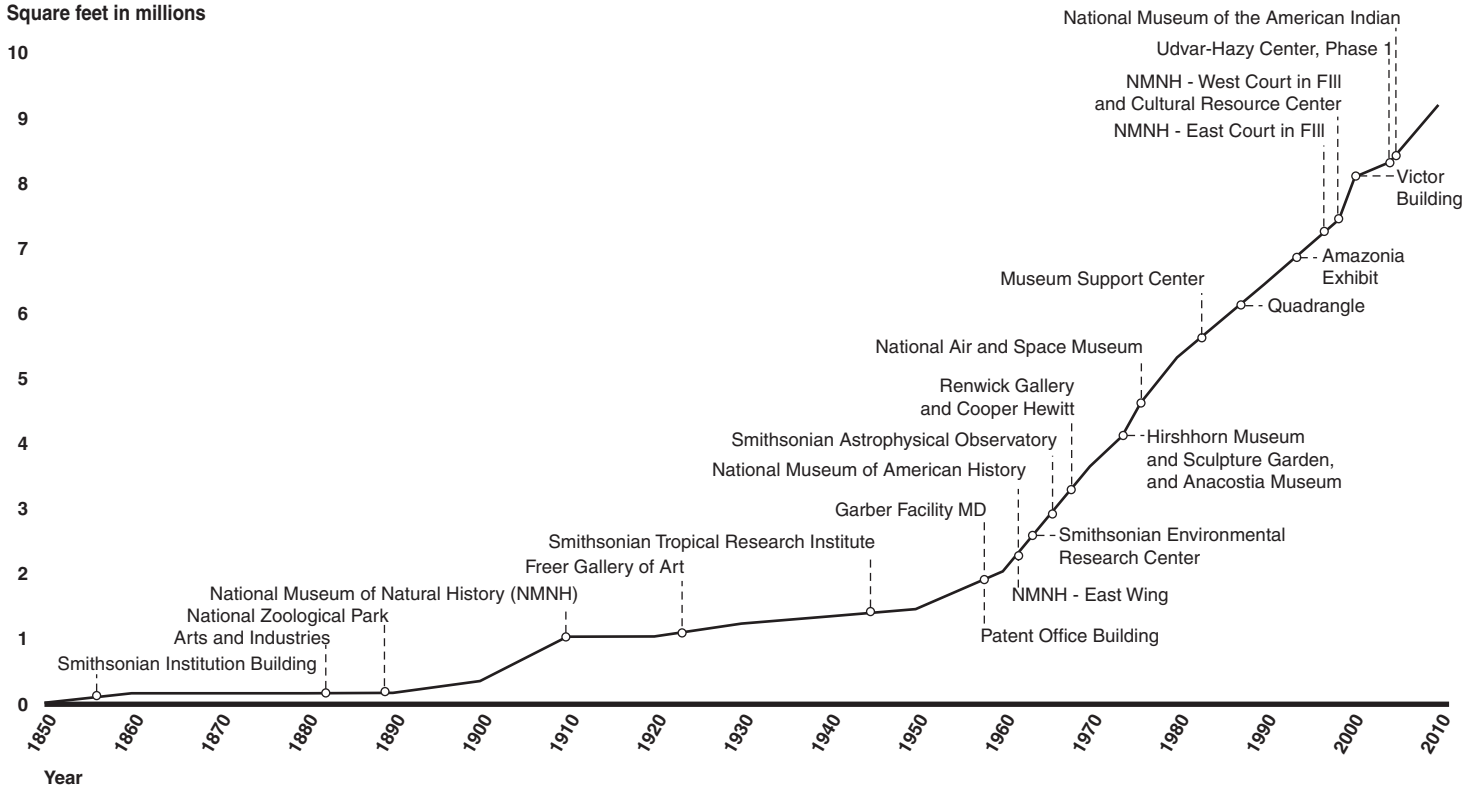
and about 40 are listed on the National Register of Historic Places or otherwise eligible for special consideration under federal guidelines for historic buildings.[11] Not all of these buildings involved new construction. For example, the Patent Office Building, Renwick Gallery, and Cooper-Hewitt Museum were transferred to the Smithsonian after they were built, and the Victor Building was purchased for use as administrative offices. The two latest additions to the Smithsonian are the Steven F. Udvar-Hazy Center (phase I), which is part of the National Air and Space Museum and opened in December 2003, and the National Museum of the American Indian, which opened in September 2004. The Smithsonian's growth will continue with the construction of an aircraft restoration area at the Udvar-Hazy Center (phase II), which the Smithsonian plans to complete in 2008,[12] and the design and construction of a National Museum of African American History and Culture, authorized by the Congress in 2003. Beyond this, some members in both houses of Congress have expressed interest in developing a National Museum of the American Latino Community.[13]

[11]According to Smithsonian officials, these classifications increase the difficulty of maintaining buildings because they involve federal requirements for revitalization and maintenance. The National Historic Preservation Act (NHPA) of 1966 outlines specific actions required of federal agencies (of which the Smithsonian is considered to be for the purposes of NHPA) to protect cultural resources listed, or eligible for listing, in the National Register of Historic Places. The standards require owners to maintain the original structure, fabric, and character of the site (both interior and exterior) when making additions or upgrades.

[12]The construction of the Steven F. Udvar-Hazy Center was divided into two phases to allow for the Smithsonian to raise the private funding needed for the project.

[13]Several bills were introduced in the 108th Congress to study the creation of a National Museum of the American Latino Community. These bills were not enacted.

Figure 2: Growth in Major Facilities Owned by the Smithsonian, in Square Feet



Source: Smithsonian Institution.

Note: This figure tracks the square footage for all owned buildings as they were added to the inventory over time. Only the major facilities are named in the figure, although the square footage of smaller buildings is included.

In 1995, a commission established by the Smithsonian's Board of Regents reported that the Institution's facilities were deteriorating at an accelerated rate because of their age, the large number of visitors, and the Smithsonian's failure to invest sufficient resources to repair, revitalize, and maintain them. The commission concluded that over the next decade, a total of $50 million a year would be needed to restore the Institution's facilities (excluding the National Zoo) to the point of being safe for people

and appropriate for collections.[14] This estimated annual need was more than double the fiscal year 1995 appropriation for these purposes.

Generally, the Congress provided increased funding in the late 1990s, but in 2000 the newly appointed Secretary of the Smithsonian testified that he believed the Smithsonian's buildings were in poor condition and that the cost to restore them would be substantially more than previously identified.[15] The Secretary stated that the Smithsonian "has hesitated to represent to Congress the full scale of the need. Instead, we've tried to make do." In response, the Congress directed the Smithsonian to contract with NAPA for a review to obtain a better understanding of the use of funds that had been provided to date. Specifically, NAPA was to determine (1) how the Smithsonian had expended federal funds for repair and restoration of its facilities, (2) what progress had been made in restoring the facilities, and (3) what tasks lay ahead.[16]

NAPA reported in July 2001 that the federal funds appropriated for the Smithsonian's facilities had been used properly; the Smithsonian's facility requirements exceeded the amounts provided in the institution's annual budgets; and the Smithsonian's 2000 estimates were based on a reasonable, building-by-building approach and were more realistic than previous estimates.[17] NAPA found that the Smithsonian had used the funds for high-priority repair and restoration projects but that its needs were far greater than those identified in its budget requests. While validating the Smithsonian's 10-year estimate of about $1.2 billion in repair and revitalization projects, NAPA noted that this estimate could increase to at least $1.5 billion because it was not adjusted for the effects of inflation and reflected only rough "orders of magnitude" estimates for later-year

[14]*Report of the Commission on the Future of the Smithsonian Institution*, 1995.

[15]The Secretary testified before the U.S. Senate Committee on Rules and Administration on June 27, 2000.

[16]H.R. Rep. No. 106-914, at 183-184 (2000).

[17]National Academy of Public Administration, *A Study of the Smithsonian Institution's Repair, Restoration and Alteration of Facilities Program*, (Washington, D.C.: July 2001). This report examined repair, renovation, and alteration but did not examine new construction.

requirements.[18] The report also recommended management improvements, including centralizing the Smithsonian's decentralized facilities management under a single organization and implementing a more structured maintenance program. At the beginning of our review, the Smithsonian had implemented 25 of the 30 recommendations, including a fundamental reorganization of its facilities management organization, funding, and staffing and the other 5 recommendations were in the process of being implemented. (See app. II for a listing of NAPA's recommendations and the status of the Smithsonian's implementation of them.) In addition to the need for management improvements, NAPA highlighted the importance of a "continuing and substantial infusion of funds" to address facilities needs.

We alluded to the Smithsonian's facilities problems in our *High Risk Series* report on federal real property. The Smithsonian is one example of the problem facing agencies across the federal government, which have accumulated significant backlogs of maintenance and renovation needs and face serious deterioration problems. Overall, we found that the condition of federal facilities is one of alarming and accelerating deterioration.[19]

Facility Conditions Have Generally Had Limited Effects on Access and Collections, but Some Chronic Problems Present Ongoing Risks

Facilities-related problems at the Smithsonian have resulted in a few building closures and access restrictions and, in some cases, harm to the collections. The problems range from major structural deterioration to chronic leaks that have damaged a few collections and threatened others. While the impact of these problems thus far has been limited, ongoing deterioration continues to present serious long-term risks to collections' accessibility and safety.

[18]Such estimates are based on feasibility studies. Order-of-magnitude estimates can vary by plus or minus 30 to 50 percent.

[19]GAO, *High-Risk Series: Federal Real Property*, GAO-03-122 (Washington, D.C.: January 2003), pp. 2, 15, 25.

Restrictions on Access

Serious structural problems have led to the closure of the third-oldest building in the Smithsonian's inventory, the Arts and Industries Building, as well as several buildings at the National Zoo. The roof panels of the Arts and Industries Building, which opened in 1881, have deteriorated to the point where they are considered unsound. The building was closed to the public in 2004 and will be closed to staff in 2005. Prior to its public closure, the Arts and Industries Building housed collections and received more than 900,000 visitors annually. The building also provided the Smithsonian with a venue for functions related to fund-raising. No date has been set for reopening this museum. Figure 3 shows a comparison of the North Hall of the Arts and Industries building in 1977 and February 2005.

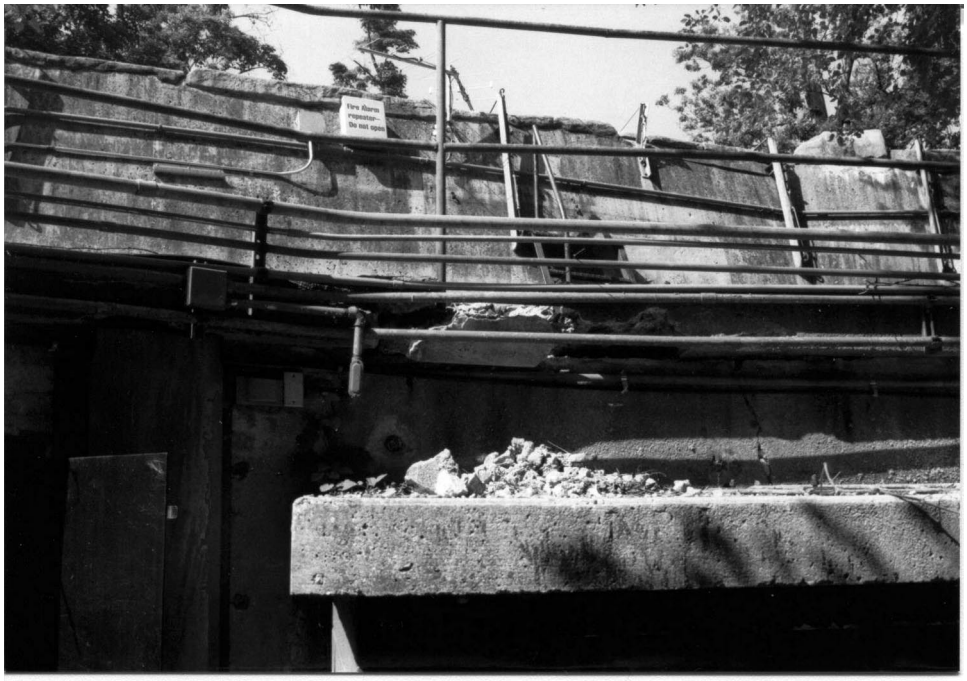
Figure 3: Arts and Industries Building, 1977 (left) and February 2005 (right)

Source: Smithsonian Institution.

At the National Zoo, facilities such as the sloth bear enclosure and the flight cage for birds of prey have been rendered unusable because of deterioration. In 2002, the National Zoological Park Director testified to the Congress that over half of the National Zoo's buildings have seriously compromised structural, mechanical, electrical, and fire and life-safety systems. The National Zoo has begun a revitalization program that

currently is being funded. Figure 4 shows the deterioration at the zoo's sloth bear facility.

Figure 4: Sloth Bear Facility, National Zoo



Source: GAO.

In addition to structural deterioration, problems with asbestos have restricted researchers' access to certain collections. At the Garber Facility, a complex used for storage and other support purposes, researchers' access to 5 of the complex's 40 buildings has been restricted because of asbestos. In these 5 buildings, the stored items must be covered with plastic, and access is limited to a few staff. Figure 5 shows the interior of building 16 at the Garber Facility, which provides storage for artifacts for the National Museum of American History.

Figure 5: Measures to Shield Collections from Asbestos, Garber Facility, Suitland, MD

Source: Smithsonian Institution.

Both public and researchers' access to facilities and collections also can be temporarily restricted by revitalization projects. For example, the Patent Office Building, the second oldest building in the Smithsonian's inventory, has been closed to the public since 2000 for revitalization.[20] This building is the home of the National Portrait Gallery and Smithsonian American Art Museum. The Smithsonian has tried to limit the impact of the closure for revitalization by loaning art work from these collections to other museums or having traveling exhibits. Parts of the National Museum of American History, the National Museum of Natural History, and the National Zoo also have been closed to the public during revitalization projects. At the

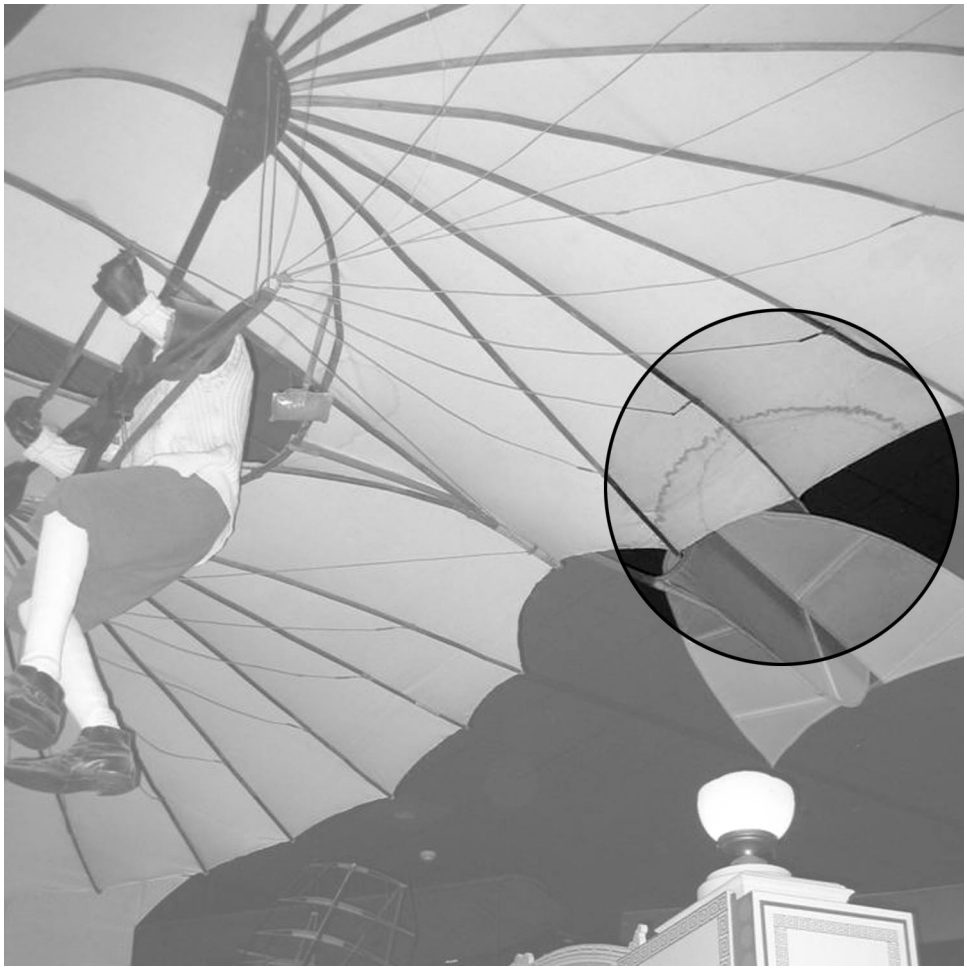
[20]The Patent Office Building was acquired by the Smithsonian in 1958 after escaping proposed demolition. This historic "Greek Revival" building was constructed in several stages and completed in 1867.

