Smithsonian Institution

# Deferred Maintenance: The Smithsonian Generally Followed Leading Management Practices, but Reducing Its Backlog Remains a Challenge

## Office of the Inspector General

**Report Number OIG-A-16-06**

**March 30, 2016**

Smithsonian Institution
Office of the Inspector General

# In Brief

***Deferred Maintenance: The Smithsonian Generally Followed Leading Management Practices, but Reducing Its Backlog Remains a Challenge***

***Report Number OIG-A-16-06, March 30, 2016***

## What OIG Did

The objective of this audit was to determine to what extent the Smithsonian Institution (Smithsonian) has developed and implemented strategies to manage its deferred maintenance backlog based on leading practices.

## Background

The Smithsonian has more than 12 million square feet of owned and leased buildings and structures to maintain. These include 19 museums and galleries, 9 research centers, and the National Zoological Park.

Deferred maintenance refers to maintenance and repair activities that were not performed when they should have been. Deferring maintenance can reduce the overall life of facilities and may lead to higher costs in the long run.

Deferred maintenance is not unique to the Smithsonian. The U.S. Government Accountability Office (GAO) identified the management of federal real property across the government as a high-risk area, in part because federal budget constraints limit agencies' ability to address deferred maintenance backlogs.

## What Was Found

The Office of the Inspector General (OIG) found that, in fiscal year 2014, the Smithsonian fully followed seven of nine leading practices for managing its $785 million deferred maintenance backlog. GAO identified these nine leading practices for managing federal deferred maintenance backlogs. The Smithsonian followed these practices when, for example, it conducted facility condition assessments to evaluate the condition of its facilities and to calculate the estimated dollar amount of the deferred maintenance backlog, and it established priorities for deferred maintenance projects.

The Smithsonian did not follow the leading practice of identifying types of facilities as being either mission critical or mission supportive, and it does not have criteria for doing so. As a result, the Smithsonian may be hindered in efforts to allocate limited resources to the most mission-critical and mission-supportive facilities. Additionally, the Smithsonian only partially followed the leading practice of structuring budgets to identify the funding (1) for maintenance and repair and (2) to address its deferred maintenance backlog. The Smithsonian structures its federal budget justifications to specifically identify the funding allotted for maintenance and repair, which meets the first part of this leading practice. However, its budget does not have sufficient detail to determine how much the backlog will be reduced by federal spending. Since OIG analysis showed that maintenance spending has little impact on the deferred maintenance backlog, providing additional information on how capital revitalization spending reduces the backlog would help decision makers, including Congress, evaluate the Smithsonian's budget requests.

Smithsonian management has not reduced the backlog of deferred maintenance because it is spending less than the recommended amounts to maintain the condition of its facilities. The National Research Council recommends that government-funded organizations spend between 2 percent and 4 percent of the current replacement value of their facilities on maintenance. The Smithsonian spent approximately 1 percent on maintenance annually between fiscal years 2007 and 2014. The Smithsonian has a strategy to reduce the size of its deferred maintenance backlog by increasing its federal budget requests for both maintenance and capital revitalization funding. However, this strategy faces challenges due to federal budget constraints.

## What Was Recommended

OIG recommended that the Smithsonian (1) develop criteria for identifying facilities as mission critical or mission supportive, and then designate facilities as mission critical or mission supportive; and (2) develop and implement a method to estimate how much planned capital revitalization spending will reduce the deferred maintenance backlog. Management concurred with these recommendations.

**For additional information or a copy of the full report, contact the OIG at (202) 633-7050 or visit http://www.si.edu/oig.**

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## ABBREVIATIONS

| | |
|---|---|
| GAO | U.S. Government Accountability Office |
| HVAC | Heating, Ventilating, and Air Conditioning |
| OFMR | Office of Facilities Maintenance and Reliability |
| OIG | Smithsonian Office of the Inspector General |

# INTRODUCTION

Deferred maintenance refers to maintenance and repair activities that were not performed when they should have been. Deferring maintenance work can reduce the overall life of facilities and may lead to higher costs in the long term. The aggregate amount of an entity's deferred maintenance, also known as its backlog, grows if the entity does not spend enough money on routine maintenance activities.

Deferred maintenance is not unique to the Smithsonian. Since January 2003, the U.S. Government Accountability Office (GAO) has designated the management of federal real property as a high-risk area, in part because federal agencies have reported billions of dollars in deferred maintenance backlogs and budget constraints limit their ability to address these backlogs.[1]

The objective of this audit was to determine to what extent the Smithsonian has developed and implemented strategies to manage its deferred maintenance backlog based on leading practices. A detailed description of the audit's objective, scope and methodology is included in appendix I.

