## Contents

### Table of Contents

**0.0 Executive Summary**  
0.1 Summary  
0.2 Project Data  

**1.0 Building History, Description, and Significance**  
1.1 Historical Background and Context  
1.2 Chronology of Development and Use  
1.3 Physical and Spatial Description  
1.4 Evaluation of Significance  

**2.0 Existing Conditions Assessment**  
2.1 Narrative  
2.2 Site and Civil  
2.3 Architectural  
2.3.1 Exterior  
2.3.2 Interior  
2.4 Structural  
2.4.1 Steel and Masonry Structure  
2.4.2 Roof Deck and Masonry Material Conditions  
2.5 Mechanical Systems  
2.6 Electrical Systems  
2.7 Plumbing Systems  
2.8 Life Safety and Fire Protection  
2.9 Security Systems  
2.10 Communications systems  
2.11 Additional Photographs and Drawings  

**3.0 Recommendations for Treatment**  
3.1 Recommended Treatment of the Building  
3.2 Zones of Intervention  
3.3 Treatment Priorities  
3.4 Guidelines and Standards  

**4.0 Opportunities and Limitations**  
4.1 Potential Building Use Scenarios and Space Allocation  
4.2 Envelope Limitations  
4.3 Building Systems Scenarios  
4.4 Codes  
4.5 Integration of Sustainability and LEED Principals  

**5.0 Notes, Bibliography, and Appendices**  
5.1 Annotated Bibliography  
5.2 Sources of Information  
5.3 Appendices  
5.3.1 Glossary of Terms  
5.3.2 Sources for Definitions  
5.3.3 Building Chronology  

**6.0 Source Documents and Photographs**  
(Separate Volume)
Executive Summary
Summary 0.1

Executive Summary

Introduction
The Arts & Industries Building (AIB) is located on the National Mall, between Jefferson Drive and Independence Avenue, east of the Smithsonian Institution Building (the Castle) and west of the Hirshhorn Museum and Sculpture Garden. The AIB possesses integrity of location, design, setting, materials, workmanship, feeling, and association. The building was listed in the District of Columbia Inventory of Historic Sites in 1964 and in 1971 it was listed on the National Register of Historic Places and designated a National Historic Landmark. The AIB is of national significance as defined by National Historic Landmark (NHL) Criteria 1 and 4. The property falls under NHL Theme III (Expressing Cultural Values), Subtheme 5 (Architecture, Landscape Architecture, and Urban Design).

Constructed between 1879 and 1881 and originally known as the National Museum Building, the Arts & Industries Building was built not only to house the vast foreign and domestic exhibits donated to the United States government following the 1876 Centennial Exposition in Philadelphia but also to accommodate the rapidly growing collections of the Smithsonian Institution (SI) which had exceeded the capacity of the Smithsonian Institution Building.

The AIB was the first of a group of purpose-built museums built by the SI with a combination of federal and private funding. Globally, the Smithsonian Institution was at the forefront of institutions developing public museums.

The Smithsonian Institution commissioned this Historic Structure Report (HSR) for the Arts & Industries Building to identify, compile, organize, and interpret previously produced research, and to develop new research and prepare a current conditions assessment. The document includes an evaluation and statement of significance to assist the Smithsonian in identifying preservation objectives and guidelines for future building preservation, maintenance, and revitalization.

Significance and Period of Significance Summary

Historical and Institutional Significance
The AIB was the beginning of what is now one of the greatest museum complexes in the world. Within the building, the Smithsonian Institution developed methods of museum administration, specimen preparation and preservation, classification and labeling, exhibition, and education outreach that became standard practice in museums worldwide.

Architectural Significance
The AIB is a unique example of early, innovative museum design inspired by the design of international exposition buildings following the 1851 success of the Crystal Palace in London. It is an early example of a building in which integrity of form and function is achieved by a clear expression of structure. It exemplifies the use of new building technologies and design attitudes to quickly, inexpensively, and ingeniously construct a new building type. It is an exceptional example of brick masonry architecture, in both design and craftsmanship, used in a major government building in a city where monumental stone architectural design now prevails for such buildings.
Its modern Romanesque style purposefully complements the historical Norman Romanesque style and scale of the Smithsonian Institution Building. The AIB is a major work of the notable Washington architectural firm of Cluss & Schulze with Adolf Cluss, FAIA, as principal architect. The AIB is the last surviving red brick building on the National Mall where once the red brick designs of Adolf Cluss and his partners dominated.

**Primary Period of Significance**

“Period of Significance” is defined as an extent of time that is important to defining the building. Because the significance of this building includes both institutional and architectural significance, the primary period of significance for the building must not only encompass the character defining features of its design and construction but also reflect important institutional changes. The primary period of significance, then, is between 1881 and 1902 as it defines both the architectural and institutional significance of the AIB. This period contains two significant eras: 1881 to 1896 A Museum for the Public and 1896 to 1902 Growth of Collections and Hornblower and Marshall.

**1881 to 1896 A Museum for the Public**

Architectural influences on Cluss and his design intent are examined in the Section 1.0 on the history of the building and its context. The critical roles of the building commission and the Secretaries of the Smithsonian Institution are also detailed in that section, which includes the detail of their missions, contributions and goals for the collections. The shift in 1896 was driven by an evolution in the ideas about museology of George Brown Goode, assistant director of the National Museum during that period.

Ongoing functional changes led to modifications to Cluss’s fundamentally democratic, open, accessible spatial design. The open physical and visual connections between the interior spaces derived from the exposition building model and reinterpreted by Cluss were blocked by the infill of many of the arched openings, signaling the evolution of an exhibition model reflected in the design of most major museums of the late 19th and early 20th centuries.

Cluss stated that the style of the building was:

A modernized Romanesque style of architecture adopted for the new building in order to keep up a relationship with the Smithsonian building, which is designed in Norman, a variety of this style. To modernize this style was found necessary on account of the different building material, and to do justice to the purposes of the building with its modern demands of perfect safety and elegance of construction, of greatest possible available floor space, of easy communications, efficient drainage, a well calculated and pleasing admission of light, free circulation of air, and all other hygienic dicta. The external architecture is based upon the general arrangement of the interior, and shows plainly the prominence of the four naves and the careful management of the light for the central portion of the building.

The effect of the “admission of light” and “free air circulation” created voluminous spaces culminating most impressively with the Rotunda.

The 1884 Visitor’s Guide to the Smithsonian Institution and the United States National Museum concisely

---

identifies the primary purposes of the building as:

It is a Museum of Record, in which are preserved the material foundations of an enormous amount of scientific knowledge...

It is a Museum of Research, by the policy which aims to make its contents serve as fully as possible as a stimulus to and foundation for the studies of scientific investigators...

It is an Educational Museum of the broadest type, by reason of its policy of illustrating by specimens every kind of natural object and every manifestation of human thought and activity...

1896 to 1902 Growth of Collections and Hornblower and Marshall
This period represents the rapid growth of the Smithsonian Institution’s mission under the direction of Secretary Samuel Pierpont Langley. At this time, the most significant changes to the architecture of the building were the interior additions made by architects Hornblower and Marshall including galleries, skylights, building systems improvements and modifications to the interior finishes within the spaces of primary public significance.

Existing Conditions Assessment
This documentation of the current condition of the building fabric, structure, and systems incorporates institutional records and facility assessments in order to develop recommendations for treatment that are both feasible and compatible with the building’s historic integrity and significance of the AIB. Section 2.1 outlines the methodology and scope of the survey and assessment.

Recommendations for Treatment Summary
This section identifies and describes the recommended treatment of the building and states the rationale for that determination. Treatment of the building is to be guided by the Smithsonian Directive 418 including Appendices A, B and C; The Secretary of Interior’s Standards for Historic Properties; the Americans with Disability Act; and the International Building Code. Non-compliance with current codes should be addressed; but because this is an historic building, alternatives to full code compliance are recommended where compliance would unnecessarily compromise the integrity of the historic building.

Zones of intervention are identified in the report where preservation, rehabilitation, and restoration strategies are recommended. Preservation and rehabilitation projects needed to stabilize, preserve, and restore building elements are defined by priorities ranging from urgent, to high priority, and desirable. The guidelines and standards developed identify appropriate approaches to work in the AIB that will avoid damaging historic and character-defining materials.

The future use of the Arts & Industries Building should require minimal changes to the building’s historic character and the significant materials, and features discussed above and detailed in this report.

The recommended treatment for the AIB is a rehabilitation project. “Rehabilitation” is defined as “the act or process of making possible a compatible use for a property through repair, alterations, and additions while preserving those portions or features which convey its historical, cultural, or architectural
values.” Of the four treatments listed in the Secretary of the Interior’s Standards — Preservation, Rehabilitation, Restoration, and Reconstruction — rehabilitation provides an opportunity to introduce a contemporary use by means of alterations, upgrades and additions needed to comply with modern building, life safety, and accessibility codes and to meet programmatic needs.

Based on the significance of historic features and spaces, their condition and integrity, and the need to create a building that can accommodate a desired use, work should fall into the following particular categories:

1. Preservation and repair of the building’s existing architecturally significant features, fabric and finishes from the Period of Significance;

2. Replacement of the building’s mechanical and electrical systems and other alterations needed to comply with current building, life safety, and accessibility codes and meet programmatic needs;

3. Restoration of the building’s significant features that have lost their character or have been removed since the end of the Period of Significance.

All treatment priorities are outlined in Section 3.3. Urgent treatment priorities are listed below. Urgent measures are required to maintain a secure weather tight building envelope and address immediate life safety issues. As this HSR is being completed, some of this work is underway.

- Replace roofs and flashing at Rotunda, halls, courts, ranges, and all monitors
- Perform additional assessment of the roof structure and conduct material testing
- Reinforce roof trusses if determined necessary by additional analysis
- Repair and refinish roof trusses
- Replace gutters and leaders at Rotunda, halls, courts, and ranges
- Repair skylights at courts
- Repair monitors
- Replace all windows
- Repair metal ceiling panels at halls and courts
- Construct structural lateral support and seismic upgrades
- Construct perimeter and site drainage

Other treatment priorities are detailed in Section 3.3.

Summary of Opportunities and Limitations
Finally, this document explores some opportunities and limitations of the building and its possible use. The recommendations are based more on the characteristics inherent to the building materials and less on their condition and repair. This section presents several sustainable design approach options aligning with LEED principles. The design of the AIB was strongly influenced by the intent to use natural light and ventilation and to create an economical, “sustainable” building using traditional as well as innovative building technologies.

These founding goals provide the foundation for a rehabilitation of the Arts & Industries Building that is shaped by current sustainable design strategies.

**Documentation Summary**
As this report is the result of both past and new research it includes copies of the original source material and an annotated bibliography to facilitate access and use of this report for future projects.
Executive Summary

Project Participants

**Smithsonian Institution**
600 Maryland Avenue, SW Suite 5001
Washington, DC 20024

Project Site Address:
900 Jefferson Drive, SW,
Washington, DC

Sharon C. Park, Preservation Officer
Christopher B. Lethbridge, Project Manager
Mary Kfoury, Design Manager

**Architect and Engineer**
EwingCole – Philadelphia
100 North 6th Street
Philadelphia PA 19106

EwingCole – Washington DC
1025 Connecticut Ave NW #900
Washington DC 20036

**Structural Engineer (Steel and Load Bearing Masonry Assessments)**
Thornton Tomasetti
2000 L Street, NW, Suite 840
Washington, DC 20036

**Structural Engineer (Interior Roof Metal Panel and Masonry Material Assessments)**
Simpson Gumpertz Heger
Park Plaza 1, 2101 Gaither Road, Suite 250
Rockville, MD 20850

41 Seyon Street, Building 1, Suite 500
Waltham, MA 02453

**Security**
Steve Keller Associates (Architects Security Group, LLC)
22 Foxfords Chase
Ormond Beach, FL 32174

**Architectural Historian**
Tanya Edwards Beauchamp
930 Leigh Mill Road
Great Falls, VA 22066

**Research Historian and Editor**
Mary M. Konsoulis, AICP
111 West Masonic View Avenue
Alexandria, VA 22301

**Preservation Advisor**
Oehrlein & Associates Architects
1350 Connecticut Ave. NW #412
Washington, DC 20036
**Acknowledgements**

The project team sincerely thanks the Smithsonian Institution for the opportunity to compile a Historic Structure Report for the Arts & Industries Building, a building of international architectural, cultural, economic, and social significance. The process was greatly facilitated by the in depth research undertaken by the Smithsonian staff and by previous consultants. The quality of previous research has been a guiding and informative tool for the authors of this report. It is a personal and professional pleasure to work with professionals dedicated to documenting the heritage of the Smithsonian Institution and to ensuring its future.
Building History, Description, and Significance
Building History, Description and Significance

The History of the Building and Its Context
The Arts & Industries Building (AIB), built between 1879 and 1881 and known originally as The National Museum Building, was constructed to receive, exhibit, and preserve the collections of the natural resources, arts, and industries belonging to the national government. It was the first such building on the National Mall. The impetus for construction of the building was the acceptance by the U.S. Congress of the enormous donations of both foreign and domestic exhibits from the 1876 Centennial Exposition in Philadelphia. The design of the building was inspired by exposition architecture as it had developed since the Crystal Palace in London in 1851. Although Congress appropriated the funds, designated the site, and approved the design, the trust-funded Smithsonian Institution (SI) was responsible for planning and actually building the museum. Once completed, the Smithsonian Institution was responsible for building exhibition cases and preparing to open the museum to the public. At a time when the idea of the museum as an encyclopedic national collection and place of public education and recreation was still evolving, this was a challenging task.