National Museum of Natural History, the mammal collection was closed to researchers for 2 years while the exhibit hall was undergoing revitalization.

Damage and Threats to Collections

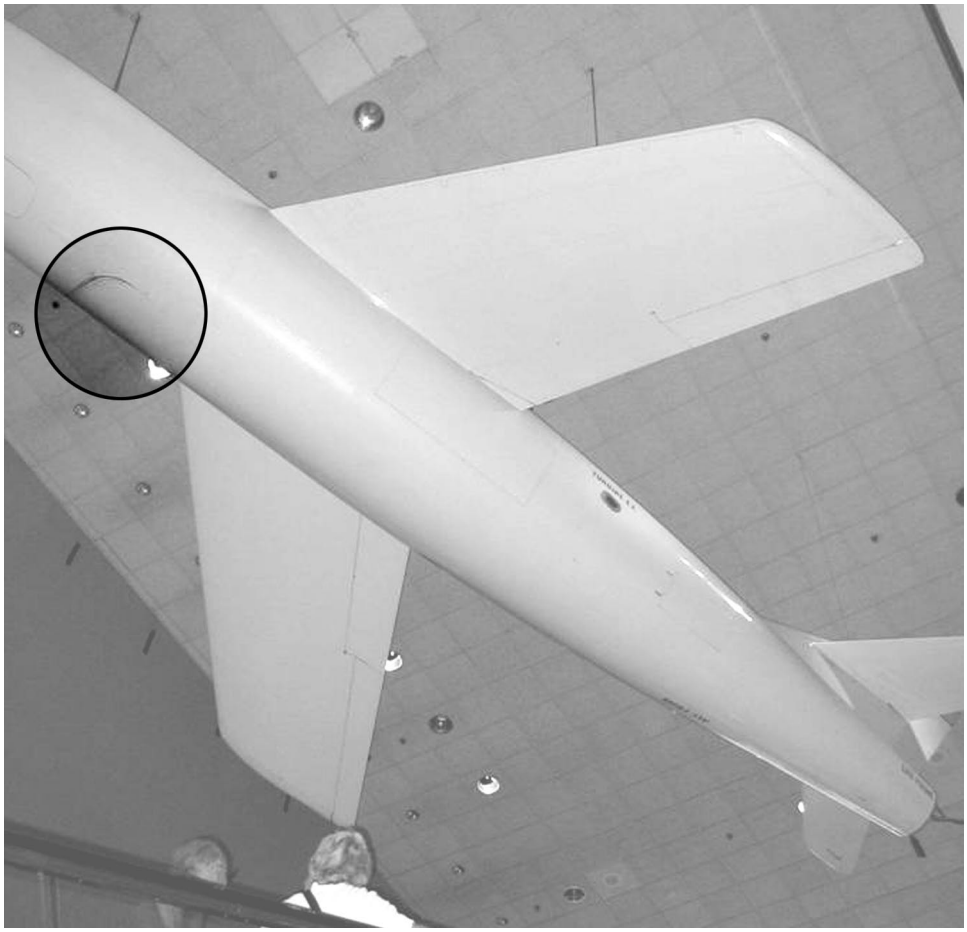
Besides affecting access to the collections, the condition of Smithsonian buildings can also affect the collections themselves. The greatest dangers to the collections to date have been posed by water. For example, at the National Air and Space Museum, Smithsonian officials showed us that leaks have damaged both the Lilienthal Hang Glider, which helped pioneer early flight design by influencing the Wright Brothers, and the Douglas Skyrocket, D558, the first airplane to break Mach 2. (See figs. 6 and 7.) Water also damaged 200 books at the Smithsonian Institution Archives due to a drain back-up.

Figure 6: Water Stain on Wing of Lilienthal Hang Glider, National Air and Space Museum



Source: Smithsonian Institution.

Figure 7: Rust on Fuselage of Douglas Skyrocket, D558, Caused by Water Leak, National Air and Space Museum



Source: Smithsonian Institution.

Smithsonian officials identified several incidents and vulnerabilities related to water, including:

- In February 2005, a broken pipe at the National Zoo's mechanical room that supports the pools for the seals and sea lions flooded the room with 8 feet of water and damaged controls, pumps, and motors. The pipes were scheduled for replacement this spring. See figure 8.

Figure 8: Flooded Mechanical Room at the National Zoo

Source: Smithsonian Institution.

- At the Smithsonian Institution Archives, 19 water emergencies have occurred since June 2002, and the facility has formed an emergency response team to deal with them. "We are excellent drapers of plastic," according to an Archives official. Some of the leaks were directly above collections, but quick action by the staff averted damage to the collections.

- At the National Museum of African Art, breaches in the roof membrane, malfunctioning valves, and clogged pipes often leak over galleries, collection storage areas, and offices. Replacing the roof and the water condensate system could address these problems, but other, higher priorities have received funding instead.

- At the Renwick Gallery, gutters have leaked into the Grand Salon and adjacent gallery, but damage to artwork has been avoided. Repairs are scheduled for fiscal year 2005.

- At the Freer and Sackler Galleries, water has leaked many times in storage areas and the library, and condensation poses a serious problem in the Freer Gallery's exhibition areas. To date, no major damage to the collections has occurred.

Another area of concern is related to fluctuating temperature and humidity, particularly in a museum setting where collections must be stored and displayed in precise ways. While we toured various facilities, operations and maintenance managers showed us aging heating, ventilation, and air-conditioning systems that, the managers said, were no longer consistently maintaining the temperature and humidity needed to protect collections from deterioration. At the Renwick Gallery, for example, fluctuations in temperature and humidity produced by steam outages have caused weeping of the plaster on the gallery walls and could potentially damage art work. Poor ventilation at the Smithsonian Institution Archives caused high humidity, resulting in mold damage that made some records unreadable.

Lastly, safety concerns and hazardous materials also threaten some collections. For example, at both the National Museum of Natural History and the Smithsonian Environmental Research Center, biological specimen collections are preserved in an alcohol solution that poses a safety risk from fire or explosive vapor that has to be controlled. Additionally, at the Smithsonian Environmental Research Center, collections are stored in deteriorating surplus trailers, many of them over 20 years old. Figures 9 and 10 depict problems with the storage of specimens stored in alcohol-filled containers of various sizes at the National Museum of Natural History. Several large rooms of about 10,000 square feet are used to store these containers, though current code limits such rooms to 500 square feet for safety purposes. Figure 9 shows that the storage containers are not enclosed, and figure 10 shows alcohol storage rooms that do not have current code-required explosion proof electrical equipment and fixtures.

Figure 9: Alcohol-Preserved Specimens Stored on Open Shelves at the National Museum of Natural History

Source: Smithsonian Institution.

Figure 10: Nonexplosion Proof Lighting Fixtures and Switches in Alcohol Storage Rooms at the National Museum of Natural History

Source: Smithsonian Institution.

The Smithsonian is working to address these situations. Containment for these collections that is up to code is costly and will require new construction, which is currently under way.

Smithsonian Has Centralized Its Facilities Management Organization and Budget to Improve the Efficiency and Effectiveness of Its Operations

The Smithsonian has recently reorganized its facilities management function to improve its operational effectiveness and make more efficient use of limited staffing and funding resources. In July 2001, NAPA reported that the Smithsonian's decentralized organizational structure and management practices, in some cases, had a direct and adverse effect on the planning, design, and construction activities that were integral to the institution's revitalization, construction, and maintenance programs. In response to NAPA's recommendations for improvement and its own internal review, the Smithsonian began in fiscal year 2001 to centralize its facilities management, adopted a variety of industry best practices for managing facilities projects, and established a priority process for facilities management. Because of the relative newness of the reorganization, it is too early to assess its effectiveness, though it appears to be moving in the right direction. Smithsonian museum, program, and center directors (the internal customers directly affected by the reorganization) had generally positive or neutral reactions to the reorganization, although several directors believed that OFEO needed to improve communications with them. Many of the directors, as well as OFEO officials, noted that reductions in OFEO's staffing and budget have hindered fully implementing the reorganization.

Smithsonian Has Centralized the Responsibility for Facilities Management

At the time of NAPA's 2001 report, the Smithsonian's facilities operations were decentralized. Three distinct organizations—the offices of Physical Plant, Environmental Management and Safety, and Protection Services—were loosely integrated under the central Office of Facilities Services, but each organization had its own director and budget. The Office of Physical Plant was further divided into 14 different divisions and offices. These organizations were responsible for facility planning, design, construction, and maintenance activities for the museums and research facilities. However, the National Zoo had its own budget and on-site staff to perform these functions for itself and for its Conservation and Research Center at Front Royal, Virginia. In addition, each museum or other major facility had its own separate funding and organization for providing custodial services, loading dock management, trash collection, and minor maintenance.

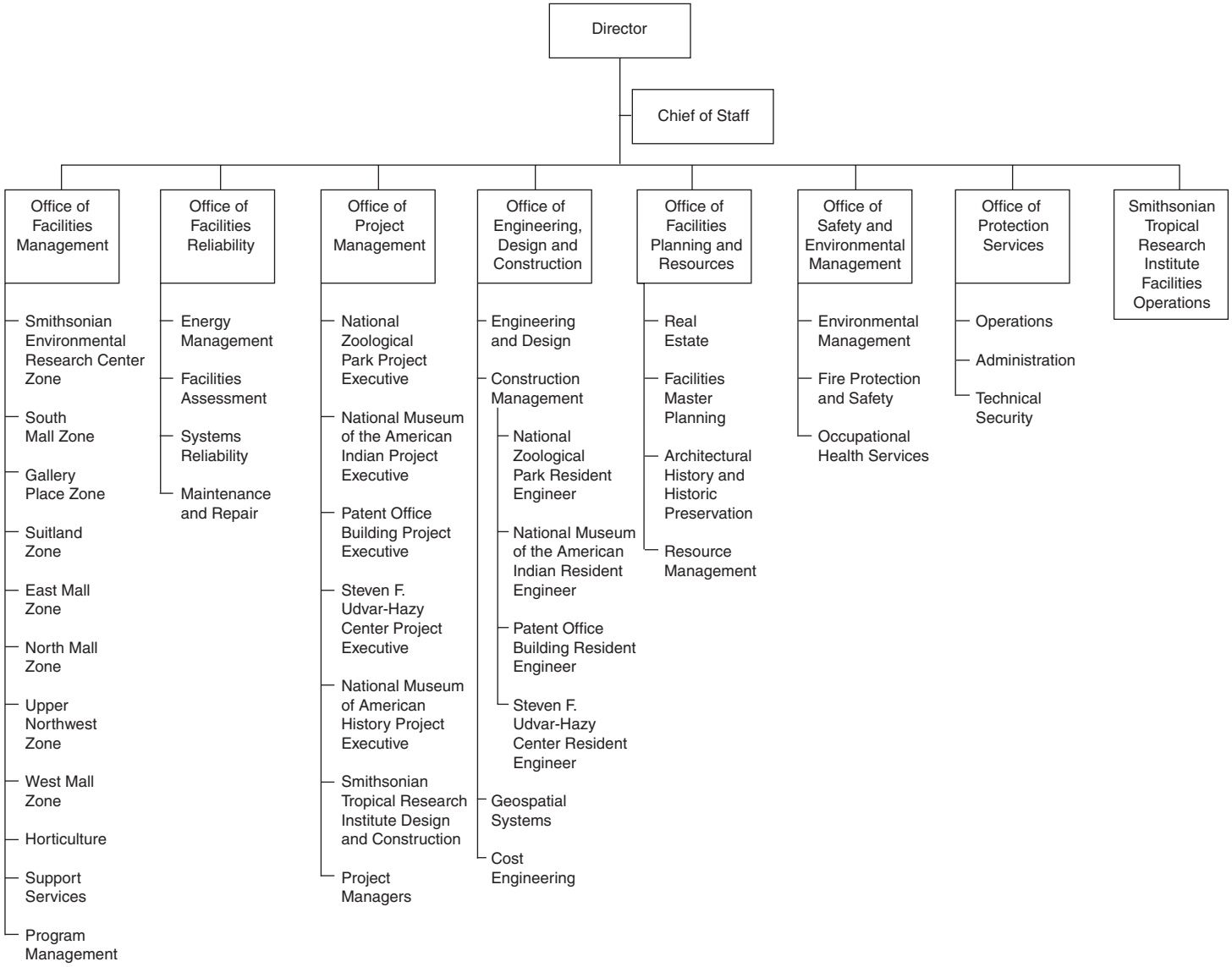
In its 2001 report, NAPA found that the sheer size of the Office of Physical Plant (with a span of control encompassing 14 different units) and the wide diversity of its functions (operations, repair, restoration, planning, design, and maintenance) led to a hybrid organization that was awkward to manage, diffused responsibility and accountability, and did not facilitate a focus on the office's three primary responsibilities: (1) operation and maintenance of the physical plant; (2) repair and restoration of facilities; and (3) new construction. NAPA also noted that the functions and tasks associated with operating and maintaining facilities were common to all of the Smithsonian buildings and that overlap and duplication were likely when more than one organization was responsible for carrying out the same functions. NAPA concluded that centralizing facilities management should enable the Smithsonian to provide more efficient and effective services by putting a single organization in charge. According to NAPA, this centralization would promote uniform policies and procedures, improve accountability, and avoid overlap and duplication.

In March 2001, before NAPA issued its report, the Smithsonian hired the former director of Facilities Engineering at the National Aeronautics and Space Administration to lead the reorganization of the facilities program and to head the new organization. The Director met with the NAPA team and studied its findings and recommendations. He also met with the Smithsonian's senior leadership and, with the help of a small internal team, listened to priorities and suggestions from various customers, stakeholders, and other Smithsonian staff in developing a plan for the reorganization.[21]

The result of this effort was the creation, in fiscal year 2004, of the Office of Facilities Engineering and Operations (OFEO), a new, flatter facilities management organization. OFEO assumed responsibility for all facility-related programs and budgets that had been divided among four offices the National Zoo, and each museum or other major facility. OFEO consists of eight offices—Project Management; Facilities Planning and Resources; Engineering, Design, and Construction; Facilities Reliability; Facilities Management; Protection Services; Safety and Environmental Management; and the Smithsonian Tropical Research Institute Facilities Operations—all reporting directly to the OFEO director and funded through one budget (see fig. 11). OFEO received its first budget in fiscal year 2004.

[21]*Museums and Facilities: Critical Assessment and Improvement Objectives*, September 2001.

Figure 11: Organization of Smithsonian's New Office of Facilities Engineering and Operations



Source: Smithsonian Institution.

Appendix III provides a detailed description of the responsibilities of each OFEO office. While all eight OFEO offices play a role in the facilities program, the Office of Project Management oversees all revitalization and construction projects, and two offices—Facilities Management and

Facilities Reliability—manage maintenance projects. The Office of Project Management develops preliminary project scopes, schedules, and budgets; monitors, directs, and reports on updated scopes, schedules and budgets for projects; and coordinates the efforts of stakeholders, designers, and construction execution.[22] Major projects (in excess of $5 million) are overseen by project executives, small projects ($5 million and less.) by project managers. For major projects, such as the construction of the National Museum of the American Indian and the revitalization of the Patent Office Building, monthly reports indicate the status of each project's cost and schedule. The OFEO director attends a monthly operational review of major revitalization and construction projects with museum directors, and the Smithsonian's deputy secretary/chief operating officer, general counsel, and chief financial officer are briefed approximately quarterly on the major projects. The Office of Project Management is also responsible for the initial prioritization of revitalization and construction projects.

The Office of Facilities Management provides day-to-day facilities maintenance services, including preventive maintenance, janitorial and grounds maintenance, transportation and mail delivery, building management for leased facilities, landscaping, and system start-ups for newly completed facilities. The responsibility for maintenance is divided among eight zones. A zone may consist of one or more buildings. Each zone has a manager who is responsible for maintenance in that zone. If Facilities Management staff cannot perform the work, then the work is sent to the Office of Facilities Reliability.