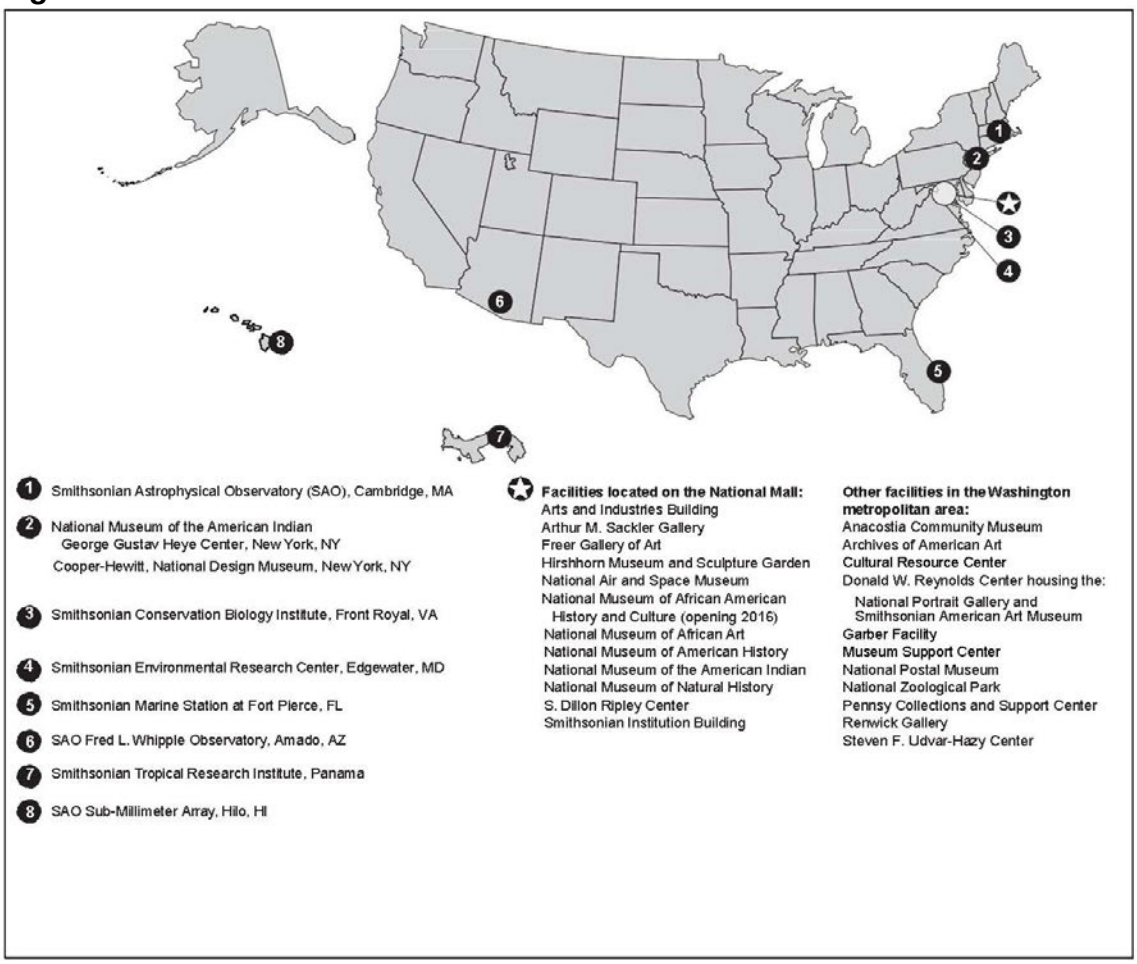
# BACKGROUND

As shown in figure 1, the Smithsonian includes 19 museums and galleries, 9 research centers, a zoological park, and other facilities that are visited by millions of people every year. Most of these facilities are in or near Washington, D.C., with others in Arizona, Florida, Hawaii, Massachusetts, New York, and Panama. These facilities include 856 buildings and structures that are owned and leased, ranging from major museum buildings to storage buildings and sheds.[2] There are 10.9 million square feet of owned space and 1.6 million square feet of leased space.

Federal appropriations cover the majority of the funding needed for the Smithsonian. The Smithsonian uses trust funds, such as private donations, grants, and revenue from its business operations, to cover the rest of its funding needs. The Smithsonian generally uses federal appropriations, not trust funds, to pay for the maintenance of its facilities.

[1] GAO, *High Risk Series: An Update*, GAO-15-290 (Washington, D.C.: February 2015).
[2] According to the *Fiscal Year 2013 Facility Condition Assessment*, the Smithsonian reported a total inventory of 663 buildings and 193 structures. The Smithsonian updates this comprehensive assessment every three years.

**Figure 1: Location of Smithsonian Facilities**




Source: OIG analysis of Smithsonian facility locations.

The major buildings owned by the Smithsonian range in age from less than 2 years to 160 years old, with most of the growth in the number of facilities occurring since the 1960s. About half of the buildings are more than 35 years old, and six are designated as National Historic Landmarks. The Patent Office Building, Renwick Gallery, and Cooper-Hewitt Museum were transferred to the Smithsonian after they were built. The two latest additions to the Smithsonian were the National Museum of the American Indian, which opened in September 2004, and the Mathias Laboratory at the Smithsonian Environmental Research Center, which opened in September 2014. In 2016, two new facilities, the Gamboa Laboratory at the Smithsonian Tropical Research Institute in Panama and the National Museum of African American History and Culture in Washington, D.C., will be opening.

The deterioration of the Smithsonian's facilities has been a long-standing concern. According to a report by the National Academy of Public Administration in 2001:

> Despite the historical and architectural importance of the museums and related facilities, there is an abundance of physical evidence of continuing deterioration at accelerated rates due to their age, high visitation traffic and under-funding. This is particularly true of the very oldest buildings, such as the Smithsonian Castle, the Arts and Industries Building, the Patent Office Building, and the National Zoo facilities.[3]

In 2005, in a report on Smithsonian facilities management, GAO reported:

> The age of the structures, past inattention to maintenance needs, and high visitation have left its facilities in need of revitalization and repair…Facilities-related problems at the Smithsonian have resulted in a few building closures and access restrictions and some cases of damage to the collections.[4]

A bibliography of Office of the Inspector General (OIG) and GAO products related to maintenance of Smithsonian facilities is provided in appendix II.

Smithsonian Facilities is the office responsible for the maintenance and repair of the Smithsonian's facilities including the management of the deferred maintenance backlog.[5] Within Smithsonian Facilities, the Office of Planning, Design and Construction is responsible for planning capital revitalization projects, while the Office of Facilities Management and Reliability (OFMR) is responsible for prioritizing deferred maintenance projects.[6] Other key stakeholders such as the Smithsonian's Capital Planning Board, the Secretary, and the Board of Regents have significant input into these prioritization decisions.[7]

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[3] National Academy of Public Administration, *A Study of the Smithsonian's Repair, Restoration and Alteration of Facilities Program* (Washington, D.C.: July 2001).
[4] GAO, *Smithsonian Institution: Facilities Management Reorganization is Progressing, but Funding Remains a Challenge*, GAO-05-369 (Washington, D.C.: April 2005).
[5] On December 15, 2015, the name of the Office of Facilities Engineering and Operations was changed to Smithsonian Facilities.
[6] Capital revitalization projects replace declining or failed infrastructure to address the problems of advanced deterioration. These projects generally cost more than $250,000. Deferred maintenance projects generally have a smaller scope and are less expensive than capital revitalization projects.
[7] The Capital Planning Board is responsible for providing advice, counsel, and recommendations for consideration by the Secretary related to planning and implementation of the Smithsonian's capital program.

# RESULTS OF THE AUDIT

## The Smithsonian Generally Followed Leading Practices to Manage Its Deferred Maintenance Backlog, but Reducing the Backlog Will Be a Challenge

In managing its deferred maintenance backlog, the Smithsonian fully followed seven of the nine leading practices identified by GAO, including conducting facility condition assessments to evaluate the condition of its facilities and to calculate the estimated dollar amount of the deferred maintenance backlog, establishing priorities for deferred maintenance projects, and setting performance metrics for monitoring the condition of its facilities.[8] The Smithsonian did not follow the leading practice of identifying types of facilities as being either mission critical or mission supportive, and it does not have criteria for doing so. As a result, the Smithsonian may be hindered in efforts to allocate limited resources to the most mission-critical and mission-supportive facilities. Additionally, the Smithsonian only partially followed the leading practice of structuring budgets to identify the funding (1) allotted for maintenance and repair and (2) to address any deferred maintenance backlog. The Smithsonian structures its federal budget justifications to specifically identify the funding allotted for maintenance and repair, which meets the first part of this leading practice. However, its budget does not have sufficient detail to determine how much the backlog will be reduced by federal spending. Since OIG analysis showed that maintenance spending has little impact on the deferred maintenance backlog, providing additional information on how capital revitalization spending reduces the backlog would help decision makers, including Congress, evaluate the Smithsonian's budget requests.