The National Museum Begins in the Smithsonian Institution Building
The English scientist James Smithson (1765-1829) died on June 27, 1829, bequeathing more than half a million dollars to the United States of America “to found at Washington, under the name of the Smithsonian Institution, an establishment for the increase and diffusion of knowledge among men.”

On August 10, 1846, after lengthy deliberation on the proper disposition of this bequest, Congress established the Smithsonian Institution. The enabling legislation directed the construction of an appropriate building and creation of a museum, library, art gallery, and lecture hall with half of the income from the Smithson fund. The museum thus established by law in the care of the Smithsonian Institution was described as follows:

That, in proportion as suitable arrangements can be made for their reception, all objects of art and of foreign and curious research, and all objects of natural history, plants, and geological and mineralogical specimens belonging, or hereafter to belong, to the United States, which may be in the city of Washington, in whosoever custody the same may be, shall be delivered to such persons as may be authorized by the board of regents to receive them, and shall be arranged in such order, and so classed, as best to facilitate the examination and study of them, in the building so as aforesaid to be erected for the institution.

In November 1846, the governing Board of Regents accepted the Norman Romanesque design of architect James Renwick, Jr. (1818–1895) for the construction of the Smithsonian Institution Building (SIB). Eminent American scientist Joseph Henry (1797-1878), appointed by the Regents as the first secretary or director of the Smithsonian Institution, arrived in Washington in December 1846 with clear programmatic goals. Steadfastly focused on the creation of a great institution dedicated to original scientific research and the dissemination of the results through publication, Henry bitterly criticized diversion of half the income of the Smithson fund to purposes...
unrelated to this goal. He considered the design and the expense of construction and continued maintenance of the SIB excessive and unnecessary. At the same time, he acknowledged that a museum was “not incompatible” with his plan of research and publication, and that a working library was necessary to carry on the work of the Institution. In spite of Henry’s objections, the cornerstone of the SIB was laid on May 1, 1847. In the years to come, Henry would continue to protest diversion of the limited Smithsonian funds for the support of the museum collections and the Smithsonian Institution Building (See Figure 1).

In 1851, Joseph Henry wrote to fellow scientist Michael Faraday (1791-1867), “I regret to say that the building, though picturesque, is not well adapted to the wants of the 19th. I consider the crystal palace the true architectural exponent of the feelings and wants of the present day.” The Crystal Palace, built in London that year, housed the world’s first international exhibition — the Great Exhibition of the Works of Industry of all Nations. Glass and iron, light and soaring space, a single open exhibition floor, the building was perfectly adapted to the display of the natural resources, arts, and industries of the exhibiting countries. It became itself the most impressive of these exhibits and would be the inspiration for the many international expositions that would follow. These expositions would, themselves, become the inspiration for modern museums and groups of museums world-wide (See Figures 2 and 3).

The Crystal Palace was very different from the historically referential Norman Romanesque castle then under construction for the use of the Smithsonian. Design of the complex red sandstone building preceded the final determination of the Smithsonian program. Symbolic in concept, it had little to do with the work Henry planned for the Institution. Henry commented, “It is surely better, in the construction of such an edifice, to imitate the example of the mollusc, who, in fashioning his shell, adapts it to the form and dimensions of his body, rather than that of another animal who forces himself into a house intended for a different occupant.” As the construction of the building progressed, Henry requested a number of changes in the interior layout.

Footnote 3: Ibid, 8-10.

Building History, Description and Significance

that would adapt the building more effectively to the needs of the Smithsonian. These included enlargement of the lecture room to seat 1000 persons, a more convenient arrangement of the physical apparatus and laboratory rooms, increased library space, and additional fire-proofing.\(^5\)

Spencer Fullerton Baird (1823–1887) joined the Smithsonian staff in 1850, appointed by the Board of Regents as Assistant Secretary in the Department of Natural History. Baird found a collection of unorganized, privately donated, natural history specimens already in the possession of the Smithsonian. He added his own collection and received donations of many others as he developed the basis for a great museum of natural history. Henry, still opposed to the idea of a museum under the care of the Smithsonian, resolved “to confine the collections, principally, to objects of a special character, or to such as may lead to the discovery of scientific generalizations.”\(^6\) In vain, he advised the Regents to refuse the government’s collections. With completion of the construction of the SIB in 1855, work began on museum exhibition cases. The transfer of the collections of the national government, which were held at the U.S. Patent Office, occurred in 1858. Relieved of this responsibility, the Department of the Interior arranged for the annual Congressional appropriation of $4,000\(^7\) to be transferred to the Smithsonian for the care and exhibition of the collections. The Commissioner of Patents had entered into a cooperative agreement with Henry the previous year to continue and expand, at the U.S. government’s expense, the system of meteorological reporting initiated at the Smithsonian. Henry’s interest in the museum grew as he recommended that the Regents accept the collections from the Patent Office:

Footnote 5: Henry, AR 1850, 61.


Footnote 7: Henry, AR 1858, 14.

Footnote 8: Henry, AR 1856 to 28 January 1857, 22.

Footnote 9: Henry, AR 1858, 15.

Historical Background and Context 1.1

Since experience has shown that the building will ultimately be filled with objects of natural history belonging to the general government, which, for the good of science, it will be necessary to preserve, it may be a question whether, in consideration of this fact, it would not be well to offer the use of the large room immediately for a national museum, of which the Smithsonian Institution would be the mere curator, and the expense of maintaining which should be paid by the general government.\(^8\)

The cases in the museum room which were to receive the collections from the Patent Office were “arranged in two stories, forming a series of alcoves and a gallery on each side”\(^9\) doubling the space that had been available in the Patent Office. As the size of the collections predictably increased, Henry repeatedly suggested that Congress take over the major part of the building for use of the National Museum and appropriate funds to support both the National Museum and the Smithsonian Institution Building (See Figure 4).
On January 24, 1865, a fire heavily damaged the Smithsonian Institution Building and its contents. Richard Wallach (1816-1881), mayor of Washington and a regent of the Smithsonian, recommended Washington architect Adolf Cluss (1825-1905) as architect of the necessary reconstruction. Cluss had recently completed the highly acclaimed Wallach School on Capitol Hill, the first in a series of prototypical modern, multi-story urban public school buildings for the city. Cluss’ design approach was rational, using modern materials and methods of construction in new building types. His ideas for lighting, acoustics, heating, ventilation, and fireproofing expressed function through design and were based upon scientific investigation. Like Henry and Baird, he believed that the exterior design of buildings should express the interior function. This was the beginning of a continuous 25-year relationship between Cluss and the Smithsonian Institution. After the fire, Henry transferred the library of the Smithsonian to the Library of Congress for safe-keeping. Parts of the art collections were transferred to the Library of Congress and the Corcoran Gallery of Art. The plant and insect collections were transferred to the Department of Agriculture, but were returned to the Smithsonian after Baird became Secretary. The National Museum, with contributions from private individuals and institutions, government agencies, and the surveying and exploring expeditions of the U.S. government, remained in the SIB.

These collections soon increased beyond the capacity of the building to house them and the available staff to catalogue, display, and maintain them. In 1870, Congress first indicated its intention to fully support the National Museum, appropriating $10,000 for the maintenance of the government’s collections and an additional $10,000 for improvements to the building for the better display of the collections. Henry urged Congress to take over the entire SIB for the museum, separate the Institution from the museum, and reimburse the Institution for at least part of the building cost to allow construction of a smaller building that would more appropriately meet the needs of the Institution. By the end of 1873, the situation was urgent. Henry pleaded for additional space for the proper display of the collections of the National Museum, “either by transfer of the entire collection to new buildings or by making additions to that of the Smithsonian Institution.” Congress responded by gradually appropriating funds for the support of the library and the museum, leaving most of the Smithson fund for Henry’s plan of original scientific research and publication of the results. The National Museum continued under the administration of the Smithsonian’s Board of Regents with Assistant Secretary Spencer Baird as its capable director.

Planning the National Museum Building

On January 23, 1874, President Ulysses S. Grant (1822-1885) created a board to plan the collective participation of the U. S. Departments of the Interior, Treasury, Post Office, Agriculture, War, and Navy and the Smithsonian Institution at the 1876 Centennial International Exposition in Philadelphia. The exhibition would include “such articles and material as will illustrate the functions and administrative faculties of the Government in time of peace and its resources as a war-power, and thereby serve to demonstrate the nature of our institutions and their adaptation to the wants of the people.” Henry and Baird realized immediately that government participation in this

Footnote 10: Henry, AR 1870, 15.
Footnote 11: Henry, AR 1872, 16.
Footnote 12: Henry, AR 1873, 50.
Footnote 13: Baird, AR 1875, 58.
event would increase the collections of the National Museum to such an extent that a new building would be absolutely necessary. The only consideration that remained would be whether the new building would be “an extension of the present Smithsonian edifice, or an entirely separate building;” and whether it would be “advisable to continue, at least without some modification, the connection which now exists between the Smithsonian Institution and the National Museum.”

Secretary Henry again stated his preference for the separation of the Smithsonian and the National Museum. He observed, however, that “the museum is destined to an extension far beyond its present magnitude. It is an object of much interest to all who visit the National Capital, and is of great value as exhibiting the natural resources of the country, as well as a means of public education.”

Henry appointed Spencer Baird, now Assistant Secretary in charge of the National Museum, to represent the Smithsonian and the National Museum at the Centennial. The Smithsonian’s exhibit included items illustrating the character and operations of the Institution and the mineral and animal resources, ethnology, and fisheries industries of the United States. Baird took charge of all the government exhibits, arranging them so that there would be as much new material as possible with no duplication of effort. He assisted the various departments with selection, classification, and transport of scientific exhibits to Philadelphia. Congress appropriated a meager $505,000 for the work, including construction of a temporary building to present the U.S. government exhibits as a dignified, unified whole. Architect James Hamilton Windrim (1840–1919) designed the building, which was recalled in a contemporary memoir as “one of the most striking within the Centennial enclosure.”

Construction on the wood and glass building began in July 1875 and was completed in mid-February 1876. A Latin cross in plan, this lofty single-story building was 500’ long and 360’ wide with entrances at the termination of each arm. Longitudinal views toward a lofty octagonal central rotunda, reached through easily accessible interconnected exhibit areas, provided an effective spatial organization. Generous clerestories and lanterns provided natural light for the displays (See Figures 5, 6, and 7).
Meanwhile, in Washington, Joseph Henry and Spencer Baird directed Adolf Cluss to begin work on plans for expansion of the SIB. In a letter of September 4, 1875, Cluss wrote to Baird discussing progress made in the design of an intermediate connecting wing of the Smithsonian Institution:

I think that all the conditions you consider essential for this wing which forms so to say the keystone of the problem are solved. We have two exhibition halls, 39 feet by 49 feet reaching through the full height of the first story; further twenty offices, mainly 18 by 20 feet in size in first and Entresol story, four of which rooms have light from the North. Imposing main stairs about thirteen feet wide, easily accessible, which we hope, will please you. To give you a better idea of the looks of these Main Stairs we add a section longitudinally through this wing with indications of the effect in perspective since the whole building is no doubt heated by steam, there can be no objection to surround the ground well hole by a balustrade merely and thus have the benefit of light and air all the way down, and no break in the Exhibition-Halls above. The plan is elastic, that is to say we can stretch or contract it in all dimensions, though we believe, that it is carefully studied out, please think over it, and let us know your views. You will find elevators indicated in the corner adjoining the proposed new south wing (South of the connecting wing). What do you say of the sizes of the larger Elevator?

We think windows in the new Main building about 6 feet in width and piers about 8 feet in width will do so that our roof trusses are set 14 feet between centres which is favorable for strength and economy in the construction of the Iron roof, as well as in the floor. In the new part of the Main building we shall, I think, certainly resort to skylights, wherever it is of advantage.18

This letter reveals the views of Spencer Baird and Adolf Cluss on museum design at the beginning of the planning process, including glass and iron open construction, steam-heating, and elevators. It is probable that the intermediate wing discussed was an extension of the east end of the SIB. However, it is not

Footnote 18: Adolf Cluss to Spencer Baird, 4 September 1875, Assistant Secretary Incoming Correspondence 1875-1877, Box 29, 187:369, SIA.
Building History, Description and Significance


Footnote 21: Cluss to Baird, Assistant Secretary Incoming Correspondence 1875-77, Box 29, 186-7:371, SIA.

Footnote 22: Frederick Daniels and Adolf Cluss were in partnership as Cluss & Daniels from 1875 to 1878.

possible to know with any certainty since no plan has been found. Later correspondence between Cluss & Schulze and the Smithsonian Institution states that during 1874 and 1875 the firm was directed to design an extension of the SIB “by wings and a front of South B Street so as to form a hollow square.” Baird later noted to the National Museum Building Commission the loss Cluss & Schulze sustained from preparation of drawings and estimates requested by Secretary Henry for a museum extension of the SIB that was never built.