[22]A revitalization or construction project consists of three main steps: (1) project planning and development, which covers the initial project identification, scope and cost development, prioritization, and any project steps up to design; (2) design, which includes developing the design criteria package, obtaining architectural and engineering services, and preparing, reviewing and approving the final design; and (3) construction, which includes bid packages, a request for technical proposals, procurement of a construction contract, and contract administration and management procedures.

The Office of Facilities Reliability provides strategic planning and oversight for maintenance, manages the Reliability-Centered Maintenance program,[23] develops tasks and processes and then monitors work efforts, collects and analyzes data and metrics on the maintenance program, purchases utilities, manages agencywide service contracts, operates building automation services, and repairs large equipment in central shops. The office uses both in-house and contractor personnel to accomplish its objectives. When a minor repair is too large for Facilities Management, Facilities Reliability uses its staff or contracts out the work. About 15 percent of minor repairs are performed in-house, and about 85 percent are contracted out. Working with Facilities Management and others, Facilities Reliability is responsible for prioritizing minor repair projects. When we concluded our review in April 2005, the offices of Facilities Management and Facilities Reliability were being consolidated into one office that will be responsible for all maintenance projects.[24]

Smithsonian Has Adopted Industry Best Practices to Improve Its Management of Facilities Projects

In reorganizing its facilities management, the Smithsonian is incorporating recognized industry best practices so that its resources would go as far as possible toward addressing its rapidly growing revitalization, new construction, and maintenance workload.

For example, OFEO's framework for project management is considered a best practice, according to an independent review of an OFEO project by a contactor working for the Smithsonian Inspector General. OFEO also has been developing several handbooks to establish procedures and provide guidance on various aspects of facilities management. Its *Facilities Project Management Handbook* specifically addresses the Construction Industry Institute's (CII) practices of benchmarking and metrics, partnering, and

[23]Reliability-centered maintenance is a maintenance strategy that logically incorporates the optimum mix of reactive, preventive, predictive testing and inspection, and proactive maintenance practices.

[24]The merger is taking place now but will not be reflected in the budget until fiscal year 2006.

preproject planning.[25] OFEO has begun to implement these practices by, for example, establishing and tracking metrics, such as holding contract schedule growth to 10 percent or less and contract cost growth to 2 percent or less. Both Facilities Management and Facilities Reliability periodically survey their internal customers to determine their level of satisfaction with the services provided to them. Furthermore, OFEO has adopted CII's Pre-Project Planning Handbook and uses CII's Project Definition Rating Index[26] to evaluate the progress of projects at various stages—both tools recommended by CII to support the best practice of preproject planning. OFEO has also just begun to use CII's Estimate Score Program,[27] a tool designed to enhance the accuracy of early estimates. CII's best practices form the core of the practices taught to OFEO staff, and according to OFEO officials, these practices are routinely used in various phases of projects. In addition, staff participate in CII committees and teams, including those that develop best practices and participate in Federal Facilities Council committees.[28]

The Smithsonian has also adopted leading practices in capital decision making, such as identifying its inventory of assets, determining their condition and the gap between current and needed capabilities, and ranking and selecting projects according to their priority, type of work, and

[25]The Construction Industry Institute is a research organization composed of construction contractors and owners seeking to improve the construction and capital investment process. The institute has identified 14 best practices, 8 of which—alignment, benchmarking and metrics, change management, disputes prevention and resolution, implementation of products, partnering, preproject planning, and team building—are aimed at owners such as the Smithsonian and 6 of which are aimed principally at contractors and manufacturers.

[26]This is a checklist of 64 scope definition elements in a 1,000-point scoring system; each element is weighted on the basis of its relative importance to other elements. The overall rating determines whether the project should proceed through the budget cycle, allowing the Smithsonian to make better investment decisions.

[27]This is a tool for measuring how well an estimate has been prepared for a particular project. It gives a score based on rating each of 45 elements that can have a significant impact on an estimate. It provides a reality check on the estimate for better decision making.

[28]The Federal Facilities Council's purpose is to promote continuing cooperation among sponsoring federal agencies, and among the agencies and other elements of the building community in order to advance building science and technology—particularly with regard to the design, construction, acquisition, evaluation, and operation of federal facilities. The Smithsonian Institution is a sponsoring entity of the Federal Facilities Council.

fiscal year.[29] (See app. IV for more detail on how the Smithsonian is implementing these practices.) Other industry practices that OFEO has adopted include reliability-centered maintenance, which covers predictive testing and inspection, and preventive maintenance.

Smithsonian Has Established a Prioritization Process for Allocating Limited Funds to Revitalization, Construction, and Maintenance Projects

OFEO's Offices of Project Management and Facilities Reliability share responsibility for prioritizing projects—Project Management for revitalization and construction projects and Facilities Reliability for maintenance projects. Other organizations throughout the Smithsonian have input into these decisions. The Smithsonian's Capital Planning Board,[30] Secretary, and Board of Regents approve prioritizations of revitalization and construction projects in the institution's 5-year capital program, and the OFEO director approves prioritizations of maintenance projects.

The Office of Project Management, working with the museums and other facility groups, develops an annual list of new and previously submitted projects to be prioritized for inclusion in the annual 5-year capital plan. Using OFEO's priority code assignment matrix, the office assigns each project one of four condition levels (catastrophic, critical, routine, and can defer) and one of five project types (shell/system failure, code compliance/security, nonroutine capital repairs, energy/operational efficiency, and alterations and modifications). This assignment determines the project's priority code, which may be from one to five. For example, a shell/system failure project assigned a catastrophic condition level would receive a top priority code of "one" for the budget year in which funding is sought. (See app. V for the priority code assignment matrix and definitions of its elements.). After Project Management completes the prioritized list, it sends the list to the Smithsonian under secretaries and directors for review and approval. Project Management then uses the approved list to update the 5-year capital plan and sends the updated plan to the Smithsonian's Capital Planning Board for review. The Capital Planning Board reviews the plan in the context of the Smithsonian's guidelines and needs. Only projects supported by this review and then by the Smithsonian Secretary's review

[29]GAO/AIMD-99-32 (Washington, D.C.: December 1998.)

[30]The Smithsonian's Capital Planning Board is made up of the chief financial officer (chairperson); deputy secretary and chief operating officer; under secretaries for Science, and Art; chief executive officer of Business Ventures; general counsel; director of Policy and Analysis; chief information officer; and OFEO director.

are included in the updated 5-year capital plan, which accompanies the annual budget submission to the Office of Management and Budget. The Board of Regents approves the Smithsonian's annual budget submission, including the 5-year capital plan. According to Smithsonian officials, this process ensures that the institution's limited capital funding is allocated to the highest priority needs.

The Office of Facilities Reliability, in conjunction with the museums and other facility groups, identifies maintenance projects, taking into account customer input; annual safety, health and environmental inspections; code and regulatory requirements; and facility assessments. Facilities Reliability then ranks these projects on a scale from 1 to 10. For example, a project to address an imminent facility failure that poses a potential safety, health, or environmental issue is ranked as a 1, the highest priority; a project to address a moderate disruption to a facility's functions is ranked as a 6, and a project that involves no expectation of failure or effect on safety or health is ranked as a 10, the lowest priority. Facilities Reliability then uses a funding matrix to determine which projects will be funded. Any projects that cannot be funded go into the office's inventory of projects. (See app. VI for the priority decision-making flowchart and maintenance ranking scale.) According to Facilities Reliability officials, if facilities-related emergencies occur during a year, funds obligated for other projects may have to be deobligated.

Directors Generally Expressed Positive or Neutral Reactions to OFEO but Noted That Restructuring Has Been Hindered by Staffing and Budget Reductions

The 16 Smithsonian directors of museums, galleries, research centers, the National Zoo, and a program office that we interviewed expressed a range of opinions about the reorganization's impact on facilities services. Five directors said that services had improved substantially and 9 others were generally positive or neutral about the reorganization. Two directors said that services had deteriorated since the reorganization. Various directors, including the 2 that had expressed negative views, pointed out that after OFEO was reorganized, the Smithsonian had a staff buyout[31] that led to staffing and funding reductions in OFEO. In total, OFEO lost 109 of about 1,750 staff and the funding for their positions—59 in maintenance, 39 in security, and 11 in other OFEO offices, according to a Smithsonian official. These reductions, together with the recent opening of the National

[31]The buyout was available to all Smithsonian employees but was mostly taken by individuals already eligible for retirement or early retirement, according to a Smithsonian official.

Museum of the American Indian, have negatively affected both maintenance and security services, according to various directors. Also, several directors, including some with positive reactions to OFEO, noted that communications from OFEO to its internal customers could be improved.

Although implementation of the centralization effort is still a work in progress, senior OFEO officials believe the reorganization is progressing well. While full implementation has been hindered by both staffing shortages and budget constraints, OFEO has obtained permission to fill 19 of these positions in crucial areas.[32]

Estimated Costs of Facilities Projects Have Grown, Posing Serious Funding Challenge

The Smithsonian currently estimates that it will need about $2.3 billion for fiscal years 2005 through 2013 for its planned revitalization, construction, and maintenance projects, but this estimate could change as information is updated and new facilities are opened or authorized. As of April 2005, of the 13 funded major revitalization and construction projects that are active or were completed in fiscal year 2004, most were on time and within budget. Given its level of annual operating and capital program revenues (about $904 million in fiscal year 2004, including about $184.4 million for the facilities) for all of its activities, it is unclear how the Smithsonian's planned facilities needs will be funded over the next 9 years.

Current $2.3 Billion Estimate Reflects Updates but Could Change

The Smithsonian's $2.3 billion estimate for the next 9 years includes about $1.43 billion for revitalization projects (including facilities planning and design), about $136.2 million for construction projects, and about $713.9 million for its maintenance program. Table 1 breaks down these estimates by project and year. Like all estimates, these are based on the information that is available at the time they are made, and they are subject to change as new information becomes available. Additionally, the estimates for revitalization and construction, which total almost $1.57 billion, are largely based on preliminary planning documents, such as master plans and facility assessments, (some still in progress), and on preliminary designs. According to Smithsonian documents, about 86 percent of the estimates for revitalization and construction projects, which account for about $1.27

[32]The 19 positions include 1 doctor for the employee health clinic, 1 real estate specialist, and 17 operation and maintenance positions.

billion—or nearly 81 percent—of the $1.57 billion total, are "order-of-magnitude" estimates. Such estimates have a range of accuracy of plus or minus 30 to 50 percent. Thus, the $1.57 billion estimate for revitalization and construction projects could fall as low as about $875 million or rise as high as about $2.3 billion.[33] The cost estimates for maintenance projects are based on facility assessments, guidance issued by the National Research Council and the Federal Facilities Council, and a formula Facility Reliability has developed for estimating maintenance costs.

Table 1: Appropriated and Estimated Costs of Smithsonian Capital and Maintenance Programs, Fiscal Years 2005-2013

Dollars in millions

	Appropriated funds		Estimated costs for fiscal year(s)[a]						Total
	Prior funding[b]	2005	2006	2007	2008	2009	2010	2011 - 2013	2005 - 2013
CAPITAL PROJECTS									
Major revitalization									
Arts and Industries Building	$13.2	$23.4	$5.8	$11.3	$57.0	$61.0	$64.0		**$222.5**
Freer Gallery							1.0	$10.0	**11.0**
Hirshhorn Museum						2.0		20.0	**22.0**
Museum Support Center				1.0		10.0		24.0	**35.0**
National Air and Space Museum								59.0	**59.0**
National Museum of American History	4.8	10.0	18.4	13.1				50.0	**91.5**
National Museum of Natural History	101.4	10.0	15.8	33.2	34.0	32.0	33.0	125.5	**283.5**
National Zoological Park	43.9	21.4	14.0	28.9	23.5	24.1	25.6	107.6	**245.1**
Patent Office Building	121.0	44.4							**44.4**
Quadrangle								60.0	**60.0**
Renwick Gallery							4.0	25.0	**29.0**
Smithsonian Institution Building (the "Castle")	1.0							87.0	**87.0**
Silver Hill/Suitland Facility								23.0	**23.0**

[33]This range is calculated on a *weighted average* based on the four types of estimates (1) order of magnitude, (2) factored, (3) control and (4) detailed/definitive. See the paragraph following table 2 for a discussion of this estimating process.

(Continued From Previous Page)

Dollars in millions

	Appropriated funds		Estimated costs for fiscal year(s)[a]						Total
	Prior funding[b]	2005	2006	2007	2008	2009	2010	2011 - 2013	2005 - 2013
CAPITAL PROJECTS									
Major revitalization									
Smithsonian Tropical Research Institute				3.2	6.0	1.2	1.8	1.8	**14.0**
Other revitalization [c,d]	63.2	6.0	15.0	37.0	23.5	15.1	16.1	51.7	164.4
Facilities Planning and Design[e]		3.0	4.0	7.8	6.0	4.6	4.5	8.9	**38.8**
Subtotal revitalization		**118.2**	**73.0**	**135.5**	**150.0**	**150.0**	**150.0**	**653.5**	**1,430.2**
Construction									
Museum Support Center Pod 5	12.3	6.9	9.0	14.5					**30.4**
SAO - VERITAS Control Building (Arizona)		1.0							**1.0**
National Museum of African American History and Culture (planning and design)				2.0					**2.0**
Antiterrorism protection[d]			8.9	15.6	14.2	15.3	23.8	25.0	**102.8**
Subtotal construction		**7.9**	**17.9**	**32.1**	**14.2**	**15.3**	**23.8**	**25.0**	**136.2**
Subtotal capital projects[f]		**$126.1**	**$90.9**	**$167.6**	**$164.2**	**$165.3**	**$173.8**	**$678.5**	**$1,566.4**
MINOR REPAIR AND MAINTENANCE PROJECTS[g]		38.2	45.7	90.0	90.0	90.0	90.0	270.0	**713.9**
Total		**$164.3**	**$136.6**	**$257.6**	**$254.2**	**$255.3**	**$263.8**	**$948.5**	**$2,280.3**

Source: Smithsonian Institution.

[a]These estimates are in current 2004 dollars.

[b]These amounts are in year-appropriated dollars.

[c]Includes funding for 95 other revitalization projects. Projects in this category are smaller in scale than major projects, usually involve systems or pieces of equipment for a single building, and typically cost between $100,000 and $5 million.

[d]The funding for two categories—other revitalization projects and antiterrorism protection—is planned for projects at multiple Smithsonian sites.

[e]Includes cost estimates for the design of other revitalization projects and master planning.

[f]Includes funding for major revitalization, other revitalization, facility planning and design projects, and construction.

[g]Represents total funding for maintenance program, including staff costs, minor repair and maintenance projects, and other contracts, supplies, materials and equipment. For fiscal year 2005, this is the amount appropriated for the program, according to the Smithsonian. For fiscal year 2006, this is the amount in the Smithsonian's fiscal year budget submitted to Congress, according to the Smithsonian.

The revitalization and new construction costs presented in table 1 are driven, in part, by the need to modernize or add systems—fire detection and alarm; security; electrical; heating, ventilation, and air-conditioning (including environmental ventilation) systems, and elevators and escalators—and to comply with newer code requirements, such as those for air pressurization to keep stairwells clear of smoke[34] and handicapped accessibility to buildings and restrooms. Figures 12 through 15 show revitalization projects that are included in the Smithsonian's estimate of $1.43 billion. Figure 16 illustrates new construction planned to address the safety problems with alcohol storage depicted in figures 9 and 10 that are included in the Smithsonian's estimate of $136.2.

[34]The purpose of stair pressurization is to inject fresh air into the stairwells during a fire scenario and provide a positive pressure differential in relation to adjoining spaces. In other words, the positive pressure created will prevent smoke from entering the stairwell as people enter it.

Figure 12: Failing Heating, Ventilation and Air Conditioning System at National Air and Space Museum

Source: Smithsonian Institution.

Figure 13: Antiquated Fire Suppression System, National Air and Space Museum

Source: Smithsonian Institution.

Figure 14: Flooding in High-Voltage Room, National Museum of American History

Source: Smithsonian Institution.

Figure 15: Leak in the Room 4303 (History Storage Room) at the National Museum of American History

Source: Smithsonian Institution.

Figure 16: Site Footprint of Planned Alcohol Storage Unit (Pod 5) to be Added to the Museum Support Center, Suitland, MD

Source: Smithsonian Institution.