The Smithsonian has not been able to reduce its deferred maintenance backlog because since fiscal year 2007 it spent less on maintenance annually than the amount recommended by an industry standard developed by the National Research Council.[9] Beginning in fiscal year 2015, the Smithsonian significantly increased its federal budget request for maintenance and capital revitalization funds to reduce the size of its deferred maintenance backlog.[10] However, obtaining increased federal funding to reduce the deferred maintenance backlog will be a challenge due to federal budgetary constraints.

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[8] GAO, *Federal Real Property: Improved Transparency Could Help Efforts to Manage Agencies' Maintenance and Repair Backlogs*, GAO-14-188 (Washington, D.C.: January 2014).

[9] The National Research Council's mission is to improve government decision making and public policy, increase public understanding, and promote the acquisition and dissemination of knowledge in matters involving science, engineering, technology, and health.

[10] The Smithsonian uses funds from two federal appropriation line items for maintenance and repair activities: (1) salaries and expenses, which includes maintenance, and (2) capital revitalization.

## The Smithsonian Has Generally Followed GAO's Leading Practices to Manage Its Deferred Maintenance Backlog

In its 2014 report, GAO identified nine leading practices as effective strategies for federal agencies to employ in managing deferred maintenance backlogs. The leading practices GAO identified focus on analyzing and prioritizing an organization's deferred maintenance backlog. The OIG found that the Smithsonian fully followed seven of the nine leading practices, partially followed one, and did not follow one during fiscal year 2014. Figure 2 summarizes the extent to which the Smithsonian has followed each leading practice.

**Figure 2: Smithsonian's Use of GAO's Nine Leading Practices for Managing Deferred Maintenance Backlogs**

| | |
|---|---|
| (1) Conduct condition assessments as a basis for establishing appropriate levels of funding required to reduce, if not eliminate, any deferred maintenance backlog. | ● |
| (2) Establish clear maintenance investment objectives and set priorities among outcomes to be achieved. | ● |
| (3) Identify types of facilities or specific buildings that are mission critical and mission supportive. | ○ |
| (4) Establish performance goals, baselines for outcomes, and performance measures. | ● |
| (5) Identify the primary methods to be used for delivering maintenance and repair activities. | ● |
| (6) Employ models for predicting the outcome of investments, analyzing tradeoffs, and optimizing among competing investments. | ● |
| (7) Align real property portfolios with mission needs and dispose of unneeded assets. | ● |
| (8) Identify the types of risks posed by lack of timely investment. | ● |
| (9) Structure budgets to specifically identify the funding allotted (1) for maintenance and repair and (2) to address any backlog of deferred maintenance because insufficient levels of such funding can cause organizations' backlogs to increase. | ◒ |
| Legend<br>● The Smithsonian fully followed the leading practice.<br>◒ The Smithsonian partially followed the leading practice.<br>○ The Smithsonian did not follow the leading practice. | |

Source: OIG analysis of Smithsonian data.

The Smithsonian has taken the following actions relating to GAO's nine leading practices:

*Practice #1: Conduct condition assessments as a basis for establishing appropriate levels of funding required to reduce, if not eliminate, any deferred maintenance backlog.*

Smithsonian Facilities performs a facility condition assessment to evaluate the condition of all Smithsonian owned and maintained buildings and structures. This assessment is

used to calculate the estimated dollar amount of the deferred maintenance backlog. Full facility condition assessments are performed on a 3-year cycle, and updates are completed in the years between the assessments. Smithsonian Facilities performed a full facility condition assessment in fiscal year 2013 and updated it in fiscal year 2014.

To perform facility condition assessments, Smithsonian Facilities uses an analytical estimating technique that breaks out each building or structure into eight systems. The systems are:

- Structure - foundations, superstructure, slabs and floors, and pavements adjacent to and constructed as part of the facility;
- Exterior - wall coatings, windows, doors, and exterior sealants;
- Roof - roof coverings, openings, gutters, and flashing;
- Heating, Ventilating, and Air Conditioning (HVAC) - controls and balancing devices, and other mechanical equipment associated with indoor air quality;
- Electrical - electrical service and distribution within 5 feet of the facility, lighting, security, and fire protection wiring and controls;
- Plumbing - water, sewer, fire protection piping, piping for steam, gas, and water distribution in specialty systems;
- Conveyance - elevators, escalators, cranes, and other lifting mechanisms; and
- Interior - all interior finishes including wall coverings, flooring, and ceilings.

Smithsonian Facilities examines all of the Smithsonian's facilities and gives each of these systems a numerical rating from 1 (bad) to 5 (excellent).

In addition to rating the eight systems for each building or structure, Smithsonian Facilities estimates the current replacement value, meaning the actual cost of replacing the building or structure. As of September 30, 2014, the current replacement value for Smithsonian facilities was more than $7 billion. Appendix III shows the current replacement value for the 25 Smithsonian buildings that would be the most expensive to replace.

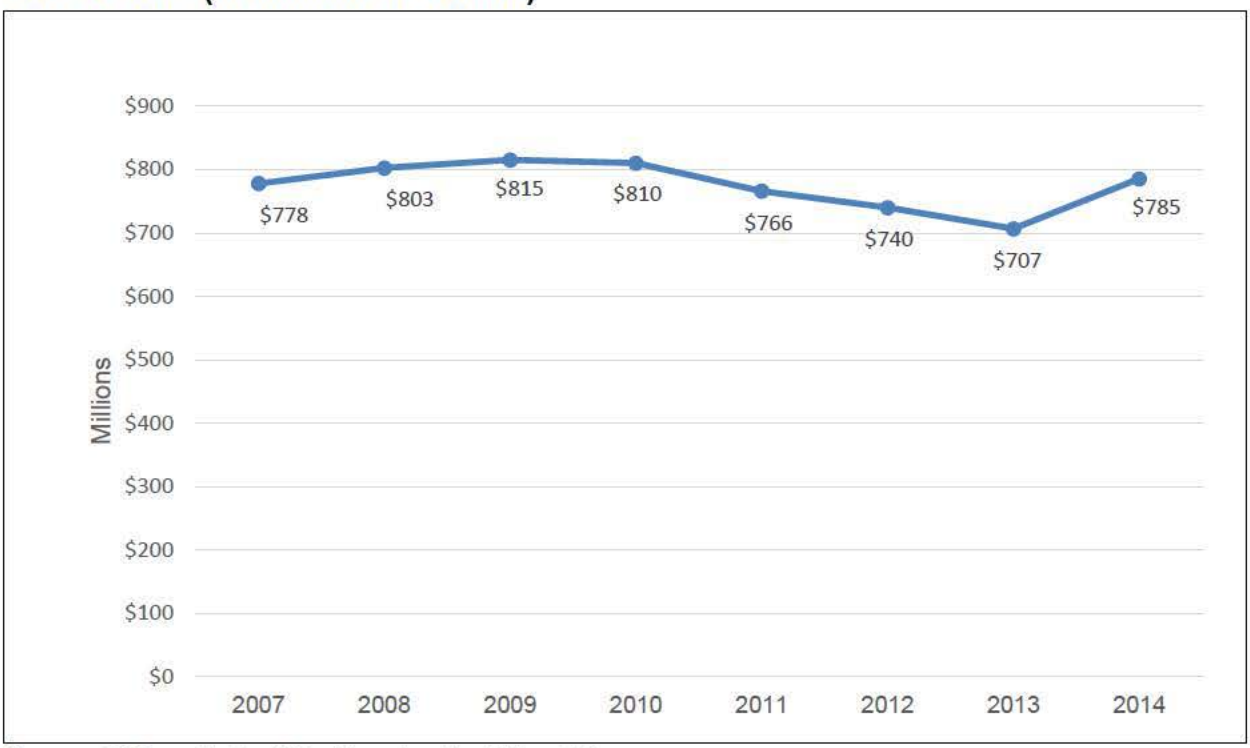
Smithsonian Facilities records the current replacement values and system ratings of each building or structure in the Facility Center system.[11] The Facility Center system