Some thought had been given to acquiring the Main Building in Philadelphia to house the Centennial exhibits in Washington. This was a building constructed with standardized glass and iron parts that, like the Crystal Palace, could be easily assembled, disassembled, and reassembled in another location (See Figures 8 and 9). Cluss, writing to Baird in Philadelphia on November 2, 1876, noted that it appeared that the Philadelphians had been successful in retaining the building. In preparation to either receive this structure or build anew he had surveyed the site south of the Smithsonian. Finding it “well level, so as not to form any obstructions for occupation,” he offered, “If the matter takes any new turn and I can be of any service, here or even in Philadelphia, please command my services.” He also observed, “I flatter myself that the plans of extension of the Institute buildings also in outside appearance will meet your approval, having taken all in consideration which was elicited in our subsequent interviews upon the subject.”

The drawings by Cluss & Daniels for this proposed extension, dated December 1876, are in the collection of the Smithsonian Archives (See Figures 10, 11, and 12).

At the close of the exhibition on November 10, 1876, the United States government received extensive donations for the National Museum of exhibits from state and foreign governments as well as private sources. Baird directed an intermediate transfer of the donated exhibits to the Government Building where they were assigned to the appropriate government departments and packed in preparation for shipment to Washington. On July 31, 1876, Congress had provided the Armory building on the Mall, at Sixth Street, S.W., near the Smithsonian, for the storage
and maintenance of these items since there was no room for them in the Smithsonian Institution Building. The great volume of the new acquisitions was then unanticipated by Congress. While 20 railroad cars were required to carry the government exhibits to Philadelphia, it appeared that 60 would be required to carry the expanded collection back to Washington. On November 17, 1876, President Grant, in response to an appeal by The National Academy of Sciences, ordered these exhibits held in Philadelphia until the Congress could determine how they would ultimately be maintained in Washington. Since the government’s contract with the Centennial Commission required removal of their building within 60 days, the request for a new museum building was now a priority.

The December 1876 drawings by Cluss & Daniel for the addition to the Smithsonian’s original building presented a formal brick entrance façade on South B Street designed in a modern Romanesque style compatible with that of the Smithsonian Institution Building. Behind this formal entrance façade, a lofty iron and glass shed provided exhibition space on ground and mezzanine levels. Brick spandrel panels in tripartite bays were similar to those finally used in the walls of the AIB. On January 19, 1876, General Montgomery C. Meigs (1816-1892) provided Spencer Baird with a rough sketch of an idea for a museum. The building would be 300’ square and located south of the Smithsonian with entry through the South Tower. Two tiers of 50’ wide interconnecting exhibition halls would surround a central rotunda. Brick walls with interior arches, a range of clerestories, and metal roofs laid on wooden planks were all part of the idea. Baird gave the sketch to Cluss (See Figure 13). Carefully detailed drawings by Cluss & Daniel, dated January 1877, adapted their December drawings to a square plan. The rhythmic design of the exterior walls, the entrance door, and clerestories remained the same. Two-story towers flanked an entrance pavilion and one-story pavilions defined the corners of the building. A dome with a cupola, recalling that of the Government Building at the Centennial, was similar in design to the three lanterns used on the museum roof in the December drawing (See Figure 14). Meigs responded by superimposing a large semi-spherical dome onto the Cluss drawing and
Historical Background and Context 1.1

Building History, Description and Significance


16: “For the National Museum at Washington, D.C., M.C. Meigs, 1877.” Note large hemispherical dome superimposed on Cluss & Daniels perspective drawing, penciled heightening of pavilions & towers.

labeling it Meigs & Cluss. The ideas of the two men for the new museum building were clearly diverging (See Figures 15 and 16).

In his report of January 1877, Baird suggested to the Regents that a new building could be cheaply constructed with a concrete floor laid on grade, “using brick walls and piers and a roof with iron beams, and wooden sheathing covered with tin. Several plans have been proposed for this building, some one of which is hoped will find favor and be adopted.”

Henry approvingly commented, “This building will be of durable though inexpensive material, and expressly adapted to the uses for which it is designed. In its construction, care will be exercised not to sacrifice utility to architectural effect, but the fact will be kept in view that architecture is essentially a useful art, and that the mind receives pleasure and improvement from the contemplation of perfect adaptability no less than from imposing exterior effect.”

On February 5, 1877, the Board of Regents sent a formal message to Congress that detailed the magnitude and value of the Centennial exhibits and the dire conditions in which they were stored. They commented, “The Government of the United States is now in possession of the materials of a museum, exhibiting the natural products of our own country, associated with those of foreign nations, which would rival in magnitude, value, and interest the most celebrated museums of the old world.” The Regents requested an appropriation of $250,000 for the immediate construction of an appropriate museum building. After careful consideration of cost estimates prepared by Cluss and reviewed by Meigs, the Regents accepted this amount as the minimum and adequate cost of the proposed construction. Their request for appropriation stated that a plan of such a building had been offered at no charge by General Meigs, quartermaster-general of the United States Army.

Senator Justin S. Morrill of Vermont (1810-1898), chairman of the Senate Buildings and Grounds Committee, met with Meigs on February 13 to discuss the plans. Senator Morrill did not want what he viewed as a temporary building to be attached to the SIB. He felt that the design of the proposed

Footnote 25: Ibid, 70.

Footnote 26: Henry, AR 1876, 13-14.

Footnote 27: Regents, AR 1876, 129-137.


building was incompatible with that of the fine Norman Romanesque Smithsonian Institution Building. He preferred a detached building sited so that the Smithsonian and Agriculture buildings could be seen from the Capitol and so that wide drives could be provided through the Mall and on all sides of the building. Meigs advised Baird, "Better not attempt to thwart him. The thing is to get a store-house. If the interior is so satisfactory as to make it desirable to preserve it, the outside can at any future time be raised higher or surrounded by a building of cut stone; or the arrangement can be used as a model for Museums, Libraries, & c. on another site. Get under cover with your collections and let the U. S. watch and guard them."31

Spencer Baird succeeded Joseph Henry as Secretary after Henry’s death on May 13, 1878. He continued to vigorously press for a new museum building. His vision differed from Henry’s in emphasizing the importance of using the collection for practical and educational purposes: “In what is now a fairly complete series of economical minerals, such as ores, combustibles, building stones, clays, earths, &c., from all parts of the world, with their incidents of reduction and application, and specimens of similar objects of art and industry derived from them, we have a collection of very great industrial importance, for it furnishes to the American manufacturer and designer information of the utmost value.”32 He noted that the bill for the appropriation for construction of the new museum building would be reintroduced into Congress at the current session (See Figure 17).

On March 3, 1879, Congress appropriated $250,000 for the erection of a fireproof building, 300’ square, to house the National Museum. The appropriation provided for construction of the building under the direction and supervision of the Regents of the Smithsonian Institution according to plans then filed with the Joint Committee of Public Buildings and Grounds. Congress approved a site for the building on the Smithsonian grounds, southeast of the SIB and no less than 50’ distant. The appropriation further required that the new building be set back with its north façade on a line with the south facade of the Smithsonian so that views from the Capitol of the Smithsonian and Department of Agriculture

Footnote 30: The buildings of the Department of Agriculture and its conservatories, located on the Mall west of the Smithsonian Institution building, were designed by Cluss & Kammerhueber and built in 1867-68.

Footnote 31: Meigs to Baird, 13 February 1877. Assistant Secretary Incoming Correspondence 1875-1877. Asst. Secretary 1850-1877. Ph-Q Box 40, 202: 452. RU 53, SIA.

Footnote 32: Baird, AR 1878, 41.
Building History, Description and Significance

buildings would not be obstructed. The plans and estimates approved were those of Cluss & Schulze, consulting architects. A model of the proposed building was exhibited in the lower hall of the SIB. Spencer Baird, in his report of 1879, anticipated an early completion of the building and requested an additional appropriation for cases. He commented, “The new building will be devoted more particularly to industrial exhibits, intended to show the animal and mineral resources of the United States and their practical applications to the wants or luxuries of man.” (See Figure 18)

Spencer Baird had worked toward this moment since arriving at the Smithsonian in 1850 to take charge of the natural history collections. He had classified and arranged exhibits, exchanged duplicates and information with other institutions here and abroad, trained amateur and volunteer naturalists to assist in collection of specimens, and endlessly lobbied for construction of a building for the National Museum. Through Baird’s success, Joseph Henry gradually came to appreciate the importance of a National Museum. Henry had noted in his 1871 report to the Regents the richness and usefulness of the anthropology collections. Improvement of the museum exhibition space after the fire of 1865, completed that year, made it possible to exhibit the interrelationships of these collections and “to illustrate the gradual progress of the development of the arts of civilized life.”

Design of the National Museum Building
The National Museum Building, today the Arts & Industries Building, was designed by Washington architects and engineers Cluss & Schulze with Adolf Cluss, FAIA, as architect-in-charge, and was constructed from 1879 to 1881. The design of the building is rationally volumetric. It radiates axially from a high central domed Rotunda, extending from center to center through all four facades and corner to corner through the terminating pavilions. The 17 individual exhibition halls are defined on the exterior by individual roofs, monitors, and clerestories of varying design. The plan features a Greek cross incised in a square with a central Rotunda as the focal point. It ingeniously groups office and shop functions in four three-story corner pavilions and four central entrance towers — leaving almost the entire 300' square museum floor as a single space for exhibition use. There were originally 17 exhibition halls, each defined within a structural system of interconnected brick masonry arcades. Each hall has its own roof and clerestory or monitor system providing the “perfect light” that Cluss considered necessary for a museum. The height of these halls rises in stages toward the Rotunda, providing a clear directional focus through high, well-lighted longitudinal entrance halls toward this grand central exhibition space. The great mass of the building is lightened and diffused through a variety of line, proportion, and color. The originally open-plan interior allowed freedom of movement for visitors while providing separate and secure working areas for the administrative, scientific, and technical staffs. The design avoids monumentality, welcoming the public to explore, celebrate, and learn about the natural resources, arts, and industries of their country.

Footnote 33: 45th Cong 3rd session, chapter 182, 1879, March 3.
Footnote 35: Baird, AR 1879, 71.
Footnote 36: Henry, AR 1871, 40.
Footnote 37: The 16-side polygonal Rotunda is topped by a dome-like structure. Cluss & Schulze use “domical structure” to describe the upper part of the Rotunda. Various other documents dating to the construction period use the term “dome” for the entire Rotunda. Although not vaulted, the structural roof system of the Rotunda is constructed similar to a dome structure, with a compression ring at the upper part and a tension ring at the lower part.
The National Museum Building Commission

Preparations for the construction of the new building moved ahead rapidly. On March 7, 1879, Spencer Baird, now both Secretary of the Smithsonian Institution and Director of the National Museum, and Regents General William Tecumseh Sherman (1820-1891) and the Hon. Peter Parker (1804-1888), members of the Executive Committee of the Board of Regents, organized themselves as the National Museum Building Commission. Sherman served as chairman of the commission; Daniel Leech, a Smithsonian clerk, served as secretary. The Commission invited Quartermaster General Montgomery Meigs of the Army to serve as advisor and referee or consulting engineer. Meigs and Architect of the Capitol Edward Clark (1822-1902) verified the sufficiency of the construction cost estimate. Meigs noted that the plan by Cluss & Schulze proposed more interior divisions and a smaller central hall than his own plan and would probably be more expensive to construct. He recommended strict economy in contracting. Baird ordered Cluss to prepare duplicate sets of plans for contracting purposes and to provide an accurate survey of the site (See Figure 19).

On March 8, 1879, the Treasury Department informed Baird that the appropriation was immediately available and ready for disbursement by an official of their department. The Commission chose Cluss & Schulze as superintending architects with Cluss as architect-in-charge and authorized Baird to request working drawings from Cluss. On March 22, 1879, the question of compensation for Cluss & Schulze was discussed since the enabling act specifically stated that no fee would be paid from the appropriation for plans. Baird explained the extent of the work that had been and would be required of the architects and recounted the long connection of Cluss with the project. An extended discussion ended with a vague agreement for payment of no more than $10,000 for bringing the project in under $250,000. The Commission ruled that they would open and award all contracts, but named Baird as their authorized agent in the contracting process.

Following a presentation of the plans and estimates by Adolf Cluss, the Commission got down to work. Sherman demanded that there should be no economies in construction of the foundations and walls, and that the heating should be placed below grade outside of the building. Meigs suggested that the plastered cylindrical columns that he had proposed in his plan were more aesthetically pleasing and stronger than the piers in Cluss’ plan. He thought that the extra cost could be absorbed by leaving the inner walls unplastered — a design detail that he preferred. He supported his views with photographs of famous Old World buildings. The other members of the Commission diplomatically turned down this idea as too expensive and not authorized by Congress. Meigs objected to Cluss’ plan to buy

Footnote 38: Report of the National Museum Building Commission, AR 1879, 125. On January 17, 1879, the Regents authorized the Executive Committee of the Board of Regents and the Secretary of the Smithsonian Institution to act on the Regents’ behalf “in carrying into effect the provision of any act of Congress that might be passed providing for the erection of a building for the National Museum.” Further notes in this section will refer to the Minutes of the National Museum Building Commission, 1879-1881, Box 7, RU 71, SIA and will be indicated by page number cited within brackets in the text unless otherwise noted.