Smithsonian Has Updated NAPA's Estimate and Implemented Other Recommendations to Improve Cost Estimation

The Smithsonian's current $2.3 billion estimate exceeds NAPA's $1.2 billion estimate because it reflects more recent and comprehensive assessments of the Smithsonian's revitalization needs, covers new construction (including about $103 million to address security requirements),[35] and incorporates more complete information about the maintenance program. After NAPA issued its July 2001 report, the Smithsonian implemented NAPA's recommendations that it revalidate its revitalization requirements and separate its maintenance budget from its revitalization budget. In September 2001, the Smithsonian issued a report outlining its revitalization objectives,[36] and it has since been updating facility assessments and completing master plans to identify further revitalization costs. It has also taken other steps to improve its cost estimation, including establishing a

[35]NAPA's estimate did not cover new construction because the Congress did not ask NAPA to review the Smithsonian's construction program.

[36]*Museums and Facilities: Critical Assessment and Improvement Objectives*, September 2001.

cost-engineering unit and attempting to implement a NAPA recommendation that calls for linking requests for construction funding to progress in completing design drawings. Table 2 provides the Smithsonian's January 2005 cost estimates for major revitalization projects, NAPA's July 2001 estimates, and summaries of the reasons for differences between the estimates. Further discussion of the Smithsonian's cost estimation methods follows the table.

Table 2: Estimated Costs for Major Revitalization Projects as Reported by NAPA in 2001 and Identified by the Smithsonian in 2005

Dollars in millions

Smithsonian facilities	2001 NAPA estimate	2005 Smithsonian estimate	Difference	Reasons for difference
Arts and Industries Building	$105.0	$235.7 ($36.6 funded)	$130.7	Continuing deterioration, particularly of the roof, prompted a decision to close the building and move tenants instead of allowing them to occupy the building during a phased renovation. Of the $131 million difference, $34 million is for permanently relocating the staff and $10 million is for replacing the roof—originally a separate project, but now included in the overall renovation. Design development has revealed more substantial systems replacement and structural reinforcement needs; substantial work is also needed to restore the building to its original state.
Freer Gallery	$3.5	$11.0	$7.5	Further investigation has revealed needs for modifying the courtyard to improve accessibility, modifying the fire protection systems, adding shade structures for the skylights, and installing new gallery lighting.
Hirshhorn Museum	$11.0	$22.0	$11.0	Further investigation has revealed the need for additional work on the building envelope to stop water intrusion.
Museum Support Center	$16.0	$35.0	$19.0	Further investigation has revealed the need for additional work on the electrical system and one emergency generator. The revalidated estimate also includes funding for a new requirement to renovate Pod 3, once alcohol-preserved collections are relocated to Pod 5. The renovation will include the construction of two floors to replace the steel system now in place.
National Air and Space Museum	$45.0	$59.0	$14.0	Design development has revealed the need for more extensive systems replacement. The project has also been postponed several years, adding a minimum of $5 million in escalation cost to the NAPA report's estimate.
National Museum of American History	$35.0	$96.3 ($4.8 funded)	$61.3	Further investigation has revealed the need for more extensive systems replacement. The fire-detection and alarm system, elevators and escalators, and security system need upgrading. Stair pressurization and restrooms must also comply with newer code requirements. Extensive renovation of the public areas, not included in the original project, is also needed to accommodate an exhibit replacement program funded by the Behring Foundation.

(Continued From Previous Page)

Dollars in millions

Smithsonian facilities	2001 NAPA estimate	2005 Smithsonian estimate	Difference	Reasons for difference
National Museum of Natural History	$200.0	$387.9 ($111.4 funded)	$187.9	The NAPA report's estimate was based on a 1980's estimate, which projected a 10-year construction period. Lack of funding has extended the project, causing its costs to escalate. Furthermore, the project's scope has changed. The plans now call for a more comprehensive renovation of the entire building, including modifying the interior to provide refurbished space for museum activities. New requirements for environmental ventilation, additional fire protection, and lighting have also increased the estimate.
National Zoological Park	$171.0	$289.0 ($65.3 funded)	$118.0	Investigation of building and utility distribution systems was just beginning in 2001, and little was known about the magnitude of the deficiencies. A 2003 study by a contractor updated the cost to restore the National Zoo to at least $250 million over the next 10 years. Also, systems have continued to deteriorate, and the estimated costs to replace them have increased. The current estimate will change further as specific studies of individual buildings progress over the next 5 years. Finally, a catastrophic fire in the wetlands exhibit that occurred after the contractor's 2003 study has added about $10 million in estimated restoration costs.
Patent Office Building	$151.0	$166.0 ($165.7 funded)	$14.4	A design development and scope change to convert about 60,000 square feet of administrative space to public space required modifications to building systems and architectural finishes.
Quadrangle	$44.0	$60.0	$16.0	The original estimate covered replacement of the roof structure, but since the project has been delayed, replacement of the mechanical systems has been added to the project.
Renwick Gallery	$23.0	$29.0	$6.0	Costs have escalated with delays in starting the project due to lack of funding.
Smithsonian Institution Building (the "Castle")	$57.0	$88.0 ($1.0 funded)	$31.0	The master plan for the complete renovation of the "Castle" building and systems and finishes has progressed to the 65-percent level, giving better cost data than when the NAPA report was done.
Silver Hill/Suitland Facilities	New	$23.0	$23.0	New requirements have been identified since the NAPA report.
Smithsonian Tropical Research Institute	New	$14.0	$14.0	New requirements have been identified since the NAPA report.

Source: Smithsonian Institution.

To estimate the costs of its revitalization projects and construction, the Office of Project Management may use facility assessments, fire and safety inspections, customer input, contracted cost estimates of projects, feasibility studies, design documents at various stages (preliminary, 35 percent, or 100 percent), and the input of the various experts in OFEO,

according to OFEO officials. The developmental phase of a project determines the types of information that are available for use in estimating its cost. Depending on the types of information used, Project Management can assign a range of accuracy to an estimate, applying a four-class system that the Construction Industry Institute (CII) uses to categorize cost estimates.[37] Estimates in each class—order of magnitude, factored, control, and detailed/definitive—are based on different, increasingly reliable documents and have increasingly narrow ranges of accuracy. Whereas an order-of-magnitude estimate could be based on a feasibility study alone and would have an range of accuracy of plus or minus 30 to 50 percent, a detailed/definitive estimate could be based on detailed drawings and could have a narrower accuracy range of plus or minus less than 10 percent. As discussed, the majority of the Smithsonian's estimates for revitalization and construction projects are order-of-magnitude estimates.

To provide better estimates of its future needs, OFEO has established a Cost Engineering Division, which recently has been fully staffed. This division is to provide revitalization and construction cost estimates for projects at the project development stage.[38] The division is also to revise construction cost estimates for each project throughout its life cycle to reflect changes and current market conditions. The recently hired associate division director has developed a draft Cost Management Guide that is currently being reviewed. According to the associate division director, the guide is to standardize the estimating process throughout OFEO, including the process for developing cost estimates for the Smithsonian's 5-year capital plan, and to provide an audit trail for estimates. He is also introducing CII's Estimate Score Program to enhance the accuracy of early estimates. He expects his division to have a major role in developing all future project estimates.

[37]The CII defines four classes of cost estimates: (1) "order of magnitude," which is based on feasibility cost/capacity curves and has an accuracy range of plus or minus 30 to 50 percent; (2) "factored," which applies major equipment factors for costs and has an accuracy range of plus or minus 25 to 30 percent; (3) "control," which is based on quantities from mechanical, electrical, and civil engineers' drawings and has an accuracy range of plus or minus 10 to 15 percent; and (4) "detailed/definitive," which is based on detailed drawings and has an accuracy range of plus or minus less than 10 percent.

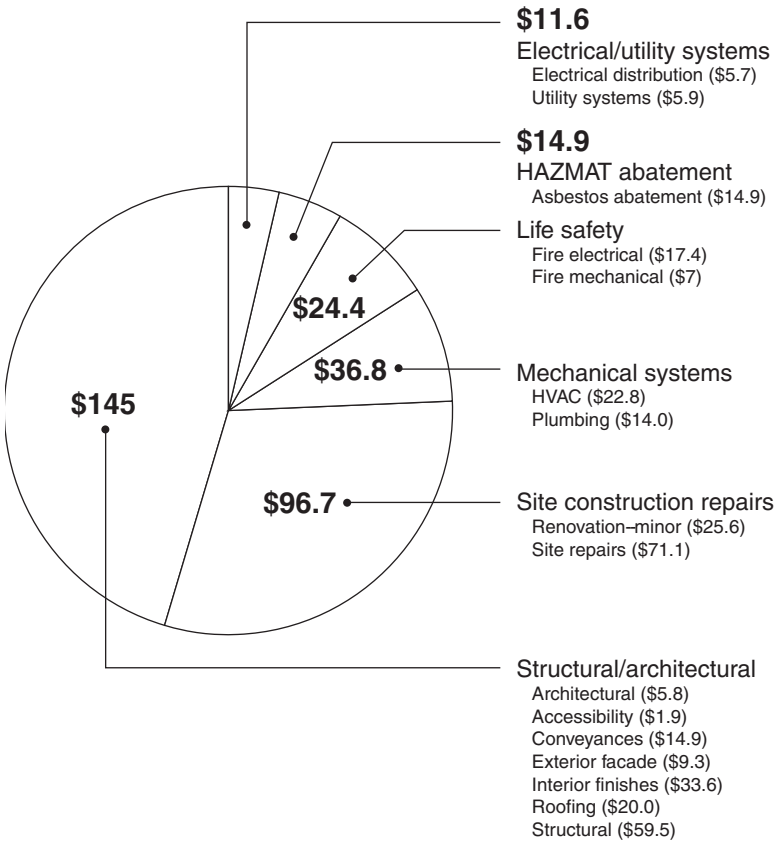
[38]Planning and project development are the initial stage and covers initial project identification, scope and cost development, prioritization and any project steps up to design.

NAPA recommended that, to improve its cost estimates, the Smithsonian not request construction funding from the Congress until it has completed partial (35 percent) design drawings for its projects. According to the OFEO director, OFEO is having difficulty meeting this recommendation because of chronic underfunding in the design category. OFEO currently can barely keep up with the requirements for complete (100 percent) design drawings for the next year's capital program, the director said, and little funding is available to meet the longer-term requirements for partial (to 35 percent) designs. Ideally, the 35-percent design drawings should be complete before OFEO develops the request for construction funding to the Office of Management and Budget. The director believes that if OFEO had a larger pool of design funds, he could provide the Congress with more accurate information for making funding decisions and develop projects in a timely manner.

Smithsonian Now Tracks Maintenance Project Costs Separately from Revitalization and Construction Project Costs

As NAPA recommended, the Smithsonian separated maintenance costs from revitalization and construction costs and now tracks and manages them through separate offices. Using facility assessments, the Office of Facilities Reliability determined an inventory of about $329 million in deferred maintenance projects as of October 2004. Figure 17 shows the breakdown of the inventory by type and total dollar value.

Figure 17: Estimated Maintenance Project Costs, by Type (dollars in millions)



Source: Smithsonian Institution.

According to Facilities Reliability officials, the yearly cost estimates for maintenance projects in table 1 provide for maintaining facilities at their current levels in fiscal years 2005 and 2006 as well as reducing the inventory of deferred maintenance in fiscal years 2007 through 2013 if funded at these levels. To calculate these estimates, Facilities Reliability first (1) considers the building's condition, as measured against a facility condition index that ranges from 1 (the worst condition) to 5 (the best condition); (2) determines an allowance (between 2 percent and 6 percent, depending on the building's condition) of the building's current replacement value; and (3) applies a formula that includes the building's

total square footage.[39] Facilities Reliability then adjusts the results of its calculations according to the type of maintenance work and the input of staff. Finally, Facilities Reliability combines the estimated maintenance costs for all the buildings to determine the estimated maintenance needs for a fiscal year. The deferred maintenance inventory rises and falls as maintenance projects are completed, new projects are identified, and the estimated replacement value of the facility inventory changes. Underfunding maintenance needs in a given year increases the deferred maintenance inventory.

Cost Estimates Could Change

For a variety of reasons, the Smithsonian's cost estimates for revitalization, construction, and maintenance could change. First, as noted, the estimates for about 86 percent of the revitalization and construction projects are order-of-magnitude estimates with an accuracy range of plus or minus 30 to 50 percent. An OFEO official pointed out that the costs are not likely to fall unless the projects are reduced in scope. Additionally, the estimates could increase further because assessments for the National Museum of Natural History, the National Zoo, and the Smithsonian Astrophysical Observatory are still in progress and could identify new needs. Moreover, as other facilities continue to deteriorate, additional revitalization needs could arise.

Second, the annual costs for maintenance are expected to increase due to the addition of the National Museum of the American Indian and the Steven F. Udvar-Hazy Center to the Smithsonian's building inventory in fiscal year 2004, and with the planned completion of the Patent Office's revitalization in 2006. According to the National Research Council's standards for maintenance, the Smithsonian's maintenance budget should increase by at

[39]According to the National Research Council, the appropriate level of spending for maintenance is 2 to 4 percent of a facility's current replacement value. This range is most valid for estimates developed for a large inventory of buildings for periods of several years, such as the Smithsonian has done. The range covers current requirements only and does not provide for work that was deferred in the past. The Federal Facilities Council suggests that one way to estimate the costs of reducing the inventory of deferred maintenance is to increase the range by some arbitrary percentage. The Smithsonian has increased its range by 2 percent to cover the deferred maintenance. As a result, the range now extends to 6 percent. For example, a condition index of "1" equates to 6 percent of a building's current replacement value, and a condition index of "5" equates to 2 percent of a building's current replacement value. Also, if the current replacement value per square foot exceeds $300, in order to be conservative, Facilities Reliability applies only one-fifth of the percentage allowance for replacement value of $300 per square foot. For example, if the percentage allowance is 5 percent, Facilities Reliability uses only 1 percent of the allowance for amounts over $300 a square foot.

least 2 percent of these buildings' current replacement value to cover their maintenance. However, a Smithsonian official told us that the Smithsonian received an increase in maintenance funding for fiscal year 2005 to provide for the National Museum of the American Indian of only $700,000 of the $2.5 million needed. Unfunded maintenance costs increase the Smithsonian's deferred maintenance inventory.

Third, the estimated costs for both construction and maintenance do not include the National Museum of African American History and Culture, which Congress authorized in 2003. This new museum is in its planning stage, and the timing and cost of its construction are still unknown, though it is likely to be several hundreds of millions of dollars. In addition, some members of Congress have expressed interest in developing a National Museum of the American Latino Community.

Most Funded Major Revitalization and Construction Projects Are on Time and Within Budget

The Smithsonian has 13 funded major revitalization and construction projects that are currently active or were completed in fiscal year 2004. As table 3 indicates, 8 of the 13 projects were within budget and on time (or were completed on time) as of April 2005.[40] Of the remaining 5 projects, 1 was both over budget and behind schedule (Museum Support Center, Pod 5); 2 had increases in their budgets, but were on schedule (Ocean Exhibit and Patent Office Building, Phase II); 2 were behind schedule, but within their budgets (Patent Office Building Phase I and Mall-wide Permanent Security Barriers). For each major project, table 3 identifies the budget, current working estimate, schedule, and comments.

[40]We counted two of the projects, Asia Trail I and Asia Trail II, as being within budget because their total budget did not change but one budget increased and one budget decreased because part of the Asia Trail II project was moved to Asia Trail I.

Table 3: Status of Fiscal Year 2004 Funded or Completed Major Projects as of April 2005

Dollars in millions

Major project	Project budget	Current working estimate (CWE)	Schedule	Comments
Revitalization projects				
Arts and Industries Building	$44	$34	On time	• This project covers closure, staff relocation and chilled water connection to GSA system. • Two leases for space signed. • Relocated Discovery Theater opened on time. • North hall tarp removed, structural investigation and implementation of temporary repairs completed. • Relocated Smithsonian Early Enrichment Center opened on schedule. • Federally funded through Smithsonian's capital program.
National Museum of American History (NMAH)				• This public space renewal project is being done in four phases, or "packages"; only the first two phases are supported by federal appropriations.
Package I (supports Price of Freedom Exhibit)	4.5	4.47	On time	• Construction is complete and the exhibit opened on time. The cost indicated reflects only the federal appropriation component.
Package II (supports Star Spangled Banner Exhibit)	80.0 (45.5 capital funds)	80.0 (45.37 capital funds)	65 percent design delivered 3/28/05, three days ahead of schedule.	• Design development under SD-410 review (Smithsonian internal review). • Notice to proceed given to contractor for value engineering on parts of the project. • Scope of work for construction documents (up to 65 percent) under development. • Construction documents (up to 65 percent) to be funded from federal funds in hand. • $45.5 million is to be federally funded through Smithsonian's capital program. The remainder is to be funded through the Smithsonian trust funds.
National Museum of Natural History (NMNH)				
Ocean Exhibit	34.11 (16.0 capital funds)	40.47 (18.27 capital funds)	On time	• Renovation costs have grown by $2.2 million because HVAC requirements have increased. The museum is using funds from other projects to cover the additional costs. • Exhibit costs have grown by $4.2 million to include specific projects of interest to the donor. The donor may cover the additional costs; if not, the additional exhibits will not be included. • $18.27 million is to be federally funded through Smithsonian's capital program. The remainder is to be funded through the Smithsonian trust funds.