[11] The Facility Center system is a centralized database system that serves as an inventory of buildings and structures and tracks the condition of those buildings and structures. Smithsonian Facilities also uses the Facility Center system to assign and track routine maintenance activities.

calculates each building or structure's facility condition index.[12] The Facility Center system also estimates the deferred maintenance backlog for that building or structure. In addition, the system aggregates the information to develop an overall facility condition index and a Smithsonian-wide estimate of the deferred maintenance backlog.

The overall facility condition index classifies facilities that score higher than 95 percent as in good condition, and those scoring between 90 and 95 percent are classified as in fair condition. Facilities are considered to be in poor condition if they receive a score of less than 90 percent. Based on this process, the Smithsonian has estimated that, as of September 30, 2014, the overall facility condition index rating for its facilities was 88.8 percent, meaning the facilities overall were in poor condition. The dollar amount of the deferred maintenance backlog was $785 million. See figure 3 below for the dollar amount of Smithsonian's estimated deferred maintenance backlog for fiscal years 2007 to 2014.[13]

**Figure 3: Smithsonian Estimated Deferred Maintenance Backlog, Fiscal Years 2007 to 2014 (in Millions of Dollars)**



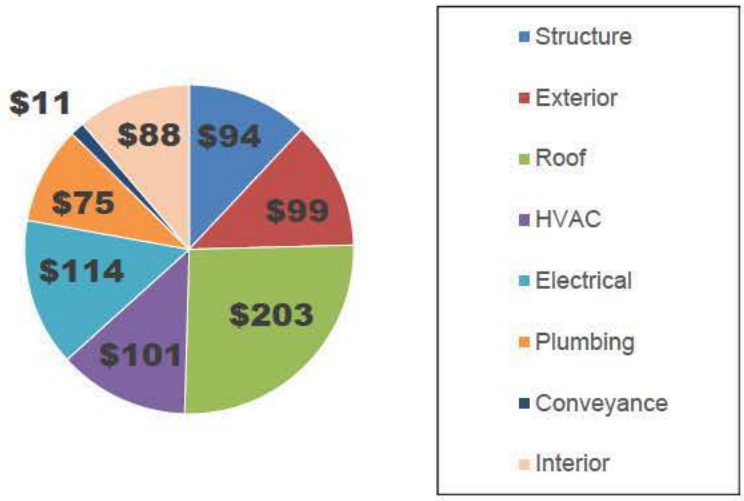

Source: OIG analysis of Smithsonian Facilities data.

[12] The facility condition index is a general measure of a constructed asset's condition at a certain point in time. It can be used as a benchmark to indicate the relative physical condition of a facility or group of buildings.

[13] Since fiscal year 2007, the Smithsonian has used this method to estimate the deferred maintenance backlog.

Figure 4 illustrates the breakdown of the $785 million deferred maintenance backlog estimate for each of the eight major systems, as of September 30, 2014. At $203 million, the roof system accounts for more than 25 percent of the deferred maintenance backlog.

**Figure 4: Cost Breakout for the Eight Major Systems in the Smithsonian's Estimated Deferred Maintenance Backlog, as of September 30, 2014 (in Millions of Dollars)**




Source: OIG analysis of Smithsonian Facilities data.

*Practice #2: Establish clear maintenance investment objectives and set priorities among outcomes to be achieved.*

Smithsonian Facilities establishes maintenance objectives by using the facility condition index and by soliciting input from eight geographical zone managers, unit directors and staff, and contractors.[14] Based on their input, Smithsonian Facilities then develops an annual plan that prioritizes deferred maintenance projects. As part of this planning process, Smithsonian Facilities zone managers, unit directors and staff use a prioritization matrix to give each maintenance project a ranking from 1 through 5 according to risk, with 1 being the highest priority.[15]

In its fiscal year 2014 plan, the Smithsonian identified a total of 109 projects as highest priority, meaning systems that are the most likely to fail and whose failure would have the worst impact on museum collections or facilities. For example, the Smithsonian repaired a leak at the Steven F. Udvar Hazy Center to address a portion of the roof

[14] The Smithsonian is divided into eight geographical zones for maintenance purposes. A zone manager is responsible for each zone. A unit director is the head of a museum, research center, or administrative office within the Smithsonian.

[15] The prioritization matrix ranks each project in the plan based on when the component is expected to fail and the impact of that failure.

system that failed, putting collections at risk of water damage. Due to funding constraints, the Smithsonian has not been able to address all of the highest priority projects, and some projects may be carried over in the plan from year to year.

*Practice #3: Identify types of facilities or specific buildings that are mission critical and mission supportive.*

The Smithsonian does not meet this leading practice because it has not classified individual facilities as either mission critical or mission supportive. Rather, it considers all of the Smithsonian's 856 facilities as either mission critical or mission supportive. Moreover, the Smithsonian does not have criteria for determining how it would designate a particular facility as mission critical or mission supportive. Without clear criteria, Smithsonian management may be hindered in efforts to allocate limited resources to the most mission-critical and mission-supportive facilities.