Footnote 39: William Tecumseh Sherman succeeded Ulysses S. Grant as Commanding General of the Army of the United States after Grant became President in 1868. He served as Regent and member of the Executive Committee of the Smithsonian Institution from 1871 to 1874 and from 1878 to 1885. He graduated from West Point in 1840.
Brick masonry walls in progress, arch moulds in place. Note Warren trusses fabricated for Ranges by Phoenix Iron Co. in right foreground. Looking east from Smithsonian building. August 1879. SIA RU 95, B32, F 7.


Footnote 40: The Hon. Peter Parker, retired Minister to China and physician, served as Regent and member of the Executive Committee of the Smithsonian Institution from 1868 to 1884. A native of Farmingham, Massachusetts, Parker graduated from Yale College in 1831. Afterwards studying medicine, he journeyed to Canton, China, where he founded a hospital and practiced his profession. Later named resident Minister of the American legation, he remained in China for twenty-eight years.

It was agreed that lime should be bought in quantity and by weight — not by the barrel. Meigs asked for the installation of a scale at the job site to weigh materials as received. The Commission decided to advertise proposals in three local newspapers, and in one Boston and one New York newspaper. Later, they would also advertise in Philadelphia. The office of the Boston Herald was designated as a depository for copies of the specifications for cut-stone work. [55] The initial proposal for bids on the foundation and brick work drew 59 responses.
Foundations and Walls

The contract for grading, excavating, concrete foundations, rubble-stone masonry, concrete stone, and brick-work was let to Gleeson & Himber on April 11, 1879. Excavation for the foundations began on April 17, 1879, and was carried to solid ground at least three feet below the surface. Hard clay was encountered beneath the topsoil and, below this, a layer of clean, dry gravel, providing a natural drainage for the building and indicating the proximity of the Potomac River shoreline. Placing the concrete foundations began on April 29, 1879, with footings of waterproof hydraulic cement concrete. Gneiss rubble-stone, laid with hydraulic cement mortar, was carried to grade from these footings. Hydraulic cement mortar, with a composition of one barrel dry cement to two barrels of unslaked lime, was used to parge the exterior cellar walls below grade. The foundation work was completed on June 9, 1879. Cutting and laying of a granite base course began on May 19, 1879, and the brick-work above this base course began on May 21, 1879. Both the exterior and interior brick walls were substantially completed by November 1, 1879. John Miller contracted for the sand; Rothwell & Lloyd, for the gravel; Joseph A. Bl undon, for the gneiss rubble-stone; Carson & Son, of Riverton, Vermont, for the lime; and the Cumberland Hydraulic Cement Company of Cumberland, Maryland, for the cement. Richmond granite and Euclid sandstone were selected for the cut-stone work [59].

Before the bidding process began, Cluss reduced the amount of cut-stone work originally planned and increased the amount of the less expensive ornamental brick-work. This would compensate for the additional cost of granite base course, doorway sills, and entrance platform construction. For the exterior walls, Cluss ordered two grades of brick in lots — the higher grade for facing. Meigs thought that this was unnecessary as within the 4,000,000 bricks ordered there would surely be enough of sufficient quality for facing. He felt that more than $1,600 could be saved by buying only one grade of brick. Cluss pointed out that the bidding process did not bear this out since the lowest bid for the two grades specified did not exceed the approved estimate. [49]

The Washington Brick Machine Company agreed to deliver the entire lot of bricks within four months of the date of contract and so received the brick contract. Gleeson & Himber began the brick-work on May 21, 1879, and by November 1, 1879, had completed the principal walls, laying 4,740,000 bricks.

A dispute arose when, midway through the project, the contractors asked for extra pay for extra work not in the contract. They claimed they had bid on an ordinary red brick job only to find that the facing bricks were press bricks that required a more highly skilled and highly paid worker. The buff bricks caused the same concern, as did the cutting and fitting of the buff bricks for the wall above the arches. Gleeson & Himber complained to the members of the Building Commission, “A mechanic takes pride in his work and with superior brick he cannot be prevented trying to make a fine job.” [89] This extra care was expensive. In addition, they demanded pay for miscellaneous work not in the contract, including building the walls of the basement in the northeast corner, setting stone sills and window frames, making and furnishing centers for the arches, and setting iron floor beams and wailing them in. Sherman, Cluss, and Baird
recommended payment for work well done to avoid a crisis. Meigs voted against payment. In the end, payment for the miscellaneous work was approved and payment for pressed brick work was denied. It was noted that the contract price was considerably below the estimate so some assistance to the contractors was justifiable.

Work stopped on September 22, 1879, as the dispute continued and the contractors failed to pay the workers. The Building Commission called a meeting of the contractors, brick-layers, and laborers to present grievances. Gleeson & Himber stated that although the contract called for red brick, the Washington Brick Machine Company had decided to furnish pressed brick for advertising purposes. The brick-layers and laborers complained that they had not been paid for three weeks but were “anxious to go on with the work.” They “felt a pride in the building and wanted to see it completed.” [105] Work resumed on September 23, 1879, [110], as the Building Commission guaranteed payment for the workers and refused further payment to the contractors until they had satisfied their obligations. The contractors complied on September 26, 1879, but the dispute was far from over. On October 31, 1879, Gleeson & Himber declared the work, according to their contract, completed. Although there were still 200,000 bricks to be laid, Cluss advised closing the contract and finishing with their own foreman. Meigs finally agreed that this was in the best interest of the government. In the end, about 5,250,000 bricks were laid both under contract with Gleeson & Himber and by day labor under the supervision of the Smithsonian’s foreman. This included both face and ordinary red brick, shaped red arch bricks, blackened, buff and sand-blasted enameled blue bricks.


Footnote 42: The original descriptions refer to the structures topping the Rotunda, halls, courts and pavilions as lanterns. For this report, the terminology used is “lantern” for the roof structure allowing light into the Rotunda, and “monitors” for the roof structures allowing light into the halls, courts and pavilions.

The concrete flooring was not in the contract for the foundations. Cleaning the outer faces of the walls was not in the contract for the brick work. The Commission authorized Cluss to buy Gleason & Himber’s scaffolding and begin laying the floor arches where needed. Baird and Cluss stood fast in denial of extra payment for pressed brick work. Cluss commented in his year-end report:

The specifications call for a superior class of brickwork, laid in black mortar on the facades without resorting to the expensive “tucked” or “ruled” joints commonly used in first-class pressed brickwork, and this has been duly enforced. In this we were aided by the commendable ambition of the Washington Brick Machine Company, who have furnished a superior quality of brick for the facades. We, on the other hand, have spent a large amount of money in bringing out the beauty of the material by cleaning down and oiling the facades.41

Roofs
The Building Commission received five proposals for the important and complicated wrought and cast iron work of the roofs, stairs, and railings. They chose the bid of C. A. Schneider & Sons of Washington, D.C. [71]. The galvanized iron work, with three bids, went to D. W. Stockstill & Co. on July 11. [11 July 1879, 78] The work included: (1) the pediments with acroterias over the four main entrances; (2) the pediments and copings over the gables of the main walls; (3) the facing of the lantern dome with patent leaded iron roof, and the base mold of the flagstaff; (4) the finials of the towers; (5) the dormers of the towers with water-shedding louvers backed with galvanized wire-netting, and all necessary precautions against leakage; (6) the finials of the lanterns42 of the
square halls and corner pavilions; (7) the pediments of the lanterns of the corner pavilions; (8) ridge-mold for the main halls and their skylights; (9) base-mold and cornice of the skylights; (10) casings of the sides of the skylights of the main halls and square halls, and corner pavilions; and (11) main cornice of outer halls, main entrances, corner pavilions, main halls, square halls, towers, and dome.

The Commission received nine bids for slate and slaters work, opening the bids on July 5 [75]. Cluss had specified blue slate for the roofs of the towers, pavilions, square halls, and naves. The vast expanses of blue were relieved by green slate laid in bands and red slate in plain patterns for decorative effects. The slates were to be 12" × 24" × 1/4" allowing a 4" lap with 10" to weather. Originally, they were to be hung on 1 1/2" by 2' angle-iron purlins with annealed copper wire. Cluss recommended Maine slate. He felt that this slate would guarantee the most durable colors, while that of Pennsylvania would fade. He urged taking Maine slate; if not Maine, then Buckingham. Meigs countered that the Commission should take the lowest bid, as even the best slate would fade in time. He felt that the difference in color retention did not compensate for the higher price. Sherman agreed. The contract for slater’s work and fastenings was awarded to John O. Jones [79]. On July 29, Cluss submitted the results of experiments he had conducted on the strength and absorption of the several blue slates offered to the Commission. He urged acceptance of the proposal for Maine slate. Meigs did not think the extra strength and resistance to water absorption demonstrated by the Maine slate would compensate for the increased cost. Sherman again agreed. [82] The contract for blue slate was awarded to Edwards & Roberts of Ore Banks, Virginia, for Buckingham slate. The contract for red and green slate went to Story & Wilbur of Boston for Vermont slate.

The Commission opened six bids for metal roofing on October 6, 1879. As the prices of tin and leaded iron were advancing day to day, the Building Commission had recently taken advantage of a favorable opportunity and had purchased the necessary quantity of roofing material from the Phelps Dodge Co. of New York. They had obtained orders from the Treasury Department to admit this tin free of duty. [114] The contract was awarded to D.W. Stockstill & Co. as the Commission felt it was advantageous to have one firm responsible for both the tin and the galvanized iron work. [120] On October 29, the Commission considered installing a layer of felt between the tin roof and the ceiling gratings. Asbestos, introduced at the 1876 Centennial Exposition, was suggested but rejected as too expensive. General Meigs suggested laying a light wood grating encased in a fireproof mixture of plaster of Paris, lime, coal-ashes, and cinders. The Commission adopted this method in lieu of the metal ceiling originally specified by Cluss. By December 10, 1879, the flat roofs were installed and plastered. Delay in delivery of some of the iron beams prevented completion of the roof. By March 10, 1880, [176] all of the iron was on site and work on the framing of the dome was underway. Cluss explained to the Commission that the slating work had been discontinued until completion of the dome, since walking over the slate caused breakage. He noted that a ¾" layer of plaster would be applied to the slate, but recommended an iron lathing under the plastered slating if money allowed. By May 12, 1880, [182] all of the roofs were complete and Cluss reported to the Commission that he had been in the building during the hard rain of May 11 and found that the roofs were perfectly tight with no leaks.

Footnote 43: Maine Geological Survey, Department of Conservation, State of Maine, Maine.gov © 2005. “From 1880-1904 Maine was among the top five slate-producing states in the country, providing slate of excellent quality for roofing tiles and other purposes. Many Maine homes and public buildings dating to that time are still protected by their original slate roofs.”

Footnote 44: New York Public Library, Rare Books and Manuscript Division, Accession Sheet, # *86 M 27. Phelps, Dodge & Co. was founded in 1834, importing metals — including tin, iron, and copper — from England and exporting American cotton for sale in England. New York Public Library.
Building History, Description and Significance

Windows Five proposals were submitted for the window frames and sash. The Building Commission awarded the contract to Barbour, Henderson & Co. on May 5, 1879 [67]. On July 7, 1879, Cluss complained about the unsatisfactory condition of some of window frames and backwardness of their delivery. [77] Five proposals for glass were submitted. One of the contractors remarked that while American glass was available in the market, it was of an inferior quality and was advancing in price. The Building Commission approved Cluss’ design using double panes of glass set with an intermediate air space for insulation purposes in all exterior sash and using ground glass in one of the panes in all exhibition halls. [45] Peter Parker suggested that the glass should be set by the parties supplying the material.

Since there was little glass of the desired sizes then in the United States, the Building Commission decided to import glass from Belgium. They contracted with Seamon, Bache & Co. for window glass and double-thick transom glass and Holbrook Bros., for plate glass. These glass-importing firms were located in New York City. [117] On October 29, Seamon Bache replied, noting that although the price of glass had advanced considerably since they had made their proposal, they would furnish an additional quantity at about the same rates as for the original order. On December 10, 1879 [155], Holbrook Bros. notified the Commission that some of the plate glass had arrived in New York. By December 31, 1879 [160], about 6,000 lights of glass had arrived. The Commission ordered contracting of the glazing. [164] The remainder of the plate glass had arrived in New York as well as 528 boxes of window glass. Permits for free entry were requested. By February 18, 1880 [172], work had begun priming the sash and setting the glass for the windows of the corner pavilions.

Footnote 45: The location of the ground glass pane remains unclear. The 1980s restoration project documented the ground glass at the interior pane of the windows.