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Dollars in millions

Major project	Project budget	Current working estimate (CWE)	Schedule	Comments
National Zoological Park				
Asia Trail I	48.44 (41.59 capital funds)	50.44 (43.6 capital funds)	On time	• Asia Trail II otter exhibit scope added to Asia Trail I project for construction. Asia Trail I construction budget increased by otter construction budget ($2 million); total project budget increased from $48.44 million to $50.44 million. • $43.6 million is to be federally funded through Smithsonian's capital program. The remainder is to be funded through the Smithsonian trust funds.
Asia Trail II	62.71 (37.85 capital funds)	60.71 (35.85 capital funds)	Design is on time	• Otter exhibit moved to Asia Trail I project. Asia Trail II budget reduced by otter construction budget of $2.0 million. • Friends of the National Zoo (FONZ) is evaluating feasibility of raising $30 million matching funds for elephant facility. • Architect/engineer responding to 35 percent design review. • $35.85 million is to be federally funded through Smithsonian's capital program. The remainder is to be funded through the Smithsonian trust funds.
Kids Farm	5.193	5.193	Opened on time	• $4.989 million federally funded through Smithsonian's capital program. $204,000 in trust funds of which $82,000 was funded by FONZ.
Patent Office Building				
Phase I	166.0	166.0	99 days behind schedule due to unexpected construction problems found during the renovation.	• CWE within $166 million after executing scope reductions (security, exterior signage, furniture, elevator maintenance, and lighting) and transferring approved costs to trust fund budgets (wireless, build-out, collection move, Lunder Visible Conservation Center equipment). • Substantial completion projected to April 2006 (99-day delay) for a limited number of specific areas. Working to isolate delays and minimize overall impact to exhibit effort. • National Capital Planning Commission Submission anticipated on 4/15/05 for hearing on 5/5/05. • Federally funded through Smithsonian's capital program.
Phase II	50.0	51.7	On time	• Funding is from trust funds. • Working on strategy that maintains $44.3 million budget and completion date 1/31/07. Smithsonian decision pending next contract funding increment. • Increased cost reflects potential desired enhancements.

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Dollars in millions

Major project	Project budget	Current working estimate (CWE)	Schedule	Comments
New construction				
Museum Support Center, Pod 5	30	42.7	Design is 4 months behind schedule	• The schedule and funding have been adjusted to address this design delay. • The Smithsonian is including an option for a laboratory in the contract documents for Pod 5 for an estimated $9.8 million. This $9.8 million plus an increase in design cost of $400,000 accounts for $10.2 million between the budget and the current working estimate. • Review of cost estimates resulted in a $2.5 million increase due to longer contract period and later separate contract awards. • Federally funded through Smithsonian's capital program.
National Museum of the American Indian	219.3	219.3	Opened on time, on Sept. 22, 2004	• About $119 million was federally funded through Smithsonian's capital program. The remainder was funded through the Smithsonian trust funds.
Steven F. Udvar-Hazy Center	219.8	218.3	Opened on time, in December 2003	• Does not include funding provided by Commonwealth of Virginia for site improvements. • The $210.3 million was funded through the Smithsonian trust funds. About $8 million in design funds was federally funded through Smithsonian's capital program.
Mall-wide Permanent Security Barriers	0	33	Phase 1 National Air and Space Museum construction contract awarded 2 months behind schedule	• Smithsonian needs to resolve Mall-wide 35-percent design issues. • Funding requested in fiscal year 2006 to design & construct barriers at NMNH. • Funding projected in fiscal year 2007 to complete barriers at NMAH. • Federally funded through Smithsonian's capital program.
Smithsonian Institution Building (the "Castle"), National Air and Space Museum, Freer Gallery, Hirshhorn Museum, Quadrangle, Renwick Gallery				• No major projects are planned until 2011 to 2013.

Source: Smithsonian Institution.

- The current working estimate of the National Museum of Natural History's Ocean exhibit increased from about $34.1 million to $40.5 million. This $6.4 million increase reflects higher costs for renovations ($2.2 million for heating, ventilation, and air-conditioning [HVAC] work required to support the planned exhibits' advanced technology and

more interactive components) and $4.2 million for specific additional exhibits that the donor has suggested. The National Museum of Natural History is reprioritizing its capital projects to cover the higher HVAC costs. The donor will provide the $4.2 million in additional funds for the specific exhibits requested, or the additional exhibits will not be included in the project.

- The current working estimate of Phase II of the Patent Office Building renovation was increased to reflect desired enhancements should additional trust fund monies become available. The current courtyard enclosure is within the original target.

- The current working estimate of the Museum Support Center Pod 5 project increased from $30.0 million to $42.7 million. The additional costs include $9.8 million for a laboratory, $400,000 for further design work, and $2.5 million[41] due to a longer contract period,[42] delays in obtaining program funds,[43] and later separate contract awards. The purpose of this Pod is to store collection specimens preserved in alcohol-filled containers in a code-compliant building. According to the project manager, the design costs were higher than expected because it is difficult to design a storage facility to contain such a large quantity of alcohol.

Delays in the three projects that were behind schedule were due to unexpected construction problems during renovation (Patent Office Building, Phase I), a design problem (Museum Support Center, Pod 5), and the late award of a construction contract (Mall-wide Permanent Security Barriers). According to a Smithsonian official, they are trying to minimize the impact of the construction delay on the Patent Office Building so that the public spaces can be opened on time. The project manager for the Museum Support Center believes that they can make up the delay. The project manager for the Mall security barriers is still working to determine the potential effects of the delay.

[41]This estimate was prepared by OFEO's cost-estimating section.

[42]Contract period was extended from a planned period of 9 to 18 months to 24 to 30 months.

[43]Funding requests were moved from fiscal years 2005 and 2006 to fiscal years 2005, 2006, and 2007.

In fiscal years 2002 and 2003, the Smithsonian's Office of Inspector General completed management reviews of three Smithsonian projects—the construction of National Museum of the American Indian, the Steven F. Udvar-Hazy Center, and the revitalization of the Patent Office Building. The reviews of the National Museum of the American Indian and of the Steven F. Udvar-Hazy Center showed that, overall, project management practices were effective and financial management controls were adequate to ensure compliance with contract terms.[44] The third review, on the Patent Office Building, was performed by a contractor for the Office of Inspector General who found that adequate controls were in place to oversee the project's management and the existing cost-accounting system was effective in tracking the project's execution costs, which were managed by OFEO.[45] While all three reports were generally positive, they included recommendations on how OFEO could improve its operations. OFEO has taken actions to adopt the recommendations.

Funding Its Planned Revitalization, Construction, and Maintenance Remains a Key Challenge for the Smithsonian

NAPA's report focused strongly on improvements to the Smithsonian's facilities management. But the report also drew attention to the need for a substantial and ongoing infusion of funds to deal with the deterioration of the physical plant. Funding the $2.3 billion in planned facilities programs is an imposing challenge for the Smithsonian, the Administration, the Congress, and private sector supporters of the institution.

Funding for the Smithsonian's annual operations and capital programs comes from two general sources: its trust funds and federal appropriations. Trust funds are used to carry out innovative research, expand the national collections, fund new exhibits, and support outreach activities to communities. The Smithsonian has been successful in attracting substantial philanthropic contributions to its trust fund that have been critical to the development and construction of new facilities. For example, most of the Udvar-Hazy Center's $218 million construction cost and $100 million of the $219 million of the National Museum of the American Indian's construction cost were funded through the trust funds. Smithsonian

[44]Smithsonian Institution Office of the Inspector General, *Report on Project Management of the National Museum of the American Indian Mall Museum* (Washington, D.C.: Sept. 30, 2002), and *Report on Project Management of the Steven F. Udvar-Hazy Center* (Washington, D.C.: July 31, 2003).

[45]Smithsonian Institution Office of the Inspector General, *Project Management Review: Patent Office Building Renovation Project* (Washington, D.C.; Mar. 31, 2003).

officials noted, however, that it is difficult to attract donor support for general revitalization and maintenance projects. Therefore, in these types of efforts, federal appropriations have been important. According to the Smithsonian, Congress first began to provide the Smithsonian with annual federal funding in 1858 to cover the cost of caring for objects of art and natural history belonging to the United States. Today, federal appropriations are used to operate, maintain, and protect the Smithsonian's facilities; conserve the national collections; sustain basic research; educate the public; provide administrative and support services; and support revitalization and construction. (See app. I for additional details on the Smithsonian's trust funds and appropriations.)

For fiscal year 2004, about 34 percent of Smithsonian's $904 million in revenues for operations and capital programs came from its trust fund assets, with the remainder coming from direct federal appropriations. Of this total amount, about $184.4 million was designated for facilities revitalization, construction and maintenance. While recognizing that future funding decisions could result in different levels of funding, annual revenues at the 2004 level would fall well short of the $2.3 billion estimate for the revitalization, construction, and maintenance needs identified for the next 9 years. In our *High Risk Series* report on federal real property, we highlighted the importance of ensuring credible, long-term budget planning for sustaining and modernizing facilities.[46] Such planning involves key stakeholders in government—the property-holding agency, the Office of Management and Budget, and the Congress—in examining viable funding options. In the case of the Smithsonian, the importance of this approach is underlined by the trust-trustee relationship that defines the relationship between the institution and the federal government. We asked Smithsonian officials if a strategic approach had been developed for funding the planned facilities work. Officials told us that various funding approaches and options have been discussed by the staff, the Board of Regents, and with congressional leaders but said that no consensus for dealing with this issue has emerged.

Conclusion

As an organization that relies heavily on federal support to maintain its facilities, the Smithsonian Institution is part of the general challenge facing the federal government in real property management. As we noted in our

[46] *High Risk Series: Federal Real Property*, p. 46.

2003 *High Risk Series* report on federal real property, the overall condition of the federal facilities portfolio is one of alarming deterioration, with the problem accelerating in recent years due to the age of the buildings. Greatly improved management processes and tens of billions of dollars will be needed to restore federal real property assets and make them fully functional. At stake with the Smithsonian are not just the buildings themselves, but the irreplaceable scientific and cultural assets that they contain.

To address its own set of problems, the Smithsonian has taken major steps, in line with NAPA's 2001 recommendations, to reorganize its facilities management structure to achieve improved accountability and operational efficiency. OFEO is incorporating industry best practices for facilities management and has established processes for prioritizing work with the aim of leveraging its limited staffing and funding resources to the institution's best advantage. OFEO has also put processes in place to develop more accurate estimates of its facilities funding needs. The reorganization appears to be going in the right direction, though it is still in an early stage of implementation and its long-term effectiveness has yet to be determined. Full implementation of the restructuring effort has been hindered by staffing and funding reductions that have occurred throughout the Smithsonian due to budget constraints.

Along with recommending management improvements, NAPA pointed to the need for a continuing and substantial infusion of funds for maintaining and improving existing and new facilities. The federal government has responded in recent years with increased levels of appropriations for the Smithsonian's facilities needs, and the Smithsonian itself has successfully raised its share of private sector funding for the construction of its two newest museums. Still, the estimated $2.3 billion in costs for facilities needs over the next 9 years is beyond the current level of the Smithsonian's annual operating revenues from its trust funds and federal appropriations. At present, it is unclear how, when, or to what extent the planned projects will be funded.

Recommendation for Executive Action

Given the critical importance of correcting the deteriorating condition of the Smithsonian's facilities, we recommend that the Secretary of the Smithsonian Institution establish a process for exploring and analyzing, in a structured and reportable manner, various options for funding its facilities needs (including options that may require legislative authorization), together with the advantages and disadvantages of each.

This process would culminate with a method and time frame for engaging the key stakeholders—the Smithsonian Board of Regents, the Administration, and the Congress—in the development and implementation of a strategic funding plan to address the revitalization, construction, and maintenance projects identified by the Smithsonian.

Agency Comments

We provided a draft of this report to the Smithsonian for comment. In response, the Smithsonian provided us with both oral and written comments, indicating that it concurred with our findings. In oral comments, the Director of Government Relations stated that the Smithsonian agreed with our recommendation. The Smithsonian also offered some technical comments and updates that we incorporated where appropriate. A letter from the Secretary of the Smithsonian commenting on our report is included as appendix VIII.

As agreed with your office, unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days after the date of this letter. At that time, we will send copies of this report to the appropriate congressional committees, the Secretary of the Smithsonian Institution, and the Director of the Office of Management and Budget. We will make copies available to others upon request. In addition, this report will be available at no cost on the GAO Web site at http://www.gao.gov. If you have any questions about this report, please contact me at (202) 512-2834 or goldsteinm@gao.gov. Key contributors to this report are listed in appendix IX.

Mark L. Goldstein
Director, Physical Infrastructure Issues

Funding Sources and Statutes Related to the Smithsonian's Revitalization, Construction, and Minor Repair and Maintenance Programs

The Smithsonian uses funding from a variety of public and private sources for revitalization, construction, and minor repair and maintenance (maintenance) of its facilities. Currently, maintenance is funded primarily through appropriations, according to a Smithsonian official. The Smithsonian's funding can be classified into two broad categories: trust funds and congressional appropriations.

Trust Funds

Unrestricted trust funds—These funds are not subject to any donor-imposed or legal restrictions on the use of the monies. The Board of Regents may expend these funds in any manner they deem appropriate in promoting the Smithsonian's mission. The unrestricted trust fund includes income from investment earnings; income from Smithsonian Business Ventures, which includes revenue from the Smithsonian's magazines and other publications, museum stores, mail-order catalogs, concessions, IMAX theater, and licensing and media enterprises; and income from government grants and contracts. Unrestricted trust funds are often devoted to programs, collections, and general administration, but could be used for revitalization, construction, and minor repair and maintenance. Various government agencies and departments provide grants and contracts for projects that only the Smithsonian can conduct because of its expertise in a particular area of science, history, art, or education and because of its ability to respond quickly to certain needs. At the end of fiscal year 2004, government grants and contracts accounted for about 12 percent of the Smithsonian's revenue. At the end of fiscal year 2004, the Smithsonian's unrestricted operating revenues totaled $399.4 million, of which $173.1 million was spent to operate the Smithsonian's businesses that generated $195.0 million in revenues, according to its audited financial statement.

Temporarily restricted trust funds—These funds include donations, earnings on endowments, and private grants that are subject to donor-imposed stipulations on how the money is spent. The types of restrictions imposed by donors include limitations on the use of funds for the construction or renovation of a specific museum or facility or support for a specific program or exhibit. For example, the construction of the Steven F. Udvar-Hazy Center was funded by numerous private contributions that were classified as temporarily restricted and could only be spent on construction of the Hazy Center. At the end of fiscal year 2004, the Smithsonian's temporarily restricted operating revenues totaled $83.9 million, according to its audited financial statement.

Permanently restricted trust funds—These funds include donations, earnings on endowments, and bequests that are subject to donor-imposed stipulations that the principal be maintained permanently. Donors of these funds permit the Smithsonian to use all or part of the income earned from these funds for either general or donor-specified purposes. James Smithson's original bequest is included within this category. At the end of fiscal year 2004, the Smithsonian's permanently restricted operating revenues totaled $0.5 million, according to its audited financial statement.

Direct Federal Appropriations

Regular congressional appropriations for the Smithsonian began in 1858, according to a Smithsonian official. In 1879, the Congress authorized and appropriated $250,000 for construction of a National Museum (now known as the Arts and Industries Building). Today, 20 U.S.C. § 53(a) provides that appropriations are authorized for repairs and alterations of the Smithsonian's buildings and grounds. According to a Smithsonian official, this is the authority the Smithsonian uses to perform revitalizations and major repairs when there is no specific congressional authorization for a project. For fiscal year 2004, federal appropriations were $596.3 million, according to the audited financial statement.