*Practice #4: Establish performance goals, baselines for outcomes, and performance measures.*

The Smithsonian has established performance metrics for monitoring the condition of its facilities, and it tracks and reports on its progress. For fiscal year 2014, its goal was to ensure that 75 percent of its buildings received a facility condition index higher than 90 percent. However, the Smithsonian reported that due to lack of funding, only 69 percent of its buildings met that target.[16]

*Practice #5: Identify the primary methods to be used for delivering maintenance and repair activities.*

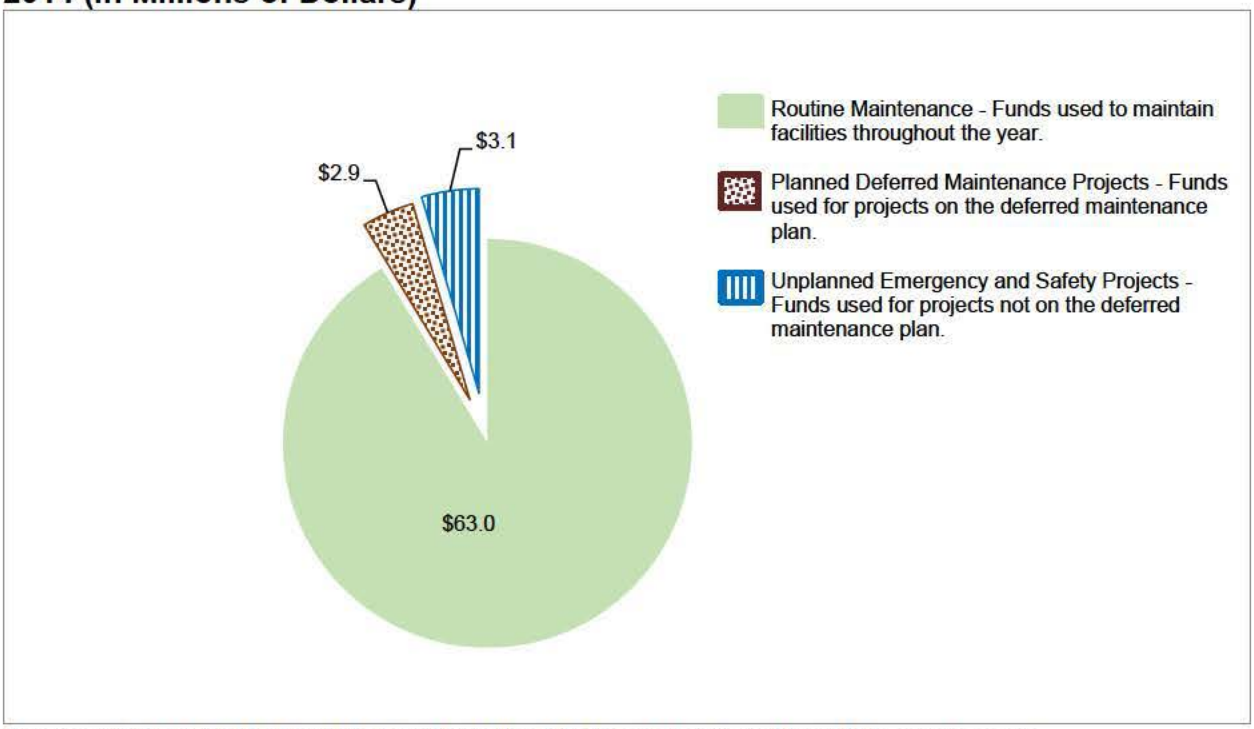
The Smithsonian funds its maintenance and repair activities through two federal appropriation line items: (1) salaries and expenses, which includes a specific amount for maintenance, and (2) capital revitalization.

For the first appropriation line item, in fiscal year 2014, the Smithsonian received $69 million for maintenance and spent 91 percent, or $63 million, on routine maintenance activities such as periodic testing, inspection, adjustment, and lubrication of equipment. OIG analysis showed that the Smithsonian spent $2.9 million on 63 prioritized projects to address the deferred maintenance backlog identified in Smithsonian Facilities' annual plan (discussed in Practice #2). For example, the Smithsonian spent $150,600 to replace an air handler at the Museum Support Center in Suitland, Maryland. OIG analysis also showed that the Smithsonian spent the remaining $3.1 million on 70 unplanned projects that addressed unexpected safety risks or emergencies. For example, the Smithsonian had to spend $301,500 to replace three steam boilers at the National Museum of the American Indian that failed because of mineral deposit

[16] Smithsonian Institution, *Annual Performance Report Fiscal Year 2014*, (Washington, D.C.: no date). The annual performance report provides information on progress towards achieving the goals and objectives described in the annual performance plan.

build-up. According to the Director of OFMR, if these 70 unexpected projects had not occurred, the Smithsonian could have spent the $3.1 million on deferred maintenance projects identified in Smithsonian Facilities' annual plan. See figure 5 for the amount of maintenance spending in fiscal year 2014 that went to planned deferred maintenance projects and to unplanned emergency and safety projects.

**Figure 5: Distribution of the Smithsonian's Maintenance Spending, Fiscal Year 2014 (in Millions of Dollars)**




Source: OIG analysis of Smithsonian Facilities data on completed maintenance projects.

For the second appropriation line item, in fiscal year 2014, the Smithsonian received $103 million for capital revitalization. Capital revitalization funds are for projects that generally cost greater than $250,000 and have the potential to more significantly reduce the backlog than planned deferred maintenance projects. For example, in 2008, the Smithsonian renovated the central core of the National Museum of American History. One part of this comprehensive renovation project involved replacing certain HVAC systems which otherwise might have been paid for with maintenance funds from the salaries and expenses line item. Capital revitalization projects also can involve other improvements, such as modifications to ensure compliance with safety and Americans with Disabilities Act codes, restoration of historic features, and modernization of the buildings to support current program requirements.

*Practice #6: Employ models for predicting the outcome of investments, analyzing tradeoffs, and optimizing among competing investments.*

The Smithsonian uses a model that assesses the effect of different maintenance and capital revitalization funding scenarios on the condition of its facilities. The Smithsonian Facilities' model made the following forecasts in October 2015 based on various funding scenarios:

- *Increased funding*. The Smithsonian's facility condition index would improve to 92.6 percent by fiscal year 2020 if federal funding levels reached the Smithsonian Facilities' target of $350 million annually from fiscal years 2017 through 2020. This would mean that the Smithsonian's facilities would improve overall to fair condition.

- *Static funding*. The Smithsonian's facility condition index would decline to 87.1 percent by fiscal year 2020 compared with the fiscal year 2014 index of 88.8 percent if federal funding levels remained static, meaning the funding levels would stay at $200.4 million annually from fiscal years 2017 through 2020. This would mean that the Smithsonian's facilities would continue to be in overall poor condition.

- *Reduced funding*. The Smithsonian's facility condition index would decline to 86.8 percent by fiscal year 2020 if federal funding levels were reduced to $195.4 million annually from fiscal years 2017 through 2020. That would mean that the Smithsonian's facilities would continue to be in overall poor condition.