Footnote 46: L. E. Gannon to Cluss & Schulze, 23 Dec. 1879, (SI-AHHP, Box 2) Proposal to furnish above in “Rolled Cathedral Glass, cut to sizes and ornamented in full accordance with the plans and designs, including glazing.” Accepted by Cluss & Baird, 661, Numbered Correspondence. Box 1, RU 71, SIA.

Entrances The contract for cut-stone work, including the sandstone wrought work of the four main entrances and inscription plates, granite base blocks, thresholds, and sills, was let to Rothwell & Lloyd on April 24, 1879. On August 14, 1879, the Building Commission accepted the design of New York sculptor Casper Buberl (1834-1899) for an allegorical sculptural group for installation over the gable end of the north nave at the main entrance. A committee of residents of South B Street asked the Commission to provide a similar sculptural group for the south entrance. [45] The group, representing “Columbia Protecting Science and Industry,” was cast in zinc and finished with plaster. The completed sculpture arrived on December 3, 1879, [149] together with a model for a second group, “Peace with the Fine Arts.” Meigs and Cluss argued in favor of having the group cast. Sherman opposed, arguing that there might not be enough money, and the group was not cast. [155] Cluss had originally planned similar groups over all four main entrances, but only the statuary for the main entrance was provided. Below the sculptural group a plaque simply reads “National Museum 1879.” Three illuminated windows in rolled cathedral glass, designed by Cluss & Schulze, are included in each of the gable ends of the naves. The contract, including cutting, ornamenting, and glazing, was let to L. E. Gannon. [46]

The Commission contracted with August Glass to provide the four sets of main entrance doors and frames. Glass’ proposal described the doors as “of prime, seasoned white pine skeletons with solid
walnut veneers and oak panels, each to be twelve feet wide in four folds, and fifteen feet high; two sets to have imposts and transoms, also to furnish and finish the frames and trimmings to correspond.47

On October 17, 1879, Meigs questioned the need and expense for the main entrance platform proposed by Cluss, but was overruled by the Commission [120]. Cluss comments, "A spacious tiled platform bounded by granite side blocks is constructed in front of this entrance. It is approached by four low and wide granite steps of 37 feet in length, which are flanked by molded base-blocks, carrying stately candelabras."48 Sherman proposed a sloping concrete walk on the east and west sides at least 2' from the building [160]. Plans for modifications in the roadways and landscaping of the grounds were presented to the Commission on January 16, 1880. Colonel T. L. Casey, commissioner of public buildings and grounds, agreed to do the landscaping [170].

Plastering and Interior Decorative Detail
On October 27, 1879, Sherman demanded that the plastering work proceed [125]. On November 5, 1879, the Commission directed one room to be plastered in order to determine whether the work should be done by day labor or by contract. On February 18, 1880 [172], Meigs demanded that the plastering begin without further delay, and that the work be contracted by the job and not by the square yard. On March 3, 1880 [174], the Commission opened 12 bids for the plastering contract. Cluss recommended George W. Harness as most advantageous for the progress of the work. Although Harness was not the lowest bidder, his proposal was accepted by the Commission. On May 12, 1880 [181], with the completion of the roofing, the Commission bid the remainder of the plastering. An insufficient amount of scaffolding caused a delay in the plastering work [June 2]. Sherman impatiently directed Cluss to get it done. Finished in sand and washed in tints to provide a neutral background for the exhibits, the work was completed in August 1880.

The piers were scored to resemble stone. The Commission contracted with fresco painter H. Mattill, on April 20, 1880, to provide stenciled decorations for the Rotunda:

...according to the designs and full size details of Messrs. Cluss & Schulze, Archt. And in such colors as will be directed by them – 1) Frieze and spandrels over the 16 windows of the dome; 2) Panels under the sills of the 16 windows of the dome; 3) Twenty four niches on sidewalls of dome; 4) Continuous frieze underneath those niches; 5) Spandrels over the eight doorways of dome; 6) Twelve large sized segmental panels over the doorways in Main Halls which lead into the dome.49

These stenciled decorations were apparently inspired by the popular decorative art publications by Owen Jones and Auguste Racinet with designs based on the historical precedent of Moorish, Greek, Byzantine, and other original sources.

Floors
The contract for rolled iron beams for the fireproof floors of the pavilions, towers, and annexes went to the New Jersey Steel and Iron Company on June 9 [70]. These floors, with brick arches sprung between...
1.1 Building History, Description and Significance

Rolled iron beams, were leveled with concrete and finished with Florida pine. This was a fireproof floor design used by Adolf Cluss throughout his career. Originally, the hydraulic concrete slab on grade of the exhibition halls was to be finished with asphaltic concrete in the main halls and Rotunda, and with Georgia pine in the smaller halls. An additional appropriation from Congress allowed finishing the main hall floors with "white-veined red, black, and gray marble tiles laid in chaste patterns. The marble tiling was surrounded by a frieze of dark blue Pennsylvania slate of sufficient thickness to bridge the ducts containing the steam-pipes, wires, &c.; and around the frieze a border of parti-colored Portland cement pavement was extended."\(^{50}\) The low bid of E. Fritsch, of New York, was accepted, and the work completed by the middle of September, 1881. The architects reported that "An octagonal fountain with sides of molded and polished granite, and floor of Portland cement, was constructed and finished in the early part of August, 1881. The floor of the rotunda around the fountain was laid with encaustic tile, according to our designs."\(^{51}\) The Building Commission had sought bids from both domestic and foreign manufacturers, selecting the United States Encaustic Tile Company, of Indianapolis, Indiana. The work was finished by October 1, 1881.

**Systems** The contract for the glazed terracotta and cast iron drain pipe was awarded on July 12, 1879 to Blinkhorn & Hannan [78]. The Commission requested that installation be delayed until the walls were in place. The cost of the steam heating apparatus, radiators, and underground piping for water, gas, and steam was not included in the original estimate of costs for the museum building. Anticipating an additional appropriation from Congress for these items, the Commission advertised for proposals. They received nine bids on November 9, 1879, for a steam heating apparatus, including supplying, delivering, and setting up in complete working order [147]. Before making a selection, Cluss went to New York City to examine the heating apparatus of certain large buildings in that city. Back in Washington on December 10, 1879 [153], he submitted a heating apparatus schedule with a report upon several plans and propositions to the Building Commission. He recommended acceptance of the bid of Baker, Smith & Co. [154]. The Building Commission agreed, with Meigs suggesting that the radiators should not be against the wall. Congress appropriated an additional $25,000 for a steam heating apparatus and fuel; $12,500 for water, gas fixtures, and electrical apparatus; and $1,000 for construction of a relieving sewer, with the necessary manholes and traps for the new National Museum to the Seventh Street sewer — all to be immediately available.\(^{52}\)


Footnote 51: Ibid.

Footnote 52: Forty-sixth Congress, second session, chapter 235; 1880.
Completion of the National Museum Building

Spencer Baird wrote to Adolf Cluss on January 5, 1880, “Did I tell you the other day that the Director of the British Museum, on receiving a copy of the plan of our new building, says that as far as he can judge, he likes our building better than his, and asks how many years it took to erect it! The new British Museum has been eight years in process of construction and is not yet finished.”53 In the summer of 1880, Baird reported, “A portion of the building is already occupied for its legitimate objects.” The work, done within estimates, “promises to be even more suitable to its purpose than was anticipated. All the requirements in regard to light and heat are fully met; and in this respect, and in that of its slight cost in proportion to the space obtained, the building is believed to have no parallel in the country.”54 The work in 1880 included completion of the roofs, glazing, plastering, floors, cast iron interior stairs and platform railings, painting, miscellaneous decorative features, and various systems details (See Figure 25).

As construction neared completion, General James A. Garfield (1831-1881), one of the Regents of the Smithsonian Institution, was elected President of the United States. The Regents agreed to hold Garfield’s March 4, 1881, inaugural reception in the new museum. The few exhibits already in the museum were locked away. The floors in the main halls and Rotunda were hurriedly finished with temporary polished wooden dance floors. An inaugural committee, directed by Adolf Cluss, decorated the hall with a series of emblematical and allegorical shields, monograms of the president and vice-president, American flags, tropical plants, and miles of evergreen festooning suspended from the roof trusses (See Figure 26). Five thousand feet of gas pipe with jets about a foot apart, was installed horizontally from pier to pier above the crowd throughout the building. Sculptor Caspar Buberl created a colossal figure of the “Goddess of Liberty” for display in the Rotunda. The next day the Washington Post rhapsodized, “The face of the figure is benignant and the pose natural. In the uplifted right hand is borne a lamp in which burned the new light, the great electric light, which is to revolutionize the world and make dark places to shine with the all-effulgence of noonday.”55 (See Figures 27 and 28) Refreshments were served in a temporary building erected at the east entrance of the museum building. The Smithsonian grounds were decorated with calcium lights, the Evening Star commented:

The new Museum Building was conspicuous from a long distance, its lights within giving a good view of its outlines and making it resemble a crystal palace. The contrast between the whiteness of the electric lights in the rotunda and dome and the yellowness of the thousands of gas burners elsewhere produced a very fine effect.

Footnote 53: Baird to Cluss, 5 January 1880, Outgoing Correspondence, Office of the Secretary, 1865-1891, 90: 81, RU 33, SIA.

Footnote 54: Baird. AR 1880, 1.


The statue was constructed of excelsior and lath covered with plaster of Paris, the head and shoulders were cast and modeled after the Centennial gift of France to the U. S. which had been displayed at the 1876 Centennial Exposition in Philadelphia and which was then on display in N.Y. Buberl constructed it in less than a week. It was demolished on August 21, 1881 as work began on the fountain and paving of the Rotunda. [Washington Post, 8 March 1881, 2; 21 August 1881, 4.]
Historical Background and Context 1.1

Smithsonian Institution Arts & Industries Building


Footnote 57: Goode, AR 1881, 83.

Footnote 58: Ibid, 83.

Footnote 59: Ibid, 84.


Footnote 61: Ibid, 94.


Footnote 57: Goode, AR 1881, 83.

Footnote 58: Ibid, 83.

Footnote 59: Ibid, 84.


Footnote 61: Ibid, 94.
Like Spencer Baird, he was pleased with the new building, exclaiming that it exceeded all expectations. He praised the perfect illumination, the generous space available for exhibitions, and the importance of ground-level exhibition space for both staff and visitors (See Figure 29).

Goode consulted with other museums, both in the United States and abroad, on the design of cases, considering metal, walnut, and mahogany for their construction. He ordered a number of metal cases, but soon found that the greater visibility afforded the exhibits did not justify their heavy weight and lack of portability. At first, he had ordered cases from outside contractors in Philadelphia and Baltimore. Soon he was able to use Smithsonian carpenters and day laborers for the vast and continually increasing numbers of cases required. The design of the exhibition cases by W. Bruce Gray was innovative and ingeniously adapted to the modular plan of the museum (See Figures 30, 31, 32, and 33):

The building consisting practically of a single large hall; the cases are so constructed as to form partitions dividing the hall into seventeen halls of lesser extent.

1. The cases are all of one length, 8 feet 8 inches, which is the architectural unit of the Museum building, or are of such lengths that, combined together, they always conform to this unit, so that they are interchangeable.

2. The construction is such that, with very slight expenditure of labor, any one of them full of specimens can be transported from one part of the building to another, thus allowing great freedom in the matter of rearranging the museum.

3. All the smaller specimens are mounted in groups upon small tablets or in glass-covered boxes of uniform size, which can be handled with great facility and which afford great security to the specimens, and diminish immensely the labor properly caring for them.
4. The objects are displayed against backgrounds which at the same time afford the greatest ease to the eye of the visitor and the greatest relief and effectiveness to the object displayed.

5. The objects being shown singly against a suitable background, and at the same time brought as close as possible to the glass front of the case, the sense of confusion, so often experienced in museums, is entirely avoided.

6. The labels are printed in large, heavy-face type and upon paper of soft tints, which are much less wearisome to the eye than the ordinary labels in black and white.62

Goode, fully engaged in the organization and installation of collections, regarded 1882 as the first year of occupation of the new building. His attention next turned to regulation and security, a persistent problem both at the SIB and at the U.S. Patent Office. A uniformed building staff included a superintendent of buildings, two assistant superintendents, one engineer and one assistant engineer, three firemen, three carpenters, two painters, one mason, twelve watchmen, four janitors, twenty laborers, four messengers, and two cleaners. Confronted by outright theft and the “mania of the relic hunter,” he increased security, closing the private doors in the SIB, stationing watchmen at all entrances, restricting removal of all packages from the building, and banning canes and umbrellas. The electrical room of the National Museum, in these early days of electrical building applications, included an extensive security system but little else of electrical utility:

One 50-drop telephone switch-board, with 34 connections, 14 of which are in the National Museum, 9 in the Smithsonian building, and 11 outside. There are 5 ordinary electric lamps, and 2 electric lamps for photographic purposes, with dynamo-electric Machine and resistance-box. There is also a 100-drop annunciator, to which are connected 300 windows and 85 doors throughout the Museum building; 1 large watch-lock for recording on paper dials the time signals which the watchman turns in from the 12 clock stations throughout the building as he makes his patrol; and one alarm box of the district Telegraph

Footnote 62: Goode, AR 1881, 94.