We were told by a Smithsonian official that major Smithsonian facilities (those that represent national landmarks or are otherwise significant) have all been legislatively authorized by the Congress. According to a Smithsonian official, it has built or replaced facilities without congressional authorization, but those projects did not exceed a $1 million cost ceiling agreed to with congressional staff and primarily have consisted of administrative, utility, and laboratory facilities. Further, recent appropriation acts have required the Smithsonian to consult with the Appropriations Committees before planning or commencing any construction projects, according to the same official. While the Congress has authorized major new museums and facilities, the Congress has moved away from fully funding the construction of these facilities beginning in 1982, when authorizing the construction of a building for the National Museum of African Art and a Center for Eastern Art. The Congress limited the federal funding to $36.5 million—just less than half of the estimated $75 million total cost of the project. The legislation directed that no appropriated funds be obligated or expended except for planning, administration, management expenses, and architectural or consulting services until the Smithsonian had sufficient private funding in hand which, when combined with federal funding, could complete the project.

More recently, the Congress required that not more than two-thirds of the total cost of planning, designing, and constructing the National Museum of the American Indian come from federal appropriations. The Congress authorized the Udvar-Hazy Center and appropriated money for the design, but it did not allow any appropriations to be used for construction. The Smithsonian built the facility with private donations and a $78 million general obligation bond. In 2003, the Congress authorized the Smithsonian to plan, design, and construct a building for a National Museum of African American History and Culture. The authorization provided that half of the costs are to come from nonfederal sources.

Currently, maintenance projects are funded primarily through appropriations, although the maintenance staff are funded by both appropriations and trust monies according to a Smithsonian official. A Smithsonian official also told us that the institution is moving toward trying to get private donors to allow part of their donations to be set aside for repair and maintenance of exhibits. Exhibits such as *America on the Move* and *The Price of Freedom* have planned maintenance budgets of about $1 million each, some of which has already been raised from the private sector. For *The Star Spangled Banner*, the Smithsonian is planning an endowment fund of $4 million for maintenance. One donor has agreed to let the Smithsonian use $1 million of his original gift for this exhibit to help fund the endowment.

Selected Smithsonian Institution Legal Authorities Relating to Construction and Revitalization of Facilities

Enabling Laws

Act of 1836[1] – Accepted James Smithson's bequest of his property to the United States for the purpose of founding in Washington, D.C., the Smithsonian Institution, an establishment for the increase and diffusion of knowledge among men. Among other things, the act required the Treasurer

[1]An Act to Authorize and Enable the President to Assert and Prosecute with Effect, the Claim of the United States to the Legacy Bequeathed to Them by James Smithson, Late of London, Deceased, to Found at Washington, Under the Name of the Smithsonian Institution, an Establishment for the Increase and Diffusion of Knowledge Among Men.

of the United States to account separately from all other accounts of his office all sums received by virtue of Smithson's bequest and for the funds to be spent in such manner as the Congress later directed.

Act of 1846[2] – Established the Smithsonian Institution in its present form and provided for the administration of the Smithsonian Institution trust by a Board of Regents. The act appropriated from federal funds an amount from the interest on Smithson's bequest for the erection of suitable buildings and other expenses of the institution. The act stated that all appropriations and expenditures that would be made for the purpose of the institution would be from the interest accrued and not from the principal of the fund. The act authorized the Board of Regents to select a suitable site for a building and contract for the construction of a suitable building necessary for the institution. The act authorized the Secretary of the Board of Regents to take charge of the building and property of the institution. The act also reiterated that all money recovered by, or accruing to the institution, would be paid into the United States Treasury and separately accounted for as provided by the 1836 act.[3]

Current Statues

20 U.S.C. § 41 – Establishes the Smithsonian Institution for the increase and diffusion of knowledge among men, with the powers, limitations, and restrictions contained in the act.

20 U.S.C. § 42 – Establishes the members of the Board of Regents.

20 U.S.C. § 46 – Provides for the Secretary of the Board of Regents to take charge of the buildings and property of the Institution.

20 U.S.C. § 53 - Provides that all laws relating to the protection of public property in the District of Columbia shall apply to the lands, buildings, and other property of the Smithsonian Institution. Also provides that all money recovered by or accruing to the Smithsonian Institution shall be paid into the Treasury of the United States, to the credit of the Smithsonian bequest, and separately accounted for.

[2]An Act to Establish the Smithsonian Institution for the Increase and Diffusion of Knowledge Among Men.

[3]The permanent provisions of the Act of 1846 were reenacted in the Revised Statutes of the United States in Force on the First Day of December, One Thousand Eight Hundred and Seventy-Three (1875) as §§ 5579-5594. Current statutes relating to the Smithsonian Institution are located in 20 U.S.C. §§ 41-70.

20 U.S.C. § 53a – Provides that appropriations are authorized for repairs and alterations of buildings and grounds occupied by the Smithsonian Institution in the District of Columbia and elsewhere.

20 U.S.C. § 54 – Provides that interest is appropriated for perpetual maintenance and support of the institution. Also provides that all expenditures and appropriations made from the Smithsonian Institution treasury account for the purposes of the institution are to be made from the interest and not the principal in the account.

20 U.S.C. § 55 – Provides that the Secretary is authorized to receive and deposit in the Treasury on the same terms as the original bequest of James Smithson's, such sums that the Regents see fit to deposit. This section specifically states that this shall not operate as a limitation on the power of the Smithsonian Institution to receive money or property by gift, bequest, or devise, and to hold or dispose of the same to promote the purposes of the institution.

20 U.S.C. § 56 – Authorizes the Smithsonian Institution Board of Regents to dispose of any money which has accrued as interest on the Smithsonian fund, or not appropriated, as they deem best suited for the promotion of the purpose of James Smithson's bequest.

Annual Appropriations Acts – Appropriates funds for maintenance, alteration, repair, revitalization, lease, and construction of facilities.[4]

Selected Statutes Enacted Since 1955 Authorizing Smithsonian Institution Facilities

An Act to Authorize the Construction of a Building for the Museum of History and Technology Including the Plans and Specifications[5]

- Authorized the Board of Regents to prepare drawings and specifications for, and to construct a suitable building for, a Museum of History and Technology. Authorized to be appropriated such sums not to exceed $36,000,000 as may be necessary to carry this out.

[4]For example, see Consolidated Appropriations Act for Fiscal Year 2005, P.L. 108-447, 118 Stat. 2809, at 3088 and 3089 (2004); Department of Interior Appropriations Act for Fiscal Year 2004, P.L.108-108, 117 Stat. 1241, at 1297 and 1298 (2003); and Consolidated Appropriations Act for Fiscal Year 2003, P.L. 108-7, 117 Stat. 11, at 265 and 266 (2003).

[5]Act of June 28, 1955, Ch. 201, 69 Stat. 189.

An Act to Authorize the Plans and Specifications for the Construction of a Building for a National Air Museum[6]

- Authorized the Board of Regents to prepare plans, including drawings and specifications, for the construction of a suitable building for a National Air Museum and authorized to be appropriated such sums as may be necessary to carry this out.

An Act for the Establishment of the Joseph H. Hirshhorn Museum and Sculpture Gardens[7]

- Authorized the Board of Regents to remove any existing structure, prepare architectural and engineering designs, plans, and specifications and to construct a suitable museum and sculpture garden for the use of the Smithsonian Institution within the area designated within the act for the establishment of the Joseph H. Hirshhorn Museum and Sculpture Garden. Pledged the faith of the United States to provide such sums as may be necessary for the upkeep, operation, and administration of the Joseph H. Hirshhorn Museum and Sculpture Garden. Authorized to be appropriated not to exceed $15,000,000 for the planning and construction of the Joseph H. Hirshhorn Museum and Sculpture Garden and such additional sums as may be necessary for the maintenance and operation of the museum and sculpture garden.

An Act to Authorize the Smithsonian Institution to Plan Museum Support Facilities[8]

- Authorized the Board of Regents to prepare plans for museum support facilities to be used for (1) the care, curation, conservation, deposit, preparation, and study of the national collections of scientific, historic, and artistic objects, specimens, and artifacts; (2) the related documentation of such collections of the Smithsonian Institution; and (3) the training of museum conservators. Authorized to be appropriated such sums as may be necessary to carry this out. Provided that the museum shall be located on federally owned land within the metropolitan area of Washington, D.C., and authorized any federal

[6]P.L. 85-935, 72 Stat. 1794 (1958).

[7]P.L. 89-788, 80 Stat. 1403 (1966).

[8]P.L. 94-98, 89 Stat. 480 (1975).

agency to transfer land under its jurisdiction to the Smithsonian Institution for the site without reimbursement.

An Act to Authorize the Smithsonian Institution to Construct Museum Support Facilities[9]

- Amended an Act to Authorize the Smithsonian Institution to Plan Museum Support Facilities, P.L. 94-98, to authorize the Smithsonian Institution to construct museum support facilities. Authorized to be appropriated $21,500,000 to carry this out.

An Act to Authorize the Smithsonian Institution to Plan for Development of the Area South of the Original Smithsonian Institution Building[10]

- Authorized the Board of Regents to plan for the development of the area south of the original Smithsonian Institution Building adjacent to Independence Avenue at Tenth Street, Southwest, in Washington, D.C. Authorized to be appropriated $500,000 to carry this out.

An Act to Authorize the Smithsonian Institution to Construct a Building for the National Museum of African Art and a Center for Eastern Art[11]

- Authorized the Board of Regents to construct a building for the National Museum of African Art and a Center for Eastern Art together with structures for related educational activities and authorized to be appropriated $36,500,000 to carry this out. Provided that only funds appropriated pursuant to this act may be obligated or expended for planning, administration, management expenses, and architectural or other consulting services, and no other funds appropriated pursuant to this act shall be obligated or expended until such time as there is available to the Board of Regents, from private donation or other nonfederal sources, a sum combined with any appropriated funds in an amount sufficient to carry this out.

[9]P.L. 95-569, 92 Stat. 2444 (1978).

[10]P.L. 96-36, 93 Stat. 94 (1979).

[11]P.L. 97-203, 96 Stat. 129 (1982).

An Act to Authorize the Smithsonian Institution to Purchase Land in Santa Cruz County, Arizona[12]

- Authorized the Smithsonian Institution to purchase land in Santa Cruz County, Arizona, for the permanent headquarters of the Fred Lawrence Whipple Observatory and authorized to be appropriated $150,000 to carry this out.

An Act to Authorize the Administrator of General Services to Transfer to the Smithsonian Institution Without Reimbursement the General Post Office Building and the Site Located in Washington, D.C.[13]

- Authorized the Administrator of General Services to transfer to the Smithsonian Institution, without reimbursement, for use for art galleries and related functions the General Post Office Building with any attached underground structures and the site of the building located between Seventh and Eighth Streets Northwest and E and F Streets Northwest, in Washington, D.C. Authorized to be appropriated to the Board of Regents of the Smithsonian Institution $40,000,000 for renovation and repair after the transfer of the building is made to the Smithsonian Institution.

An Act to Authorize the Smithsonian Institution to Plan and Construct Facilities for Certain Science Activities[14]

- Authorized the Board of Regents to plan and construct facilities for the Smithsonian Astrophysical Observatory and the Smithsonian Tropical Research Institute. Authorized to be appropriated $4,500,000 for the Smithsonian Astrophysical Observatory and $11,100,000 for the Smithsonian Tropical Research Institute.

An Act to Authorize the Smithsonian Institution to Construct the Charles McC. Mathias, Jr., Laboratory for Environmental Research[15]

[12]P.L. 98-73, 97 Stat. 406 (1983).

[13]P.L. 98-523, 98 Stat. 2433 (1984).

[14]P.L. 99-423, 100 Stat. 963 (1986).

[15]P.L. 99-617, 100 Stat. 3488 (1986).

- Authorized the Board of Regents to construct the Charles McC. Mathias, Jr., Laboratory for Environmental Research in Edgewater, Maryland. Authorized to be appropriated $1,000,000 to carry this out.

An Act to Establish the National Museum of the American Indian within the Smithsonian Institution[16]

- Authorized the Board of Regents to plan, design, and construct a facility to house the portion of the National Museum to be located in Washington, D.C. at a site specified in the act. Provided that the Board of Regents shall pay not more than two-thirds of the total cost of planning, designing, and constructing the facility from funds appropriated to the board with the remainder of the costs coming from nonfederal sources.

- Authorized the Administrator of General Services to lease to the Smithsonian Institution, at a nominal charge, space in the Old U. S. Custom House in New York to house the portion of the National Museum to be located in New York and designated as the "George Gustav Heye Center of the National Museum of the American Indian." Authorized the Board of Regents to plan, design, and construct a facility for the National Museum in the Old U. S. Custom House in New York and authorized the Administrator of General Services to plan, design, and construct an auditorium and loading dock for the shared use of all the occupants of the Old U. S. Custom House in New York. The act provided that the Board of Regents shall pay one-third of the costs of planning, designing, and constructing the National Museum in New York from funds appropriated to the board with the remainder of the costs coming from nonfederal sources. The act limited the obligation of federal funds for construction of the National Museum in New York in any fiscal year, until nonfederal sources have paid to the Board of Regents the nonfederal share of the costs which the board estimated will be incurred in any such year. The act noted that New York City and New York State each agreed to pay $8,000,000 or an amount equal to one-third of the costs for planning, designing, and constructing the facility, whichever is less. The act provided that after construction of the National Museum in New York is completed that repairs and alterations of the facility shall be the Board of Regents responsibility.

[16]P.L. 101-185, 103 Stat. 1336 (1989).

- Authorized the Board of Regents to plan, design, and construct a facility for the conservation and storage of the collections of the National Museum at the Museum Support Center of the Smithsonian Institution with a total aggregate square footage of at least 400,000 square feet.

- Authorized to be appropriated to the Administrator of General Services from the Federal Buildings Fund $25,000,000 to carry out the plan, design, and construction of the auditorium and loading dock and to make repairs and alterations to the portion of the Old U. S. Custom House that is not leased to the Board of Regents.

- Authorized to be appropriated to the Board of Regents such additional sums as may be necessary to carry out the planning, design, and construction of the National Museum to be located in Washington, D.C., the National Museum to be located in New York, and the Museum Support Center for the collections of the National Museum.

An Act to Authorize the Smithsonian Institution to Plan, Design, Construct, and Equip Space in the East Court of the National Museum of the Natural History Building[17]

- Authorized the Board of Regents to plan, design, construct, and equip approximately 80,000 square feet of space in the East Court of the National Museum of the Natural History Building. Authorized to be appropriated $30,000,000 to carry this out.

An Act to Provide for Planning and Design of a National Air and Space Museum Extension[18]

- Authorized the Board of Regents to plan and design an extension of the National Air and Space Museum at Washington Dulles International Airport and authorized to be appropriated $8,000,000 to carry this out.

An Act to Authorize the Smithsonian Institution to Plan, Design, and Construct the West Court of the National Museum of the Natural History Building[19]

[17]P.L. 101-455, 104 Stat. 1067 (1990).

[18]P.L. 103-57, 107 Stat. 279 (1993).

[19]P.L. 103-151, 107 Stat. 1515 (1993).

- Authorized the Board of Regents to plan, design, and construct the West Court of the National Museum of the Natural History Building. Provided that no appropriated funds may be used to pay any expense for the planning, design, and construction of the West Court.

An Act to Authorize Construction of a National Air and Space Museum Dulles Center at Washington Dulles International Airport[20]

- Authorized the Board of Regents to construct the Smithsonian Institution National Air and Space Museum Dulles Center at Washington Dulles International Airport. Provided that no appropriated funds may be used to pay for any expenses of construction.

An Act to Authorize the Smithsonian Institution to Plan, Design, Construct, and Equip Laboratory, Administrative, and Support Space for the Smithsonian Astrophysical Observatory Submillimeter Array[21]

- Authorized the Board of Regents to plan, design, construct, and equip laboratory, administrative, and support space to house base operations for the Smithsonian Astrophysical Observatory Submillimeter Array in Hilo Hawaii. Authorized to be appropriated specific amounts in various fiscal years to carry this out.

Smithsonian Facilities Authorization Act[22]

- Authorized the Board of Regents to plan, design, construct, and equip additional special use storage and laboratory space at the museum's support facility in Suitland, Maryland. Authorized to be appropriated specific amounts in various fiscal years and such additional sums as necessary to carry this out.

- Authorized the Board of Regents to plan, design, and construct improvements to the interior and exterior of the Patent Office Building, including the construction of a roof covering for the courtyard. Provided that funds to carry this out will be from nonappropriated sources.

[20]P.L. 104-222, 110 Stat. 3025 (1996).

[21]P.L. 106-383, 114 Stat. 1459 (2000).