*Practice #7: Align real property portfolios with mission needs and dispose of unneeded assets.*

The Smithsonian has disposed of unneeded assets in its real property portfolio when they are no longer necessary to accomplish its mission. The Smithsonian uses cost-benefit analyses to make decisions regarding how to deal with its aging buildings and structures. Specifically, the Smithsonian has determined in some cases that it is more effective to demolish and rebuild a building or structure than to spend additional resources to maintain or revitalize it. For example, the Smithsonian constructed a new laboratory at the Smithsonian Environmental Research Center in Edgewater, Maryland, which was dedicated in fiscal year 2014. As part of this project, old and unsafe temporary trailers were removed and replaced with new laboratory space.

*Practice #8: Identify the types of risks posed by lack of timely investment.*

The Smithsonian has identified health, safety, and damage to collections as risks posed by failure to invest in needed repairs. As part of a Smithsonian-wide risk analysis performed during fiscal years 2013 and 2014, management identified deferred maintenance as among its top 10 risks.[17] Based on this analysis, Smithsonian Facilities developed a risk action plan for deferred maintenance, dated December 22, 2014. Specifically, the action plan stated that failing infrastructure or inadequate temperature could result in loss of or damage to collection objects.

*Practice #9: Structure budgets to specifically identify the funding allotted (1) for maintenance and repair and (2) to address any backlog of deferred maintenance because insufficient levels of such funding can cause organizations' backlogs to increase.*

The Smithsonian partially met this leading practice because it did not address both elements. To meet the first element of this practice, the Smithsonian structures its budgets to specifically identify the funding allotted for maintenance and repair in its salaries and expenses line item.

However, the Smithsonian did not meet the second element of this leading practice because the *Budget Justification to Congress* for fiscal year 2014 did not have sufficient detail to determine how much the backlog will be reduced by the federal funding it receives. As previously discussed in practice number 5, OIG analysis showed that the Smithsonian spent $2.9 million for deferred maintenance projects out of $69 million in maintenance funds in fiscal year 2014. The $2.9 million represents less than 1 percent of the estimated deferred maintenance backlog. In its *Budget Justification to Congress* for fiscal year 2014, the Smithsonian requested $103 million in capital revitalization projects, but it did not specify how much of the deferred maintenance backlog would be reduced by these projects. Capital revitalization projects have the potential to more substantially reduce the backlog because they are larger in scale than deferred maintenance projects. Smithsonian Facilities' officials said they have the ability to estimate how capital revitalization funding for various projects will decrease the deferred maintenance backlog. Providing additional information on how capital revitalization spending reduces the deferred maintenance backlog would help decision makers, including Congress, evaluate the Smithsonian's budget requests.

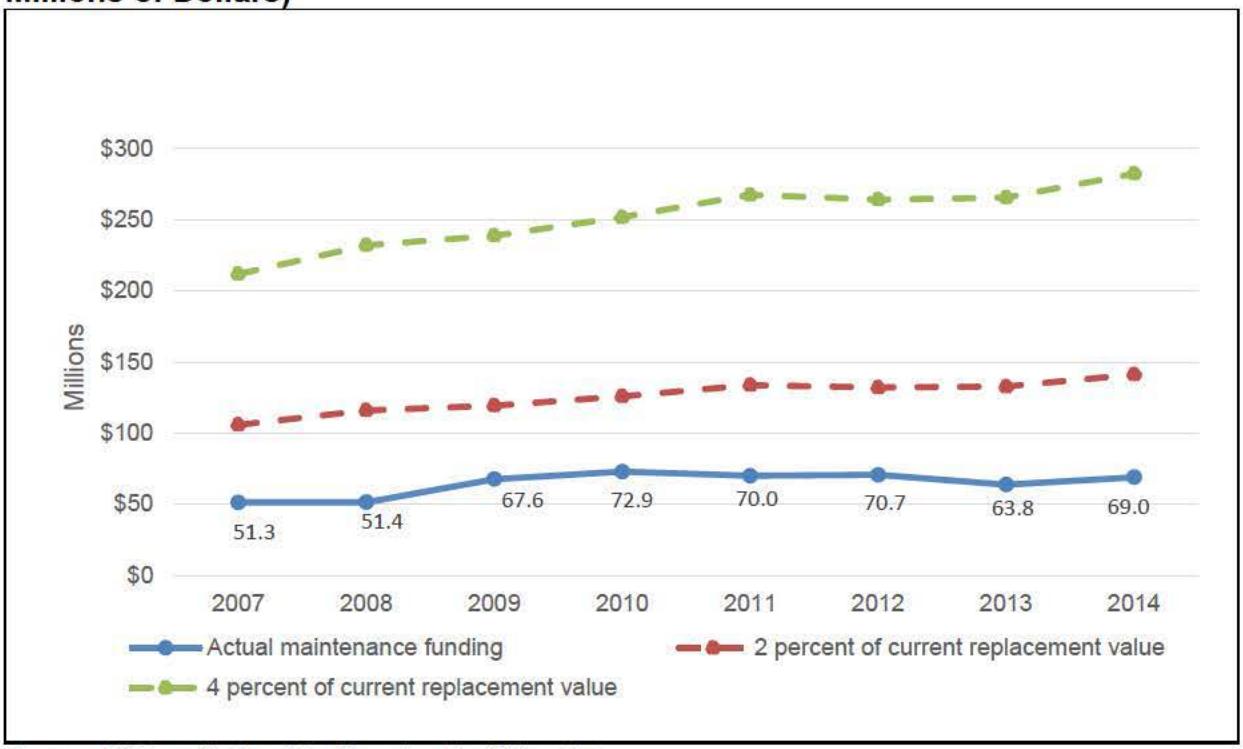
[17] In fiscal year 2013, the Smithsonian began an evaluation to develop and implement an ongoing framework to identify, prioritize, and manage a broad spectrum of risks facing the Smithsonian, referred to as Integrated Risk Management. In the evaluation, the Integrated Risk Management Committee interviewed 70 senior executives to identify the highest risks facing the Smithsonian.

## The Smithsonian Has Not Reduced Its Backlog of Deferred Maintenance but Is Requesting More Federal Funds

Smithsonian management has not reduced the backlog of deferred maintenance because it is spending below the recommended amounts to maintain the condition of its facilities. However, the Smithsonian has increased its budget request for federal funds for maintenance and capital revitalization.

The National Research Council recommends that government agencies spend between 2 percent and 4 percent of the current replacement value of their facilities (more than $7 billion for Smithsonian facilities) to maintain the condition of the facilities. However, the Smithsonian spent approximately 1 percent of its current replacement value on maintenance annually from fiscal years 2007 to 2014. The actual amount of spending for maintenance ranged from $51.3 million in fiscal year 2007 to a high of $72.9 million in fiscal year 2010. In fiscal year 2014, if the Smithsonian had followed the National Research Council's recommendation, it would have spent from $140 million (2 percent) and $280 million (4 percent) on maintenance rather than the actual $69 million. See figure 6 for the Smithsonian's maintenance funding compared with the National Research Council's recommended amounts of spending for maintenance.