34: Lecture Room and Catlin Exhibit, West North Range, c. 1890. SIA RU 95, B 42, F7.

35: Library c. 1890. SIA RU 95, B 32, F 18.
Company. In the Smithsonian building there are 9 clock stations, controlled in the same manner as those in the Museum building, and also a special telephone connection with the city.63

The number of visitors for 1882 totaled 167,455 at the National Museum building and 152,744 at the SIB. The Biological Society held its meetings in the new building and the museum initiated two lecture series under the auspices of the Biological and Anthropological Societies. These included eight Saturday afternoon lectures in March and April and twelve “young folks” lectures begun in December. The unexpectedly heavy attendance at these lectures made it necessary to abandon the planned use of the North West Range as a lecture room and instead to use the larger West North Range for lectures and public meetings. The National Academy of Sciences, the American Institute of Mining Engineers, and the National Dental Association also met in the lecture room of the National Museum during 1882 (See Figure 34).

Baird observed in his 1882 annual report, “The Museum building was received from the hands of the architects in so complete a state that but little remained to be done beyond the tinting of a portion of the walls and filling up of some of the alcoves with canvas frames, &c.”64 He noted many changes in the appearance of the interior as the museum program developed. These changes included enlargement of the library to accommodate the great volume of books required by curators and students associated with the museum. The original library room on the first floor, with its mezzanine level gallery, was connected to the room above on the second floor by a stair and now provided storage for as many as 10,000 books. Photographic enlargements of scenes and people from the transparencies of the exploring expeditions of Major Powell were produced for display in the windows of the museum, illustrating the contents of the rooms within (See Figure 35).

An Additional Museum Building Required As the organization of the working museum progressed, the size of the collections continued to increase enormously. The Smithsonian received additional items from the Centennial Exposition, various government expeditions, and the Ethnological Bureau. Baird anticipated much more from the industrial collections of the U. S. Census of 1880 and the collections of the U. S. Geological Survey. Baird commented, “Large and capacious as is the new Museum building, it has proved already inadequate to the existing requirements of the National Museum.” An additional museum would be necessary. On April 10, 1881, a bill providing for an appropriation of $200,000 for construction of a new museum building south of the SIB was introduced into Congress.65 The Regents recommended to Congress that, instead, $300,000 be appropriated for construction of a new museum building on the southwest corner of the Smithsonian Reservation similar in style to the existing museum. Baird suggested that, for the sake of expediency, one architecturally independent wing could be built now, and the building completed in the future as need and resources dictated. This wing would house the offices and laboratories of the National Museum and the Geological Survey.66 This request for funding was not granted.

Footnote 63: Goode, AR 1882, 125.

Footnote 64: Baird, AR 1882, 6. This comment apparently refers to initial partial enclosure of some of the spaces between the piers as a background for exhibits. The Cluss & Schulze interior perspective of June, 1878, shows low brick walls approximately 6’-8’ high between some piers of the north hall. On March 10, 1879, Baird directed Cluss “Lay the concrete straight through. Add dividing walls between the piers as needed. This will reduce the original cost.” (Baird to Cluss, 10 March 1878, Outgoing Correspondence, Office of the Secretary, 1865-1891, 83; 88, RU 33, SIA.)

Footnote 65: Report of the Executive Committee, AR 1882, XII.

Footnote 66: Ibid, xi-xii. [H. R. 5781, 47th Cong., 1st sess.]
Originally, the great mass of unsorted stored materials, still in their crates, had occupied most of the exhibition halls. By the end of 1883, after two years of effort, only three of the seventeen halls were still in use for storage of unsorted materials. These included the South West, South East, and North East Courts. The carpenter shop was moved from the South East Court to a frame building east of the museum, freeing additional storage space within the building. The Armory building, now almost empty of stored materials, was turned over to the United States Fish Commission. An organizational plan for the museum was adopted, with 32 scientific departments grouped under the divisions of anthropology, zoology, botany, geology, and exploration and experiment. There were 11 executive departments grouped under a separate administrative division. Exhibition space had been provisionally assigned to each of the scientific departments. A large skylight was installed in the North West Annex roof to provide additional light needed after the addition of a second story and gallery.67

In the Annual Report for 1883, Secretary Baird notes that the Brush-Swan Electric Light Company had loaned the museum a powerful dynamo machine and a series of arc lights. Members of the National Museum staff took charge of this equipment and conducted experiments for lighting the building at night and for using electric light for photography. The Brush storage battery system was demonstrated in the lecture room by connecting a storage battery with 40 Swan incandescent lights and charging the battery with the dynamo. Invited government officials and private citizens witnessed the success of this system on several different occasions. The Brush-Swan Electric Light Company left this system in the lecture room, and installed 43 burners for the use of the museum.68 The building was lighted for the first time with electric lights on February 26, 1883, as the museum held a week-long public viewing of an exhibition prepared for the London International Fisheries Exhibition. Attendance averaged more than 2,000 visitors each day.69 During 1883, the electrical system was steadily expanded. By the end of the year, all of the exhibition halls had been wired for electric light and it was possible to light one or all simultaneously.70

The Smithsonian expanded the use of the museum by scientific societies, with the American Pharmaceutical Association holding its annual meeting there on April 17, 1883. A large floor area was cleared for their exhibits. The museum also shared some of its exhibits and cases for the occasion. The Philosophical Society held its annual meeting on December 8. In 1883, Congress also directed the museum to prepare a collection of duplicate specimens for the Southern International Exposition at Louisville, the Chicago Railway Exposition, and the Foreign Exhibition in Boston. The following year, Congress authorized participation in the World’s Industrial and Cotton Centennial Exposition at New Orleans and the Industrial Exposition at Cincinnati. Participation in these expositions allowed the National Museum to extend its educational program throughout the country.

Spencer Fullerton Baird died in 1887 and was succeeded as Secretary of the Smithsonian by Samuel Pierpont Langley (1834–1906). Baird had ardently supported the creation of the National Museum and had participated enthusiastically in

Footnote 67: Goode, AR 1883, 162-166.

Footnote 68: Baird, AR 1883, 44. Charles Francis Brush (1849-1929) was one of the early pioneers and inventors of electric lighting. He completed his first arc light prior to 1869, first dynamo in 1875, and by 1880 invented a 16-hour double carbon arc lamp, an automatic regulator for multiple lamps, and introduced copper plated arc carbons, solving all of the major problems in arc lighting at the time. http://antiquesockets.com/id-brush.html

Footnote 69: Goode, AR 1883, 173.

the design and construction of the building. The collections had increased ten-fold under his direction. Congress had not appropriated funding for an additional museum and valuable accessions were stored in boxes without opportunity for exhibition. In looking toward the future, G. Brown Goode envisioned Washington as “the seat of one of the greatest museums in the world.” Located in close proximity to the Smithsonian Institution Building, new buildings of the museum would complement each other in resources and scope, “being directed mainly toward the exhibition of the geology and natural history of America, and its natural resources, to the preservation of memorials of its aboriginal inhabitants, and the exposition of the arts and industries of America.” With the completion in 1886 of the Army Medical Museum and Library building just east of the National Museum, Goode predicted that a group of specialized museums would eventually be established: “Every considerable nation has a museum or groups of museums in its capital city—centres of scientific and educational activity—the treasure-houses of the nation, filled with memorials of national triumphs in the fields of science, art, and industrial progress. They are legitimate objects of national pride, for upon the character of its museum and libraries intelligent persons visiting a country very properly base their judgment as to the nature and degree of the civilization of the people.”

With the organization of the collections in hand, the National Museum steadily advanced its commitment to public education. The museum distributed duplicate specimens to local museums and schools across the country. It furnished plans for museum cases to institutions both here and abroad and made its staff of scientists available to assist with problems of specimen identification and specialized information. The public lecture series begun in 1882 was continued. The museum kept records of the number of visitors each year. Between the opening of the museum in 1881 and June 30, 1890, 2,111,949 visitors were recorded. (See Figure 36)

In 1889, in response to repeated appeals from the Smithsonian for an additional building for the National Museum, Congress directed Architect of the Capitol Edward Clark, to investigate the possibility of constructing a basement beneath the National Museum Building. Clark reported to the House on March 3, 1890, that the cost would be prohibitive and the work excessively difficult in proportion to the advantage gained. A suitable brick storage and laboratory building could easily be erected on the Smithsonian grounds or in the neighborhood at much less cost. In 1890, Senator Justin S. Morrill reported from the Committee on Public Buildings and Grounds a bill (S. 2740) to provide for the erection of an additional fire-proof building for the National Museum. This bill failed on January 9, 1891. On January 21, 1892, another bill providing for a new...
museum passed the Senate, but failed for the third time in the House on April 14.

In his 1893 report, Goode reported the heavy burden on the museum’s resources imposed by frequent participation in expositions as mandated by Congress. The work of preparing for these expositions engaged the efforts of almost the entire staff:

Many of our Museum halls have been closed, being needed for the work of mounting and packing the collections. Many of our employees have been transferred to the exhibition staff, and are absent in Chicago, while a considerable number of others have been detailed for special service at the fair, or have been given special leaves of absence to attend the congresses or to act as judges of awards.

A large number of specimens and cases have been withdrawn from the exhibition halls and sent to the expositions in Madrid and Chicago, and it has required the utmost ingenuity to fill the gaps thus caused, so that the collections may be presentable in the eyes of the visitors, who are quite as numerous this year, and among whom are many from foreign lands.75

While he estimated that an additional year would be needed to re-adjust the collections after the return of the exhibits, he noted that the benefit for public education was too great to ignore: “The National Museum is a treasure-house filled with materials for the use of investigators, and it is also an agency for the instructions of the people of the whole country.”76

By 1895, Secretary Langley observed that the size of the collections had increased so massively that they would now completely fill a new building as large as the present museum. In addition, there was no further space for storage in the SIB or rented buildings. To alleviate this situation, he proposed the erection of galleries in the South West Court and South East Range, asking Congress for an appropriation of $8,000. He noted, “Galleries were provided for in the original plans for the Museum building, and can be supported so as not to detract from the appearance of the halls or to interfere with the present system of installation.”77 A June 1878 interior perspective by Cluss & Schulze of the North Hall showed the intention of including visually light galleries in the museum. These galleries were similar in design to those that Cluss & Schulze designed for the reconstruction of the U. S. Patent Office. In 1883, already confronted with the lack of space in the new museum building, Spencer Baird had directed Cluss to “Prepare plans for the galleries originally contemplated in the four main halls of the museum building. Estimate also.”78
Secretary Langley’s request for an appropriation to construct the galleries was rejected twice but finally approved for Fiscal Year (FY) 1897. Washington architects Hornblower & Marshall prepared drawings for the galleries in February 1896. Their design included light iron framing and rails with partially cantilevered glass floors designed to minimize obstruction of natural light to the floor below. A working drawing for one of the courts by consulting architect E. Schmitt, dated November 20, 1896, follows the Hornblower & Marshall design but substitutes wood floors for glass. A stair location plan by E. Schmitt dated March 10, 1897, shows the galleries then under contract for construction and those projected for the future. The drawings show the removal of Cluss & Schulze’s stairs and galleries in the four corners of the Rotunda and replacement with new stairs leading to the new galleries directly from the Rotunda. These are shown as being ready for bid. Secretary Langley reported in 1897 that, due to unusually low prices for iron, four galleries, instead of the expected two, were under construction. He requested another $8,000 and noted “While the galleries which can be erected with this amount ($16,000) will be of very great benefit, the need of another building is not in any degree lessened, since the additional space obtained will be necessary to relieve the overcrowded condition of the floors, which has given the exhibition halls almost the appearance of storerooms.” (See Figure 37)

Congress appropriated an additional $10,000 in FY 1899 “for furnishing railings, painting the galleries, connecting them with those in adjoining hall, placing a skylight in each court, and providing a ventilator in one of the ranges.” Architect Victor Mindeleff provided drawings for the iron balustrades in the spring of 1899. Secretary Langley reported in 1899 that ten galleries had been constructed in the three years since the project began. Two more galleries were erected in 1900. The new galleries in the courts and ranges unfortunately obstructed the natural light, requiring the addition of skylights at all four court roofs and at the ranges (See Figure 38). The glass-floored galleries originally designed by Hornblower & Marshall would have allowed more natural light to reach the first floor than the terrazzo-floored galleries that were built. A similar problem had occurred in 1882 when the construction of an additional floor and a gallery in the library had necessitated the addition of a skylight to the North West Annex roof. At the South East Range, a second floor extending over the first floor exhibition space was built. Building of galleries continued into 1902.