[22]P.L. 108-72, 117 Stat. 888 (2003).

National Museum of African American History and Culture Act[23]

- Authorized the Board of Regents, in consultation with the National Museum of African American History and Culture Council, to plan, design, and construct a building for the museum. Provided that 50 percent of the costs to carry this out will be from federal funds and 50 percent of the costs to be from nonfederal sources. Authorized to be appropriated such sums as necessary to carry this out.

An Act to Authorize Construction and Related Activities for Support of the VERITAS on Kitt Peak, Arizona[24]

- To authorize the Board of Regents of the Smithsonian Institution to carry out construction and related activities in support of the collaborative Very Energetic Radiation Imaging Telescope Array System (VERITAS) project on Kitt Peak near Tucson, Arizona. Authorized to be appropriated $1,000,000 to carry this out.

[23]P.L. 108-184, 117 Stat. 2676 (2003).

[24]P.L. 108-331, 118 Stat. 1281 (2004).

Smithsonian Institution's Status on the Implementation of the National Academy of Public Administration's Recommendations

Recommendations by area	Status of implementation plans	Smithsonian comments
1. Evaluation of the renovation, repair and alteration (RR&A) requirements		
1.1. Revalidate the total backlog of RR&A requirements. This revalidation should include completing detailed facilities condition assessments for all museums and other major facilities that have not been surveyed for this purpose within the preceding 3 years. In-house capability should be supplemented with contract assistance, if necessary, to expedite completion.	Implemented.	Completed September 2001 with publication of *Museums and Facilities: Critical Assessment and Improvement Objectives*.
1.2. Develop a fully integrated and prioritized 10-year plan for executing the revalidated backlog of requirements and brief the Office of Management and Budget (OMB) examiners and congressional staffs on the total facilities requirements, even though the annual budget constraints may preclude requesting the full amount of funding actually needed.	Implemented.	Briefings with OMB and congressional staff held Spring 2002 based on *Museums and Facilities: Critical Assessment and Improvement Objectives*; subsequent briefings held annually to apprise of progress.
1.3. Cost estimates for all the capital improvements projects that are included in the Smithsonian's annual budget requests to OMB and Congress should be based on the completion of at least 35 percent of final design, with cost escalation included to improve the accuracy and reliability of the estimates.	Implementation under way.	Project Management Handbook includes this provision. Discussions have already taken place with OMB on this topic. Additional funding in Facilities Planning and Design will be required before the Smithsonian can consistently complete 35-percent design of future year projects before requesting construction funding.
1.4. Implement and adhere to strict control measures over project scope and cost increases. For selected major capital improvement projects, such as the Patent Office Building, consider establishing a formal review group to help control increases in project scope and cost.	Implemented.	Implemented.
1.5. The budget format for the RR&A program should be changed and simplified to succinctly state the actual requirements, estimated costs, and construction schedules.	Implemented.	Fiscal Year (FY) 2003 and 2004 budgets reflect new format of project descriptions. New structure for entire facilities program budget request implemented with FY 2004 request.
2. Responsiveness to Congress and OMB		
2.1. Place significantly increased emphasis on responding to congressional questions and requests in a timely and accurate manner.	Implemented.	All requests since 2002 have been dealt with expeditiously.
3. Facilities maintenance		
3.1. Develop and implement a well-structured maintenance program that includes preventive maintenance, periodic testing and inspection, and programmed maintenance.	Implemented.	Plan provided to OMB and Congress January 2002. Funds received in FY 2004 and requested for FY 2006 will begin to address capability to focus on planned maintenance activities, as guided by Reliability Centered Maintenance (RCM).

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Recommendations by area	Status of implementation plans	Smithsonian comments
3.2. Reorder budget priorities to provide for an increase to at least $10 to $15 million annually in a preventive maintenance category.	Implementation under way.	Increase of $5.4 million received in FY 2004 Salaries and Expenses (S&E) appropriation as an initial increment of increase. Additional increase of $4.7 million included in FY 2006 request to Congress. Estimate of total requirement revised upward to reflect National Research Council (NRC) guidelines of 2-4 percent of physical plant Current Replacement Value.
3.3. Consider budgeting all maintenance and minor repair requirements, excluding personnel costs, in one separate account in the RR&A budget to provide improved visibility and funds control.	Implemented.	Budget restructured to create Facilities Maintenance line item in the S&E portion of the Smithsonian's FY 2004 budget request. Decision to include in S&E rather than Capital portion of the budget discussed with OMB and congressional staff.
3.4. Consider adopting the RCM approach that many federal agencies use. RCM is a maintenance philosophy that incorporates an effective mix of proactive, preventive, predictive testing and inspection, and reactive maintenance practices that focus on reliability and risk management.	Implemented.	Associate Director for Reliability hired in August 2002. Implementation plan developed and Office Facilities Engineering and Operations (OFEO) staff trained. Predictive testing and inspection (PT&I) equipment purchased for vibration analysis, thermography, and ultrasonic thickness. Performance metrics identified and key processes are being revised and validated. PT&I tests were added as part of acceptance testing to Hazy, National Museum of the American Indian, and Patent Office Building projects.
4. Smithsonian "backlog"		
4.1. Use commonly accepted definitions for facilities maintenance and repair as spelled out in the numerous NRC reports on this subject.	Implemented.	The engineering study *Museums and Facilities: Critical Assessment and Improvement Objectives* contains specific definitions that are in accord with NRC.
4.2. Properly identify the Smithsonian's very significant backlog of specific major repair and restoration requirements and refrain from attempting to identify all facilities deficiencies and needs under the misleading term "maintenance backlog."	Implemented.	The Smithsonian no longer uses the term "maintenance backlog," and appropriately defines major repair and restoration requirements under "Facilities Capital--Revitalization Requirements."
5. Facilities management organization		
5.1. Centralize facilities management functions, including the National Zoo, under a single facilities organization. This change would improve operational efficiency and effectiveness, cost control, quality control, and accountability.	Implemented.	Office of Facilities Engineering and Operations established.
5.2. Director of OFEO should be designated the principal Smithsonian official for managing the facilities maintenance activities, the RR&A program, and the construction program.	Implemented.	Director of OFEO has been given these responsibilities by the Secretary.

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Recommendations by area	Status of implementation plans	Smithsonian comments
5.3. The Office of Physical Plant (OPP) should be restructured to place a stronger emphasis and focus on its three primary responsibilities: (1) operation and maintenance of the Smithsonian's physical plant, (2) repair and restoration of facilities to reduce the extensive backlog, and (3) construction of new facilities.	Implemented.	Former Office of Physical Plant has been reorganized into three separate entities to focus upon specific facilities management functions.
5.4. If the Smithsonian's RR&A program is substantially increased, the OFEO staffing should accordingly be increased to effectively manage the larger program.	Implementation under way.	The Smithsonian received some staff to support the capital program in FY 2003 and FY 2004; construction supervision and administration staff has been paid with project funding since FY 2003. Remaining staffing requirements for a larger capital program will be requested in future budgets as the program increases.
6. Contracting out considerations		
6.1. Conduct a comprehensive and detailed analysis to determine whether or not the facilities operations and maintenance functions that are performed by the OFEO in-house workforce could be accomplished more efficiently and cost effectively if they were contracted out.	Implementation under way.	In FY 2003, the Smithsonian awarded a contract for operations and maintenance of the Hazy Center in lieu of adding new staff, and contracted out Heating, Ventilation and Air Conditioning (HVAC) maintenance at Smithsonian Environmental Research Center. Maintenance resources added in FY 2004 are being used primarily to augment staff capacity with contracts for inspection, testing, and preventive maintenance of automatic doors; electrical panels; fire alarm systems and fire sprinklers; testing and cleaning of cooling towers; and thermographic and vibration analysis. More analysis of contracting opportunities will be conducted upon completion of reorganization and filling of new positions in OFEO.
6.2. Conduct a similar analysis of the facilities operations and maintenance functions for the National Zoological Park (National Zoo).	Implementation under way.	The Smithsonian contracts for a number of maintenance activities at the National Zoo, including HVAC maintenance. More analysis of contracting opportunities will be conducted upon completion of reorganization and filling of new positions in OFEO.
7. Capital Program Planning Board (CPPB)		
7.1. The CPPB membership should be realigned and updated to accommodate the Smithsonian's current organization.	Implemented.	A new charter for the board, now named the Capital Planning Board, reflects the current Smithsonian organization.
7.2. The Director of OFEO should be designated the Smithsonian's principal and lead official for developing, presenting, and defending all facilities programs and budgets to the CPPB and to external organizations, such as OMB and Congressional staffs, where required.	Implemented.	The board's charter assigns overall responsibility for the board to the Chief Financial Officer. The Director, OFEO, has been directed to lead the board's deliberations for facilities capital programs.

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Recommendations by area	Status of implementation plans	Smithsonian comments
7.3. The CPPB should meet on a regularly scheduled basis to review and recommend approval of the annual budget request for the RR&A program, the maintenance program, and the construction program, as well as the 5-year plans for each of these facilities programs. Minutes of each meeting should be recorded and provided to board members.	Implemented.	The board meets on a regular basis.
7.4. Board review results should be provided in the form of formal written recommendations to the Secretary of the Smithsonian Institution.	Implemented.	Board recommendations are incorporated into overall budget recommendations made to the Secretary.
8. Budgeting and financial management		
8.1. Routinely include specific data in annual budget requests on how the Smithsonian applied its RR&A funding from the prior year.	Implemented.	The Smithsonian budget requests since FY 2003 include this prior year information in summary and by major project.
9. More effective financial system		
9.1. The current Smithsonian Financial System (SFS) should be replaced with an updated system. The Smithsonian should ensure that the updated system is fully compatible with the standards set by the Joint Financial Management Improvement Program and reports obligations and outlays at the program and project level. The Smithsonian should ensure that program and major-unit managers, as well as working-level fund-control personnel, are consulted in the process of defining requirements for the new system.	Implemented.	Phase I of the Institution's new Enterprise Resource Planning (ERP) PeopleSoft implemented October 1, 2002. Capital Program managers are participating in planning for Phase II implementation, which will include the Asset Management Module.
9.2. In the interim, terminology used in the SFS reports should be clarified. If practical, SFS reports should be revised to provide actual obligation data. Key personnel should be trained to correctly apply the terms used in the federal appropriation process and those used in internal operations.	Implemented.	Terminology clarified as part of ERP development.
9.3. Recognize that managers will continue to rely on separate cuff systems unless and until a new system is in place that provides managers with the program and project-level information they need and in which the managers have confidence.	Implemented.	Capital Program cuff system (PFITS) will be retained and has been updated to match new PeopleSoft coding structure. Commercial Off The Shelf (COTS) project management software systems are being evaluated for potential use in the future.
9.4. The cuff records used by the National Zoo should be modified to more readily provide a basis for tracking obligations as well as commitments.	Implemented.	Merger of National Zoo PFITS with PFITS was completed in September 2003. All National Zoological Park PFITS obligations, commitments and expenses are now being tracked.
9.5. Survey managers to determine which SFS reports are actually providing useful data, which should be changed with the current system's capabilities, and which should be discontinued.	Implemented.	Information on reporting requirements gathered as part of new financial system (ERP) development.
9.6. Modify SFS basic reports to provide separate reporting for OPP and National Zoo transactions.	Implemented.	Separate codes have been established to distinguish between OFEO and National Zoo Facilities Capital financial activity.

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Recommendations by area	Status of implementation plans	Smithsonian comments
9.7. Until a unified system is available, a sufficient number of people should be trained to operate the various cuff systems the Smithsonian uses so that the absence of any one individual does not hamper operations.	Implemented.	Backups have been trained to support the OFEO cuff system for the Capital Program (PFITS).

Source: Smithsonian Institution.

Organization and Responsibilities of the Smithsonian's Office of Facilities Engineering and Operations

Office/Sub-offices	Responsibilities
Office of Facilities Engineering and Operations	The office is responsible for facilities planning, master planning, and resource management including facility project budget advocacy, development, policy and standards, fiduciary accountability, program oversight and analysis. The office is also responsible for architectural history and historic preservation and real estate policy utilization, guidance, and reporting, as well as facilities management systems.
1. Office of Project Management	The office provides comprehensive management of the Smithsonian's facilities revitalization and construction. It develops preliminary project scopes, schedules, and budgets; monitors, directs, and reports on the updated scope budget and schedule of individual projects and major construction; and coordinates the efforts of stakeholders, designers and construction execution on multiple projects.
2. Office of Facilities Planning and Resources	The office serves as the focal point for facilities master planning and space-management issues and efforts. It advises management on architectural history and historic preservation, conducts historic preservation reviews, comprehensive facilities master planning studies, and space utilization studies, space inventories and analysis of these issues. It also coordinates with government and community groups on facilities planning, space management, and preservation matters and provides financial and administrative services regarding facilities issues.
3. Office of Engineering, Design and Construction	With oversight from the Office of Project Management, this office is responsible for project design and construction oversight for all new construction and revitalization contracts.
3.1 Engineering and Design Division	The office administers architectural and engineering services for facility construction, revitalization and repair that include developing design scopes for projects. It oversees contracted design efforts, provides limited in-house architectural and engineering design services, and is responsible to provide and ensure thorough project reviews and code compliance.
3.2 Construction Management Division	The office provides construction administration services and operates field offices (resident engineer) at large project sites. It directs and oversees contract services of construction contractors and construction managers and is responsible for contract change order negotiations.
3.3 Cost Engineering Division	The office provides construction cost estimates for projects at the project development stage. It provides revised construction cost estimates throughout the project life cycle to reflect changes and current market conditions.
3.4 Geo-Spatial Conversions	The office consolidates and maintains a comprehensive Geographical Information System database that includes computer-aided drawings for Smithsonian facilities. It provides a central archive for facility documentation, project files, drawings, specifications, operations and maintenance, equipment and shop drawings files, as-built drawings and an improved as-built drawing capability for facilities management and project development.
4. Office of Facilities Reliability	The office provides strategic planning and oversight to facilities operations and maintenance efforts. Its goal is to reduce breakdowns and increase planned maintenance. It runs the Reliability Centered Maintenance program utilizing predictive testing and inspection tools to manage facility equipment. It develops tasks and processes then monitors work efforts, collects and analyzes data and metrics of the maintenance programs, and adjusts the operation and maintenance process to gain further efficiencies. It also purchases utilities, manages agency-wide service contracts, operates building automation services, and repairs large equipment in central shops. It uses both in-house and contractor personnel to accomplish its objectives. It is directly involved with new facility design inputs, new system start-ups and commissioning efforts.
5. Office of Facilities Management	The office performs day-to-day facilities maintenance services, including preventive maintenance, janitorial and grounds maintenance; transportation and mail delivery services, building management services for leased facilities; landscape services and is involved in new facility system start-ups upon completion. It accomplishes its work through in-house; and contracted services. Currently comprised of seven zones, due to its visibility it plays a critical role as ambassadors for OFEO.

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Office/Sub-offices	Responsibilities
6. Office of Protection Services	The office ensures the safety and security of staff, visitors, properties, and collections through the use of security forces, technology, and facility design and construction.
7. Office of Safety and Environmental Management	The office ensures the Smithsonian provides safe spaces for employees and visitors, oversees fire prevention and protection, industrial hygiene and occupational health, environmental management, and radiation safety. Conducts all safety, environmental, industrial hygiene, and occupational health compliance audits for the Institution.
8. Smithsonian Tropical Research Institute	The office is responsible for both capital projects and operations, and minor repair and maintenance.

Source: Smithsonian Institution.