**Figure 6: Smithsonian's Maintenance Funding Compared with the National Research Council's Recommended Amounts, Fiscal Years 2007 to 2014 (in Millions of Dollars)**




Source: OIG analysis of Smithsonian Facilities data.

As a result of years of maintenance spending less than the amount recommended by the National Research Council, the Smithsonian has been unable to reduce its estimated deferred maintenance backlog. For every fiscal year since 2007, the Smithsonian's estimated deferred maintenance backlog has exceeded $700 million.

It will be a challenge to address the underfunding of the deferred maintenance backlog because of federal budgetary constraints. However, the Smithsonian plans to incrementally increase the Smithsonian's annual federal budget requests to $150 million for facilities maintenance and $200 million for capital revitalization. For fiscal year 2016, for example, the Smithsonian requested $86.7 million for maintenance, an increase of $15.3 million over the fiscal year 2015 appropriation, and $200 million for capital revitalization, an increase of $90.4 million over the fiscal 2015 appropriation.[18] If the Smithsonian receives increased federal funding, its goal is to reduce the deferred maintenance backlog to $300 million.

In addition to seeking increased federal funding for its deferred maintenance backlog, the Smithsonian is planning to request hundreds of millions of dollars of federal funding for other initiatives, such as major renovations at the National Air and Space Museum and the Smithsonian Castle. Considering that federal appropriations have remained relatively static in recent years, the Smithsonian may need to turn to other funding options to federal appropriations, such as seeking private donations or using trust funds. For example, the renovation of the National Museum of American History building's central core in 2008 was made possible through a public-private partnership. Of the total cost, $46 million came from federal funds, and the remaining $39 million came from individuals, foundations, and corporations.

## CONCLUSION

Reducing the deferred maintenance backlog for the Smithsonian is critical to mitigating the risk of building system failures, preventing degradation of buildings and equipment, and protecting collections from damage. To its credit, the Smithsonian has generally followed the leading practices identified by GAO to manage backlogs, but it needs to take additional steps to fully implement two of the nine leading practices. Maintenance funding at current levels, approximately 1 percent of the facilities' current replacement value, has not reduced the backlog because the annual maintenance funding has been below a recommended industry standard. However, the Smithsonian has a strategy for significantly reducing the deferred maintenance backlog through annual requests for increased federal funding. Currently, the Smithsonian's budget does not provide enough detail on the effect that higher levels of federal funding would have on the deferred maintenance backlog. Since OIG analysis showed that maintenance spending has little impact on the backlog, providing additional budget information on the impact of capital

[18] The Smithsonian received an additional $2 million for facilities maintenance in the fiscal year 2016 omnibus appropriations law, which was enacted in December 2015. Its appropriation for facilities capital was the same as in fiscal year 2015.

revitalization funding on deferred maintenance would assist decision makers in evaluating the Smithsonian's requests for increased federal funding.

## RECOMMENDATIONS

To assist the Smithsonian in allocating funds to reduce the deferred maintenance backlog, the OIG recommends that the Under Secretary for Finance and Administration/Chief Financial Officer:

1. Develop criteria for identifying facilities as mission critical or mission supportive, and then designate facilities as mission critical or mission supportive.

To provide more detailed information to decision makers regarding the Smithsonian's efforts to reduce its deferred maintenance backlog, the OIG recommends that the Under Secretary for Finance and Administration/Chief Financial Officer:

2. Develop and implement a method to estimate how much planned capital revitalization spending will reduce the deferred maintenance backlog.

## MANAGEMENT RESPONSE AND OIG EVALUATION

OIG provided the Smithsonian with a draft of this report for review and comment. Smithsonian management provided written comments, which are found in appendix IV. Smithsonian management concurred with two of the three recommendations that OIG made in its draft report. Smithsonian management did not agree with one recommendation, which called for the Secretary to develop a plan that identifies funding options to supplement federal appropriations to significantly reduce the deferred maintenance backlog. The Smithsonian will not develop a written plan, but management did agree to explore private options to fund maintenance and major facility renovations. Because Smithsonian management agreed with the spirit of the draft recommendation and will explore options to privately fund maintenance and major facility renovations, the OIG did not include the recommendation to develop a written plan in the final report.

**Appendix I**

## Objective, Scope and Methodology

The objective of this audit was to determine to what extent the Smithsonian has developed and implemented strategies to manage its deferred maintenance backlog based on leading practices.

To gain an understanding of and evaluate the Smithsonian's management of the deferred maintenance backlog, OIG reviewed information that was available for fiscal year 2014. OIG assessed Smithsonian Facilities' fiscal year 2014 plan with deferred maintenance projects; Smithsonian budget justifications submitted to Congress; directives and guidance related to facilities management; Smithsonian Facilities' handbook and guidance related to facilities planning; the Smithsonian-wide integrated risk management plan; and presentations to the Capital Planning Board and the Board of Regents. OIG also reviewed its previous reports and GAO audit reports (see appendix II) and examined leading practices and studies from the National Research Council.

OIG met with GAO representatives to gain an understanding of the leading practices for prioritizing deferred maintenance projects and managing deferred maintenance backlogs, which were used as criteria for this audit. In addition, OIG interviewed officials from Smithsonian Facilities, the Smithsonian Tropical Research Institute, and the Smithsonian Astrophysical Observatory to discuss how they employed the leading practices identified by GAO.

OIG also reviewed the Smithsonian's facility condition assessment process and interviewed Smithsonian Facilities management and staff to determine how they develop the plan with deferred maintenance projects. In addition, OIG reviewed how the Smithsonian identifies and prioritizes capital revitalization and deferred maintenance projects, and how it makes estimates of the deferred maintenance backlog and current replacement value. OIG reviewed all 63 planned deferred maintenance projects and 70 unplanned projects initiated in fiscal year 2014 to determine to what extent the Smithsonian followed its prioritization process.

To assess the reliability of the Facility Center system's data, OIG interviewed Smithsonian Facilities management and staff about the data quality control procedures, reviewed relevant documentation, and tested the internal calculations of the Facility Center system. OIG determined that the data were sufficiently reliable for the purposes of this report.

OIG conducted this performance audit in Washington, D.C., from September 2014 through March 2016 in accordance with generally accepted government auditing standards. Those standards require that OIG plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on the audit objective. OIG believes that the evidence obtained provides a reasonable basis for its findings and conclusions based on the audit objective.

**Appendix II**

# Related Products

Smithsonian Office of the Inspector General (OIG)

OIG, *Facilities Maintenance Funds,* A-09-03-1 (Washington, D.C.: September 2009).

OIG, *Audit of Facilities Maintenance and Safety,* A-09-03-2 (Washington, D.C.: September 2009).

Government Accountability Office (GAO)

GAO, *Facilities Management Reorganization Is Progressing, but Funding Remains a Challenge,* GAO-05-369 (Washington, D.C.: April 2005).