In 1900, Assistant Secretary Richard Rathbun (1852–1918) declared the museum in crisis, unable to do the work mandated by Congress due to the overcrowded condition of the floors.
Building History, Description and Significance

The enormous growth of the collections and lack of space. He pleaded:

The demand for additional space and for new cases, always incessant, has reached a stage where the helplessness of the authorities to meet it is pathetic. Galleries have been built in some of the Museum halls. Their capacity has not sufficed to keep pace with the current demands of the years in which they were constructed, and collection after collection has been carted away to one of the outside buildings. These now are all practically filled, and next year a new one must be leased, or accessions turned away, or the exhibition halls transformed into storehouses.88

The educational program of the museum was impacted by the crowded conditions; the laboratories were insufficient for the needs of scientists here and abroad; and the shops for taxidermy, modeling, and other uses were scattered and inadequate. In 1902, Assistant Secretary Rathbun decried "conditions which are very deplorable for the National Museum of a great country. Its halls are overcrowded, the cases being generally placed so near together that two persons can scarcely pass between them and no effective view of their contents can be obtained."89

After the design of the galleries, Hornblower & Marshall continued to work with the museum on minor remodeling projects designed to update and reconfigure existing space to relieve the congestion of the museum. These projects included permanently closing the south entrance to provide additional office and storage space, the addition of new toilet rooms, construction of a new chimney at the North West Pavilion, remodeling the Division of Photography third floor interior, constructing a large north-facing skylight for the Division of Photography on the roof of the South East Pavilion, remodeling the north entrance, and providing a new door between the stair hall of the North West Pavilion and the library in the North West Annex on the first floor. Congress, in the Sundry Civil Act of 1902, appropriated $5,000 for preliminary plans for a new museum. In anticipation of this work, Hornblower and Marshall traveled separately to Europe to study museum design. Their professional experience prior to this time was primarily residential and did not include design of museums or any large public projects.90 In the winter of 1902–1903, the firm prepared preliminary plans for the new museum in consultation with the Smithsonian and visiting scientists. These plans, together with a report by Assistant Secretary Rathbun explaining the needs of the Smithsonian, were transmitted to Congress on January 23, 1903.91 The bill passed in the Sundry Civil Act for 1904.92 The Regents selected Hornblower & Marshall as architects. A new building, reflecting 20 years of innovative developmental museum experience and increasingly urgent need, was underway.

The Arts & Industries Building In 1903, Assistant Secretary Rathbun’s report to Congress suggested plans for future use of the existing 1881 building. He noted that the building had originally been constructed to receive the exhibits of the 1876 Centennial Exposition, which were primarily those of the department of arts and industries:

The department of arts and industries, the more practical side of the Museum, has perhaps suffered most from the lack of accommodations. Large exhibits have had to be removed to storage, and the

Footnote 86: SIA, drawing numbers: SO1/I186, SO1/I177, SO1/I178


Footnote 88: Rathbun, AR 1900 II, 14.

Footnote 89: Rathbun, AR 1902 II, 13.


Footnote 92: U.S. Congress, Statutes at Large, xxxii (3 March 1903) 1102.
growth of this most important and striking branch was necessarily stopped some time ago. It should be made here, as it has been in all the larger capitals of the world, one of the most important features of the national collections, and its increase, once stimulated, would go forward rapidly and at relatively small expense, as generous donations might be expected from all quarters.

Transferring to the new building the departments of ethnology, archeology, natural history, and geology would allow the 1881 building to be used exclusively for historical and industrial arts collections. The collection of fine arts would be exhibited in the original SIB. Rathbun argued that “with its collections thus distributed between the three buildings, all fireproof and of substantial construction, the National Museum may be expected to enter upon an era of renewed prosperity and usefulness.” This was the beginning of the fulfillment of Goode's vision of a group of specialized museums located on the Mall near each other and the Smithsonian Institution, sharing resources and together forming a great national museum unequalled elsewhere in the world.

While the new building was under construction, the Smithsonian began extensive renovation of the 1881 building. The work included repair and replacement of the roofs, construction of additional skylights, replacement of worn out floors, painting of walls and exterior woodwork, updating the electrical system, and many other items designed to repair and modernize the building. Unfortunately, the work also included filling in many of the original arches to create the small exhibition rooms then in style. In the 1906 Annual Report, Rathbun commented:

The halls, courts, and ranges in the Museum building are broken by so many large, arched openings, reaching nearly to the roofs, as to make of the exhibition space practically one large room, about two acres in extent. While the building itself was constructed of fireproof materials, yet the immense collection, now greatly crowded, contains much that is combustible. Every possible means of detecting the occurrence of a fire and of preventing its spread have been introduced, but as an additional and very necessary precaution it has been decided to isolate the different sections as far as possible. The only way to accomplish this effectively is to close all openings, except the few necessary passageways, with some fireproof material, and macite has been selected.

Transfer of collections from the older buildings to the still unfinished new building began in 1909. With the removal of natural history and anthropological exhibits and with the substantial completion of the new building in 1912, the Annual Report noted that space was made available in the older buildings for the collections of the department of arts and industries. Secretary of the Smithsonian Charles D. Walcott commented:

The very interesting series of objects commemorative of eminent Americans and of important events in the history of the United States; the collections illustrative of art textiles, graphic arts, and ceramics, as well as firearms, electrical inventions, and other technological material may now receive more attention and be more adequately displayed than has heretofore been practicable.
Items stored away for decades were brought out, evaluated, restored, classified, and arranged for exhibition. The original idea, that exhibitions of industrial products would serve not only as a matter of record and education but actively contribute to industrial production, was revived. Looking first at textile and mineral technology, the Smithsonian planned both an exhibition series and a reference series of objects for each industry. The exhibition series would illustrate “the latest processes and products of the industry” as well as provide a historical display. Its intent would be the education of the general public. The reference series would provide carefully catalogued, easily accessed material to assist manufacturers and technical students in product research. Cooperation with new federal government departments promoting and regulating industrial interests was planned.

With the museum remaining open to the public, the museum staff developed plans, unpacked and refurbished old materials, acquired new materials to complete collections, and constructed often intricate models to illustrate manufacturing processes. One by one the newly renovated halls were ready for viewing. By the end of June, 1912, a provisional exhibit of 37 cases was opened on the gallery of the South Hall with “a series of the raw materials and of the successive stages of manufacture of all the important textile and cordage fibers.” Donations of new materials were readily obtained from manufacturers and private collections. New England mills, among others, sent samples of their products. The renovated building was first officially referred to as The Arts & Industries Building in 1917, after being referred for a few years as the “old National Museum.” The new National Museum Building was then officially called the Natural History Building. In 1918, Secretary Walcott explains that the National Museum includes the collections of the Smithsonian Institution Building, the Arts & Industries Building, and the Natural History Building.

The entry of the United States into World War I in 1917 curtailed the normal activities of the Smithsonian. Members of the scientific staff, using the collections and research laboratories, advised the War Department on various technical issues, including shipping, fertilizer, fuel, power, and weapons. Much of their work involved extensive travel. Secretary of the Smithsonian Institution Charles D. Walcott served on the Aircraft Board, which was created to advise the War Department concerning the production and purchase of aircraft and aircraft appliances. An experimental laboratory was created at Langley Field near Hampton, Virginia, named for former Secretary of the Smithsonian Samuel Pierpont Langley. Exhibits promoting domestic conservation of food and animal products were prepared for circulation across the country. Soldiers drilled on the Mall and the facilities of the museum were thrown open to them. The Bureau of War Risk Insurance occupied part of the new museum building, now the National Museum of Natural History (NMNH), as exhibits were relocated to make room. On July 16, 1918, the new NMNH was closed altogether to accommodate the bureau.

With war-time food shortages increasing, the staff of the AIB mounted popular exhibits to introduce little-known food products such as peanut, soy, grape seed, and cottonseed oils. It promoted use of Native American food sources like potatoes, peanuts, corn, and beans. An exhibit showing the classification, use,
and conservation of foods was placed in 20 upright floor cases arranged in a circle around the statue in the Rotunda. In cooperation with the Department of Agriculture, room 80 in the South East Pavilion of the AIB was furnished with a demonstration kitchen where classes and demonstrations of new products like powdered milk, pressure cookers, and electric washing machines were held. Knitting and weaving demonstrations were popular.\footnote{103}

In the years following its designation as the Arts & Industries Building in 1917, educational, archival, and administration activities increasingly replaced the museum function and impacted the original fabric of the building. The museum complex on the Mall developed as Baird and Goode predicted and, today, includes the National Museum of Natural History, opened to the public in 1912; the Freer Gallery of Art, in 1923; the National Museum of American History, in 1964; the Hirshhorn Museum and Sculpture Garden, in 1972; the National Air and Space Museum, in 1976; the Arthur M. Sackler Gallery, the National Museum of African Art, and the Ripley Center, in 1987; and the National Museum of the American Indian, in 2006. The National Museum of African American History and Culture is now being planned for a site west of the National Museum of American History.

The Arts & Industries Building is now closed for renovation.

**The National Museum’s Architects, Engineers, and Builders**

*Adolf Cluss, FAIA, (1825–1905)* was born in Heilbronn, Württemburg, Germany, to a family of prosperous architects and builders. He apprenticed as a journeyman carpenter and worked as a draftsman on railroad construction. After involvement in the brief 1848 revolution in Germany, he immigrated to the United States, settling finally in Washington, D.C. His first employment was with the U. S. Coast Survey, and later he worked for the Office of the Supervising Architect of the Treasury and then the U. S. Navy Yard. In 1862, he ventured into private architectural practice with Joseph Wildrich von Kammerhueber, a fellow German émigré with whom he had worked at the Navy Yard. The firm of Cluss & Kammerhueber was immediately successful, designing a number of churches, the Department of Agriculture building, and the acclaimed Wallach School before their partnership was dissolved in 1866. He entered into a partnership with Frederick Daniel from 1875 to 1877 and with Paul Schulze from 1878 to 1889 when Cluss retired from private practice. During his career, Cluss designed more than 80 buildings, including prototypical schools and markets for the city, many single-family residences, Washington’s first apartment building, commercial and institutional buildings, and other projects. In addition to his work on the National Museum, his museum work included reconstruction of the SIB after the fire of 1865, reconstruction of the U. S. Patent Office after the fire of 1878, remodeling of the east wing of the SIB from 1883 to 1884 following Joseph Henry’s death, and the Army Medical Museum and Library (1883). He served as engineer member of the Board of Public Works from 1872 to 1874 and as Inspector of Public Buildings of the United States from 1890 to 1895. He was an active member and officer of the American Institute of Architects (AIA), presenting a number of papers at their national conventions. He was elected a Fellow of the AIA in 1867. He was an organizing member and the second president of the AIA’s Washington Chapter and served on the Board of Directors in 1890.

---

\footnote{103}{AR II, 1919, 15.}
Frederick Daniel (1843–1878) was born in Schwin Mecklinberg, Germany. He worked in Cluss’ office after the partnership with Kammerhueber ended, and as a partner from 1875 to 1878. Cluss & Daniel, architects & engineers, prepared early drawings for the National Museum. Many of the details of their early design survive in the completed building. Daniel died on March 26, 1878.

Paul Schulze (1828–1897) was born in Breslau, Prussian Silesia, Germany. He was educated in the technical high school of Breslau and trained in fine arts in Berlin and Vienna while working in the offices of prominent architects. Schulze participated in the 1848 uprisings in Vienna, emigrating to Boston, Massachusetts in 1849. He was the architect of Boylston Hall (1857) and Appleton Chapel (built 1856 to 1858) at Harvard. Boylston Hall was the first building at Harvard dedicated to the sciences. He moved to New York in 1857, practicing architecture with Charles Gildenmeister (1820-1869) who, with George Carstensen (1812-1857), designed the New York Crystal Palace in 1853. He was associated with Paul F. Schoen (d. 1887) in New York from 1865 to 1875 and with William G. Steinmetz (1838-1898) from 1875 to 1876. In 1877, he came to Washington, D.C. The partnership of Cluss & Schulze was formed in 1878 and continued until 1889 when Cluss retired from professional practice. Schulze formed a partnership with Albert Goenner (1860-1918) from 1891 to 1894. During the Civil War, Schulze served in the Union Army with the New York Volunteers as an engineer officer on the staff of General Blenther.104

Joseph Coerten Hornblower, FAIA, (1848–1908) was born in Paterson, New Jersey, the son of a prominent Presbyterian minister and theologian. Educated at Yale (class of 1869) in the Sheffield Scientific School, he pursued an architectural career in Washington. He studied at the Parisian atelier of Jean-Louis Pascal from 1875 to 1876, training in the methods of the Ecole des Beaux Arts. In 1877, returning to Washington, he entered first into a partnership with William Poindexter, AIA. In 1879, as work on the National Museum building began, he established his own practice in the same building where Cluss & Schulze had their offices. In 1883, he formed a


Footnote 105: General Richard Montgomery (1738-1775) led the invasion of Canada by the Continental Army during the American Revolutionary War, dying 31 December 1775 while leading the assault on Quebec.

General Montgomery Cunningham Meigs (1816–1892) was born in Augusta, Georgia, the son of a prominent educator and government official and grandson of Revolutionary War hero General Richard Montgomery. He was trained in engineering at the U.S. Military Academy at West Point, New York, graduating in 1836 and joining the Corps of Engineers in 1837. Ordered to Washington in 1852, he began work on the Washington Aqueduct and immediately demonstrated his skill in dealing with Congress. He worked as superintendent of construction for Thomas Ustick Walter's additions to the U.S. Capitol building, including the removal of the original dome and its construction in its present form. During the Civil War, he served as Quartermaster General of the Army, commandeering the Corcoran Gallery of Art as his headquarters; Southern sympathizer William Wilson Corcoran (1798-1888) had fled to Europe for the duration of the war. During the war, Meigs designed field structures easily erected from standardized parts for movement from one location to another. After serving on the U.S. National Museum Building Commission, he designed and supervised construction of the U.S. Pension Building (1882–1887).
partnership with James Rush Marshall. He was a founder of the AIA’s Washington Chapter and served as chapter president in 1897, 1898, 1905, and 1906.