Smithsonian's Efforts to Implement Leading Practices in Capital Decision-Making

Principles and practices	Smithsonian's efforts
I. Integrate organizational goals into the capital decision-making process	
1. Conduct comprehensive assessment of needs to meet results-oriented goals and objectives.	Secretary's Strategic Plan provides goals and specific objectives for all areas of the Institution. Annually, OFEO aligns its goals with the strategic plan. These goals include targets for percentage completion on particular projects, overall program performance, and targets for cost growth.
2. Identify current capabilities, including the use of an inventory of assets and their condition, and determine if there is a gap between current and needed capabilities.	In September 2001, OFEO did a study *Critical Assessment and Improvement Objectives*, which provides an inventory of assets and a comprehensive list of all the studies, design, and construction to that date, along with a cost estimate for outstanding work and the basis for the estimates. Every 2 to 3 years facility assessments—in-depth condition reviews of a facility— are performed by the Facility Assessment Branch. Zone Managers consolidate and advocate all facility requirements, including noncapital minor repairs and maintenance.
3. Decide how best to meet the gap by identifying and evaluating alternative approaches (including noncapital approaches).	OFEO has engaged in several noncapital approaches designed to maximize the buying power of the funding received. Among these approaches is the use of continuing contract authority. This permits multiyear funded major revitalization projects, such as the restoration of the Patent Office Building, to proceed in a measured way in partnership with the contractor, so that current year funds can be efficiently used, while not holding up the project until all funding is received. OFEO employees at all levels are members and active participants in both the Federal Facilities Council and the Construction Industry Institute. Both organizations promote best practices such as comprehensive preproject planning, value engineering and constructability reviews that ensure the best use of available dollars through project team alignment and technical innovation and flexibility.
II. Evaluate and select capital assets using an investment approach	
4. Establish review and approval framework supported by analyses.	OFEO's Office of Project Management leads the annual formulation and revision of the Smithsonian's capital design and construction program. The process of evaluation and selection of projects begins with consultation with all Smithsonian Institution units, in conjunction with the Office of Facilities Reliability and the Office of Facilities Management. The staff of the Smithsonian units and the staff of the Offices of the Deputy Secretary, the Under Secretary for Science and the Under Secretary for Art participate in this process. Projects are rated and ranked according to criteria based on health and safety concerns first, code compliance and security, and the need for repairs and operational efficiency.
5. Rank and select projects based on established criteria.	Once the cross-functional teams working at each facility rate and rank their projects by priority, type of work and fiscal year, the plan is presented to the Smithsonian's Capital Planning Board. The board under the direction of the Chief Financial Officer meets throughout the year to consider capital requests and balance needs of the design and construction program against other capital investments.
6. Develop a long-term capital plan that defines capital asset decisions.	A 5-year Facilities Capital Program Summary for funding is developed. The combined efforts of OFEO and the Capital Planning Board ensure that the capital program receives wide-ranging review and approval from all areas of the Smithsonian. The Audit and Review Committee of the Board of Regents reviews the institution's finances and the Board of Regents authorizes the submission of the budget, which includes the 5-year plan to Congress.

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Principles and practices	Smithsonian's efforts
III. Balance budgetary control and managerial flexibility when funding capital projects.	
7. Budget for projects in useful segments.	As previously mentioned, continuing contract authority is used for multiyear funded major revitalization, which allows for phased funding of projects and allows a project to proceed in a measured way in partnership with the contractor. This process is also used for new construction such as the recently completed National Museum of the American Indian on the Mall. The vast majority of the Smithsonian's Capital projects are under $1 million in cost, so the need for phased work is only present in the very largest capital projects. A goal of OFEO, given adequate resources in the Facilities Planning and Design account, is to have designs funded 2 years in advance of project execution, and to have at least 35 percent of the design complete prior to final funding decisions.
8. Consider innovative approaches to full up-front funding.	Within the recent environment of constrained funding for the capital program, the Smithsonian has engaged in unprecedented fund-raising for design and construction. Fully one third of the total project costs of the National Museum of the American Indian on the Mall come from privately raised funds, as does the entire construction of the National Air and Space Museum's Steven F. Udvar-Hazy Center. This kind of partnership with the private sector will continue to be an important source of support in the completion of the Patent Office Building revitalization, the overhaul of the major exhibitions halls at the National Museum of American History, and the future construction of the National Museum of African American History and Culture.
IV. Use project management techniques to optimize project success.	
9. Monitor project performance and establish incentives for accountability.	Monitoring project performance is the fundamental responsibility of OFEO's project, design and construction managers. The requirements for project schedules, cost estimates, milestone submissions and regular project meetings are outlined fully in the Project Management Handbook. In addition, on the largest projects, monthly executive meetings with museum directors and the OFEO director are held, as well as quarterly oversight meetings with the deputy secretary/chief operating officer and chief financial officer. There are two primary incentives for accountability: project status is reported regularly to individuals outside the project authority, as noted above; and, project managers' performance evaluations are based on qualitative and quantitative execution of their individual capital programs.
10. Use cross-functional teams to plan for and manage projects.	OFEO project teams consist of a lead project manager, design manager, resident engineer, client representatives, and contracting specialists and, during design reviews, representatives of the Offices of Safety and Environmental Management, Protection Services, Facilities Planning and Resources, Information Technology and others. Also see items II. 4. and IV. 9. above.
V. Evaluate results and incorporate lessons learned into the decision-making process	
11. Evaluate results to determine if organizationwide goals have been met.	Performance metrics are a monthly feature of project management in OFEO. Measures of overall capital performance, monthly contract obligations, time and cost growth on the largest projects and preproject planning are included within the larger program of OFEO performance metrics. The preproject planning reporting is particularly helpful in measuring customer satisfaction, as it monitors the team's alignment on scope throughout the life of the project, while there is still time to do something about it if disagreements occur.

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Principles and practices	Smithsonian's efforts
12. Evaluate the decision-making process: reappraise and update to ensure that goals are met.	Documents such as the Project Management Handbook and the SD-410 are only useful if they are up-to-date and used. Currently, both documents are being revised. Both revised documents are in the review process and will be incorporated into OFEO standard practices. External evaluation of OFEO projects is a useful tool for the largest and most complex projects. Within the past 2 years, the Smithsonian's Inspector General's office has audited three projects and the Smithsonian has adopted the recommendations made. Also sharing lessons learned outside the organization is a valuable means of achieving feedback and OFEO staff has participated in events for numerous professional organizations such as the Federal Facilities Counsel and the Construction Industry Institute.

Source: Smithsonian Institution.

Facility Revitalization and Construction Project Code Assignment Matrix

Condition Level	Project type				
	Revitalization and renewal				Construction
	A Shell/System failure	B Code compliance/ Security	C Nonroutine Capital Repairs	D Energy/ Operational efficiency	E Alterations and modifications
I - Catastrophic	Priority code (PC) - 1	PC - 1	PC - 2	PC - 2	Not applicable
II - Critical	PC - 2	PC - 2	PC - 3	PC - 3	PC - 3
III - Routine	PC - 3	PC - 3	PC - 4	PC - 4	PC - 4
IV - Can defer	PC - 5	PC - 5	PC - 5	PC - 5	PC - 5

Source: Smithsonian Institution.

Notes:
Priority codes (PC)
PC- 1 equals the budget year.
PC- 2 equals the budget year plus 1 year.
PC- 3 equals the budget year plus 2 years.
PC- 4 equals the budget year plus 3 years.
PC- 5 equals the budget year plus 4 years.

Condition level

Catastrophic - Significant projects requiring immediate funding in order to correct severe safety hazards, active failures, and prevent the loss of facilities. Asset Impact: Detrimental or irreversible failure, immediate implementation.

Critical - High priority projects requiring funding in the next fiscal year to avoid failure or correct serious safety/security deficiencies. Asset/Program Impact: Imminent failure, program begins in 1 to 3 years.

Routine - Predicted work that needs funding within 4 years. Asset/Program Impact: Moderate risk, program begins in 4 to 5 years.

Can defer - Work that can be deferred for 5 years. Asset/Program Impact: Negligible risk, program begins within 5+ years.

Project type examples

Shell/System failure - Roof leaks, building piping leaks, and utility system and equipment failures.

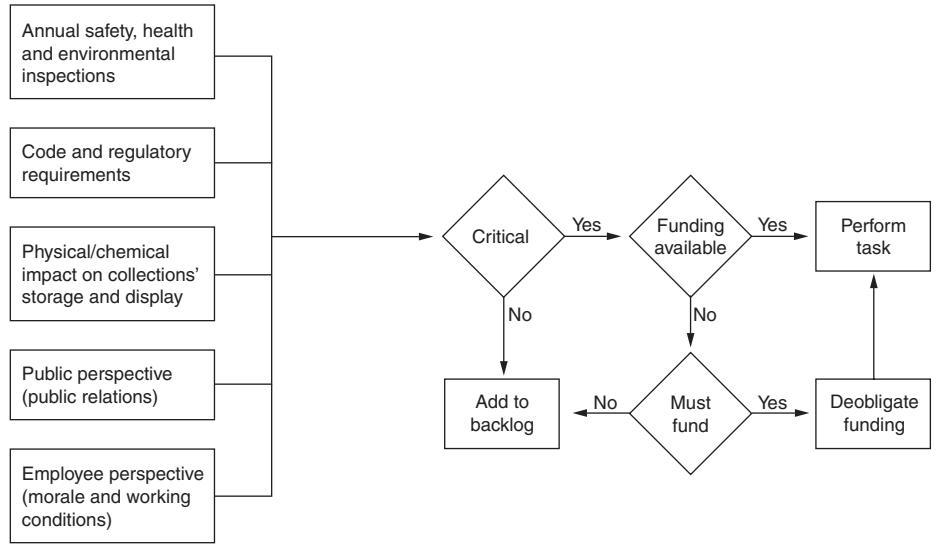
Code compliance/Security - Replacement/upgrade/modification to fire detection/suppression systems, life safety/accessibility systems and security systems, and building modifications.

Nonroutine capital repairs - One-time repair work to correct significant problem (i.e., all the doors in a building or a single HVAC component).

Energy/Operational efficiency - Projects with a 7-year cost-effective payback period.

Alterations and modification - Approved master plan projects and work to sustain existing or changing missions.

Flow Chart of the Prioritization Decision-Making Process for Minor Repair and Maintenance



Rank	Effort
1	Potential safety, health, or environmental issues. Failure imminent.
2	Potential safety, health, or environmental issues. Failure will occur with warning.
3	High disruption to facility function. All operations lost.
4	High disruption to facility function. Significant delay in restoring function.
5	Moderate disruption to facility function. Moderate delay in restoring function.
6	Moderate disruption to facility function. 100 percent of operations delayed and/or interrupted.
7	Moderate disruption to facility function. Some portion of operations delayed or interrupted.
8	Minor disruption to facility function. Repair to failure may be longer than trouble call.
9	Minor disruption to facility function. Repair to failure can be accomplished during trouble call.
10	No reason to expect failure to have any effect on safety, or health.

Source: Smithsonian Institution.

Scope and Methodology

To determine how the condition of the Smithsonian's facilities affects public and scientific access to the collections, and the collections themselves, we toured 11 facilities—the Arts and Industries Building, the Smithsonian Administration Building, the Garber Center, the Cultural Resource Center, the National Air and Space Museum, the National Museums of American History and Natural History, National Zoological Park, the Renwick Gallery, the Smithsonian Environmental Research Center, and the Victor Building. We visited these facilities because the Smithsonian identified them as having the most serious problems. The Garber Center has about 40 buildings, the National Zoological Park has in excess of 40 buildings and the Smithsonian Environmental Research Center has in excess of 30 buildings. We interviewed OFEO zone mangers and building mangers for the facilities we visited, and contacted directors of other Smithsonian facilities, both local and nationwide, asking them to identify their problems.

To determine how the Smithsonian has changed its facilities management and prioritizes its revitalization, construction, and minor repair and maintenance programs, we reviewed a variety of documents including the National Academy of Public Administration's (NAPA) 2001 report on the Smithsonian, the facility organizational chart, Facilities Project Management Handbook, drafts of the *Operation and Maintenance Handbook*, *Construction Procedural Guidelines*, and *Cost Management Guide* (for estimating costs), Facility Revitalization and Construction Project Code Assignment Matrix, the Flow Chart of the Prioritization Decision-Making Process for Minor Repairs and Maintenance, minutes of the Capital Planning Board meetings and the Smithsonian Regents meetings for 2002 through 2004, the National Research Council's *Committing to the Cost of Ownership: Maintenance and Repair of Buildings*, Federal Facilities Council's *Budgeting for Facilites Maintenance and Repair Activities* and the *Construction Industry Institute Best Practices Guide*. We also interviewed the director and chief of staff of the Office of Facilities Engineering and Operations (OFEO) and the eight heads of the offices making up OFEO, the staff responsible for prioritizing both capital projects and minor repair and maintenance, and the head of the Smithsonian's Capital Planning Board.

To determine the cost and status of the Smithsonian's major (more than $5 million) construction and revitalization projects and minor repair and maintenance projects, we toured 11 facilities (as previously identified) to view the Smithsonian's facility problems; we reviewed the NAPA report, three Smithsonian Inspector General reports on the construction of the

National Museum of the American Indian, the Patent Office Building, and the Steven F. Udvar-Hazy Center, the 2006 to 2010 Facility Capital Program Summary, minutes of the Capital Planning Board meetings and the Smithsonian Board of Regents meetings for 2002 through 2004, individual project operational reports, monthly executive reports, contractor progress reports, facility assessments, and other appropriate reports; and interviewed the OFEO director, the directors of all OFEO offices, and project executives and project managers responsible for oversight of projects. OFEO also provided cost estimates for revitalization and construction projects and the minor repair and maintenance program. We assessed the reliability of the estimates by reviewing the processes used to determine both revitalization and construction estimates, and minor repair and maintenance estimates. As noted in the main body of this report, most of the revitalization and construction estimates are "order-of-magnitude" estimates that can vary by plus or minus 30 to 50 percent. Because such variation is typical for these types of cost estimates and our objective is to use these figures to provide the estimated costs of the Smithsonian's facilities projects, we believe that these data are reliable for the purposes of our report.

To determine under what basic authorities the Smithsonian operates its revitalization, construction, and minor repair and maintenance programs, and how the Smithsonian uses its federal appropriations and trust monies to fund these programs, we researched the Smithsonian's enabling legislation; the statutes under which it currently operates, including appropriations acts and numerous statutes authorizing Smithsonian Institution facilities from the 1950s; congressional budget requests; fiscal year 2002, 2003, and 2004 audited financial statements and management letters;[1] and project operational review reports. We interviewed the chief financial officer, assistant general counsel, and other appropriate staff. We conducted our work between April 2004 and April 2005 in accordance with generally accepted government auditing standards.

[1]The auditor expressed unqualified opinions on the fiscal year 2002, 2003, and 2004 financial statements. They issued management letters with suggested improvements that the Smithsonian agreed to implement.

Comments from the Smithsonian Institution

Smithsonian Institution

Lawrence M. Small
Secretary

April 7, 2005

Mr. David M. Walker, Comptroller General
Government Accountability Office
Office of the Comptroller General
441 G Street, NW
Washington, DC 20548

Dear Mr. Walker:

Thank you for your report entitled, "Facilities Management Reorganization is Progressing, but Funding Remains a Challenge."

This report validates the Smithsonian Institution's longstanding contention that its physical facilities are in seriously deteriorated condition. While the Institution was established for the "increase and diffusion of knowledge," safe, well-maintained, and efficiently-operated facilities provide the critical underpinning for the Smithsonian to be successful. The estimated $2.3 billion in costs for revitalization, maintenance, and construction represents a severe obstacle to achieving the Institution's 159-year-old mission.

Several years ago, the National Academy of Public Administration (NAPA), at the behest of the Congress, conducted "A Study of the Smithsonian's Repair, Restoration and Alteration of Facilities Program" that confirmed the Institution's requirement for a billion and a half dollars worth of revitalization, spread over a ten-year period. As a result of more accurate information and the addition of new facilities, that amount has now grown to $2.3 billion. NAPA also recommended a number of managerial changes to improve our ability to manage effectively an increased capital program and maintain better the existing infrastructure inventory. We have paid close attention to these recommendations and followed NAPA's advice. Today, we are poised to more effectively manage every scarce dollar we are appropriated to revitalize and maintain our physical plant. We are pleased the Government Accountability Office has recognized our progress.

We acknowledge the seriousness and magnitude of our failing infrastructure problem that to date has resulted in the closure of two major historic buildings, one of which (the Patent Office Building) is undergoing extensive revitalization. The second, the Arts and Industries Building, built in 1879-81, has failed to a point that the Smithsonian Regents have directed that we vacate it as soon as possible. We are doing this now.

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The ultimate issue, as you have aptly described it, is one of securing the funding to resolve the $2.3 billion facilities infrastructure problem. With little hope of getting private funding for the basic needs of revitalizing infrastructure and sustaining it, we continue to look to the Administration and the Congress for help. It is our hope this report will help underscore the Smithsonian's critical need and assure all that every scarce resource provided will be well spent to arrest deterioration and bring the Institution back to its deserved prominence as the principal repository of the artifacts of our Nation's history and a place to be enjoyed by the over 20 million visitors who come annually to tour our museums.

All the best,

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GAO Contacts and Staff Acknowledgments

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Staff Acknowledgments

In addition to those named above, Bess Eisenstadt, Susan Michal-Smith, Faye Morrison, and Lisa Wright-Solomon made key contributions to this report.

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