GAO, *Smithsonian Institution: Funding Challenges Affect Facilities' Conditions and Security, Endangering Collections,* GAO-07-1127 (Washington, D.C.: September 2007).

GAO, *Federal Real Property: Improved Transparency Could Help Efforts to Manage Agencies' Maintenance and Repair Backlogs,* GAO-14-188 (Washington, D.C.: January 2014).

GAO, *High Risk Series: An Update*, GAO-15-290 (Washington, D.C.: February 2015).

**Appendix III**

## Top 25 Smithsonian Buildings by Current Replacement Value, as of September 30, 2014

| Name of Building | Location | Current Replacement Value (in thousands) |
|---|---|---|
| National Museum of Natural History | National Mall – Washington, DC | $1,632,098 |
| National Air and Space Museum | National Mall – Washington, DC | $776,992 |
| National Museum of American History | National Mall – Washington, DC | $754,236 |
| Quadrangle, which includes the National Museum of African Art, the Arthur M. Sackler Gallery, and the S. Dillon Ripley Center | National Mall – Washington, DC | $450,766 |
| D.W. Reynolds Center which houses the Smithsonian American Art Museum and the National Portrait Gallery | Washington, DC | $415,365 |
| Steven F. Udvar-Hazy Center, a companion facility to the National Air and Space Museum | Chantilly, VA | $396,278 |
| National Museum of the American Indian | National Mall – Washington, DC | $307,218 |
| Cooper-Hewitt National Design Museum | New York, NY | $288,218 |
| Museum Support Center | Suitland, MD | $218,627 |
| Freer Gallery of Art | National Mall – Washington, DC | $181,015 |
| Hirshhorn Museum and Sculpture Garden | National Mall – Washington, DC | $178,945 |
| Arts and Industries Building | National Mall – Washington, DC | $171,454 |
| Smithsonian Institution Building (the Castle) | National Mall – Washington, DC | $170,158 |
| Alexander Hamilton United States Custom House, which houses the George Gustav Heye Center of the National Museum of the American Indian | New York, NY | $89,867 |
| General Services Building | National Zoological Park – Washington, DC | $65,636 |
| Renwick Gallery | Washington, DC | $51,470 |
| National Museum of American Indian Cultural Resource Center | Suitland, MD | $47,567 |
| Charles Mathias Laboratory | Smithsonian Environmental Research Center - Edgewater, MD | $43,330 |
| National Postal Museum | Washington, DC | $26,984 |
| Elephant House | National Zoological Park – Washington, DC | $26,020 |
| Tupper Laboratory and Dining Building | Smithsonian Tropical Research Institute – Republic of Panama | $23,653 |
| Amazonia | National Zoological Park – Washington, DC | $23,582 |
| Bird House | National Zoological Park – Washington, DC | $22,144 |
| Education and Administration Building | National Zoological Park – Washington, DC | $21,896 |
| Veterinary Hospital | National Zoological Park – Washington, DC | $18,423 |

Source: OIG analysis of Smithsonian Facilities data.

**Appendix IV**

# Management Response

Smithsonian Facilities Memo

Date: February 20, 2016

To: Thomas Yatsco, Assistant Inspector General for Audits

From: Nancy Bechtol, Director, Smithsonian Facilities

Cc: David Skorton, Secretary
Albert G. Horvath, Under Secretary for Finance and Administration/Chief Financial Officer
Judith Leonard, General Counsel
David Voyles, Director, Office of Planning, Management and Budget
Greg Bettwy, Acting Chief of Staff, Office of the Secretary
Porter Wilkinson, Chief of Staff, Office of the Regents
Kendra Gastright, Director, Office of Facilities Management and Reliability

Subject: Management Response to Draft Audit Report on Deferred Maintenance

As requested, our written responses to the Draft Audit Report recommendations are outlined below.

**OIG Recommendation #1**

*To assist the Smithsonian in allocating funds to reduce the deferred maintenance backlog, we recommend that the Secretary develop criteria for identifying facilities as mission-critical or mission-supportive, and then designate facilities as mission-critical or mission-supportive.*

**Comment:** Concur

**Planned Actions:** While we expect all of our museums, collections storage and research lab facilities will be mission-critical, Smithsonian Facilities will work with SI leadership to define criteria for the mission-critical designation. This will be added to the multi-variate building assessments and priorities that are regularly reviewed and updated and which guide the investment of funds for renovation/revitalization projects and preventive maintenance activities.

**Target Completion Date:** September 30, 2016

**OIG Recommendation #2**

*To provide more detailed information to decision makers regarding the Smithsonian's efforts to reduce its deferred maintenance backlog, we recommend that the Undersecretary for Finance and Administration/Chief Financial Officer develop and*

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*implement a budgetary method to estimate how planned capital revitalization spending will result in reduction of the deferred maintenance backlog.*

**Comment:** Concur

**Planned Actions:** Annual capital plans are geared toward addressing the most pressing deferred maintenance needs of our many facilities and to ensuring the viability of our most important spaces. However, Smithsonian Facilities' Office of Planning, Design and Construction will re-confirm its method for estimating the portion of capital revitalization project spending that addresses deferred maintenance requirements. Starting with the FY 2018 OMB budget request planning process, that data will be incorporated into capital budget planning presentations to the Capital Planning Board. In addition, Smithsonian Facilities will provide an estimate on the projected increase to annual operation and maintenance costs due to increases to the physical plant's current replacement value, number of systems and square footage.

**Target Completion Date:** June 30, 2016

**OIG Recommendation #3**

*To address the funding challenges faced by the Smithsonian in addressing deferred maintenance, we recommend that the Secretary develop a five-year strategic plan that identifies funding options in addition to federal appropriations to achieve the goal of significantly reducing the Smithsonian's deferred maintenance backlog.*

**Comment:** Disagree. Over the past decade, the Smithsonian's capital planning and funding process has evolved to recognize both federal funding provided for facilities as well as the growing importance of private funds. At present, most of our major capital investments include federal (generally covering infrastructure and building systems) and privately raised funds (usually addressing revitalization of exhibitions or repurposing of programmatic space.) Additionally, in 2008 and 2009, the the Board of Regents exhaustively reviewed and considered various options to fund maintenance and major facility renovations. Our current strategy is based upon the Board's work and guidance and our plan contemplates that this blended funding approach will continue. However, we concur that continuing to explore private funding options is prudent and we will do so with the Office of Advancement.

**Planned Actions:** Smithsonian Facilities will work with the Office of Advancement and the Office of Planning, Management and Budget to discuss the feasibility of private funding options. In addition, Smithsonian Facilities will continue to explore opportunities for ESPC projects.

**Target Completion Date:** n/a

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If requested, anonymity is assured to the extent permitted by law. Although you may remain anonymous, we encourage you to provide us with your contact information. The ability to gather additional information from you may be the key to effectively pursuing your allegation.

Information provided is confidential.