James Rush Marshall, FAIA, (1851–1927) was born in Carlisle, Pennsylvania, the son of an educator and prominent official of the Grant administration. He attended first the Rutgers College Scientific School, leaving after his junior year to travel through Europe with his scholarly father. Like Cluss, he worked as a draftsman in the Office of the Supervising Architect of the Treasury from 1871 until 1883, when his partnership with Hornblower began. This partnership lasted until Hornblower’s death in 1908. The firm designed a series of notable Washington residences and the Baltimore Custom House. Hornblower & Marshall succeeded Cluss & Schulze at the Smithsonian Institution, advising the Smithsonian on architectural matters from 1896 forward. They designed the galleries and other projects at the AIB, and designed and superintended the construction of the National Museum of Natural History. Hornblower and Marshall were both active in the affairs of the AIA and were elected fellows of that organization. Marshall was a founder of the AIA’s Washington Chapter and served seven terms as chapter president between 1891 and 1910.

The AIB’s Relationship to Smithsonian History
The AIB was the first of a group of purpose-built museum buildings largely funded by the U. S. government and constructed and administered by the largely privately-funded Smithsonian Institution on the National Mall. It was the first building to be officially known as the National Museum, and was the beginning of what is now one of the greatest museum complexes in the world. In this building, the Smithsonian developed methods of museum administration, specimen preparation and preservation, classification and labeling, exhibition, and education outreach that are today standard practice in museums worldwide. Through the participation of the Smithsonian and the National Museum in the great international expositions of the 19th and early 20th centuries, the natural resources, arts, and industrial innovations of the United States were introduced to cities across the nation and worldwide. Sharing exhibits, plans, and publications with museums in other cities and countries, the National Museum served as a model institution assisting in the establishment of other museums. Through a series of both popular and professional lectures and publications, instituted as soon as the building opened to the public, the museum has been a vital cultural force in the nation’s capital. In the 20th century, popular demonstrations, classes, and publications have greatly extended the educational advantages provided through the Institution and the museums. Through preservation of the collections of the great U. S. government expeditions of exploration of the 19th century and of various government departments, the National Museum, operating out of the AIB, contributed immeasurably to knowledge of the cultural history of the country.

Architectural Precedents and Design Influences
The design of the National Museum Building was based in part upon the design of international exposition buildings after the success of the 1851 Crystal Palace in London, England. It specifically
references architect James Windrim’s design for the Government Building at the 1876 Centennial Exposition with its octagonal rotunda, cupola, clerestories, and longitudinal halls. With a tight budget, short schedule, and constricted site, Cluss adapted this new temporary building type for use as a permanent museum structure. Exposition buildings were often cruciform in plan with a central rotunda approached from entrances at the termination of each arm. The interiors featured a single vast exhibition floor and soaring space to allow for exhibition of items of any size. Promenades, views, and vistas promoted the social functions of the exposition. The exhibition area was sometimes expanded through galleries and laid out like a market floor with individual booths and areas assigned to individual countries and/or industrial interests. Glass and iron modular structural units were used extensively. Exposition contracts generally required buildings that could be assembled quickly with an agreement to clear the site by a fixed date. Since there was no effective means of artificially lighting these halls, their design incorporated generous natural lighting through clerestories, skylights, and monitors.

Cluss commented:

On the whole, the one-story plan which has prevailed among experts ever since the Paris exhibition of 1867 has been adopted. But by the introduction of upper stories on those outlying sections reserved for offices, ample office-room has been secured without encroaching materially upon the floor space within the square of 300 feet, to which the building was primarily limited.\(^{106}\)

He described the style of the building as modernized Romanesque complementing the Norman Romanesque of the Smithsonian Building: “To modernize this style was found necessary on account of the different building material, and to do justice to the purposes of the building with its modern demands of perfect safety and elegance of construction, of greatest possible available floor space, of easy communications, efficient drainage, a well calculated and pleasing admission of light, free circulation of air, and all other hygienic dicta.”\(^{107}\)

The “modernized Romanesque” style that Cluss cites is not a reminiscent historical style like that of the Norman Romanesque Smithsonian Building. His ideas were rooted in the *Rundbogenstil* aesthetic that developed in Germany after the 1828 publication by Heinrich Hubsch (1813-1863) of his controversial book, *In What Style Should We Build?* This was a truly modern style looking toward the future and using new materials and methods of construction for new building types with new technical requirements. It proposed that the structural system and function of a building should guide the design process and be clearly expressed in the completed building and that construction costs should be contained through use of modular, mass-produced component parts. The design, structural and economic advantages of highly versatile brick masonry construction was preferred. *Rundbogenstil*, literally round arch style, looked to early Christian and Byzantine as well as Romanesque architecture for rational design restraint and structural precedent. Decoration was integrated with structure through the use of recessed panels, corbelled cornices, decorative patterns of colored bricks and slate, and other such devices. Color was

---


**Footnote 107:** Ibid, 131.
often introduced through the deep, smooth dark red of factory-produced pressed brick laid up with a very fine joint. Cluss commented that "architecture itself constitutes the decoration of architecture."108

In his comments at the dedication of the Franklin School on October 2, 1869,109 Cluss traced his inspiration to the brick architecture of *cinque cento* Lombardy where the humble brick was formed and used with imagination and elegance to create great architecture. Washington was then a red brick city. Brick was manufactured here from the locally abundant red clay, burned at first near construction sites, and eventually manufactured and marketed by commercial firms using factory-like production methods. Cluss bought the 5,250,000 red face, common, and purpose-moulded arch bricks needed for the National Museum Building from the Washington Brick Machine Company, located in northeast Washington near the Baltimore & Ohio railroad tracks and the Anacostia River. Brick masonry construction was versatile, efficient, and cost-effective. It made effective use of manufactured materials of factory-determined dimensions such as rolled iron beams and terra cotta, cast iron, and galvanized elements.

There is a political and social aspect to Cluss’ adoption of the modernized Romanesque style. Like many other Germans, Cluss emigrated to the United States after his involvement in the failed 1848 Revolution. Early work on the construction of a new railroad between Manheim and Mainz exposed the young engineer to the dire living conditions of the workers building the railroad. He became passionately involved in liberal issues, writing and speaking in support of universal education, individual freedom, and other issues of the 1848 Revolution. The *Rundbogenstil* movement sought to define German architecture in the present and future rather than in the past. The 1848 Revolution pursued nationalism and democratic ideals, rejecting the feudalism of the past. Cluss, in both architecture and politics, worked in a transitional period as the industrial revolution and ideas of social reform were changing the world.

In addition to international exposition building precedents, the design exhibits the influence of the sketch prepared by General Montgomery Meigs showing a square plan with central rotunda and surrounding interconnected exhibition halls. Meigs’ sketch was based upon a well-known early museum plan popularized by J.N.L. Durand (1760–1834) in his 1805 *Précis des Leçons d’Architecture*. Durand’s rationalist architectural theory strongly influenced 19th century architectural practice. Entirely rejecting the structural mysticism and extreme façade plasticity of Baroque architecture, Durand advocated the simplicity and clarity of pure geometric form in

---

Footnote 108: Ibid.

architectural composition. Utility, economy, and regularity of plan and space were primary concerns. Durand’s career was interrupted by the French Revolution of 1789. Lecturing in Paris in 1794 at the newly established École Polytechnique, he expounded this rationalist theory and illustrated it through plans for proposed new public building types for a new egalitarian society. Published in 1805 as Précis des Leçons d’Architecture, his work was widely known. In 1813, he published Nouveau Précis des Leçons d’Architecture. His students at the École included Germans C.W. Coudray (1775-1845), Johann Frederich Christian Hess, and Leo von Klenze (1784-1864). In 1831, Durand’s two volumes were accurately translated into German. Through his students and publications his rationalist egalitarian theory influenced the German Rundbogenstil in architectural practice. Through the German émigrés of 1848, the style came to America and was commonly used in some variation throughout the 19th century (See Figure 39).

The AIB’s Relationship to the Development of the National Mall
In 1847, the President of the United States James K. Polk (1795-1849) designated a site for the construction of the Smithsonian Institution Building. The 47 acre site, known as the Smithsonian Reservation, extended from Seventh to Twelfth Streets, and from South B Street to the Washington Canal, now the location of Constitution Avenue. It was desolate and isolated, completely unimproved, separated from downtown Washington by the fetid canal. To the west, the Washington Monument (1848–88) would soon rise from the marshy shore of the Potomac River. In his 1791 Plan of the Federal City, Pierre L’Enfant (1754-1825) had envisioned a lushly planted green promenade, lined with beautiful buildings connecting the Capitol with the President’s park south of the White House. It would be the intellectual and artistic heart of the city. The canal was to have afforded pleasant and swift transportation from Georgetown through the downtown area, turning south at the base of Capitol Hill, then branching both toward the confluence of the Potomac and Anacostia Rivers and toward a hoped-for industrial site on the Anacostia River.

Benjamin Henry Latrobe (1764-1820), planning the canal and the Mall, adopted George Washington’s idea for a great university to be constructed on the Mall. Locating the Smithsonian, an institution dedicated to the “increase and diffusion of knowledge among men,” on the Mall was the beginning of the fulfillment of this plan.

James Renwick, Jr., architect of the SIB, laid out the grounds as part of his work for the construction of that building. He recommended grading and indicated the location of paths, roads, trees, and shrubs. The plan intended to create a kind of museum of American trees with approximately 160 different specimens. “The climate of Washington is favorable to the growth of a very large number of the products of our forests, and an exhibition of this kind would serve to render better known our botanical wealth, and to improve the public taste. The preservation and cultivation of our native trees are objects of national importance.”

The Smithsonian partially graded and fenced the area and planted trees at its own expense.

In 1851, Secretary Henry was instrumental in bringing the noted landscape designer and architect, Andrew Jackson Downing (1815-1852), to Washington to create a picturesque public park the entire length of the Mall from the foot of Capitol Hill to the


Footnote 112: Henry, AR 1856, 17.
Potomac. The Regents reported that the Mall would be “converted into a beautiful park adorned with evergreen and other ornamental trees, and traversed with carriage drives and gravel walks. In the midst of this variegated landscape the Smithsonian will occupy a prominent position, and with its picturesque style will produce a harmonious effect.” The Smithsonian removed their partition fence to assist in implementation of this unified plan for the Mall. The city built an iron foot bridge over the canal at 10th Street, N.W., and Downing laid a skillfully drained gravel walk to the main entrance of the SIB. After Downing’s death in a steamboat explosion during the summer of 1852, the project came to an end.

Initial plans for the National Museum proposed a large addition, south of the SIB, connecting through the south tower entrance or through a substantial east entrance addition. Congress, in the enabling legislation, directed a separate building “on the southeastern portion of the grounds of the Smithsonian Institution, said building to be placed east of the Smithsonian Institution, leaving a roadway between it and the latter of not less than fifty feet, with its north front on a line with the south face of the buildings of the Agricultural Department and of the Smithsonian Institution.” This action protected the view of the Smithsonian and Agriculture buildings from the U. S. Capitol, but limited the size of the museum site. It also protected the architectural integrity of the SIB.

The Washington Post, commenting on the progress of the museum construction in the summer of 1880 observed:

Located at the northeast corner of the institute, it is so adroitly placed as not to interfere with the imposing front of the irregular pile, which, with its varied architecture, has been such a source of pride to the visitor of the famed result of Smithson’s whim. The quaint curves, and turrets and towers and angles which in the aggregate make up the outside of the Smithsonian Institute, still stand in their bold outlines against the southern sky, while the new edifice, by a happy combination, is just near enough and just far enough to serve a dual purpose. It will

Footnote 113: Henry, AR 1851, 84.

Footnote 114: U.S. Statutes at Large 183 (1879) 417.
accommodate the exhibits for which it is intended, and will at the same time present, in marked contrast, the modern and mediaeval styles of architecture; for the annex is purely modern.\textsuperscript{115}

As completion of the construction neared, the \textit{Post} further observed:

The new building, when finished, will be a magnificent structure, creditable alike to the Government and to the cause of science to which it is dedicated. It is a matter of congratulation that it is to stand within the classic shades of the Smithsonian grounds. They have a special charm and individuality of their own, unlike anything else in Washington. The grounds are retired, and there is something in the approaches, in the perfect dead level of the park, full of evergreens, and in the semi-Gothic architecture of the somber-hued building that gives it a foreign look. It has not a touch of the newness that sometimes quite stares one out of countenance in our public buildings. Architecturally, the new museum is a model of beauty and convenience.\textsuperscript{116}

In 1881, Congress, in order to improve public access to the National Museum, appropriated $1,500 for the construction of asphalt walks from Seventh and Twelfth Streets to the Smithsonian Institution Building.\textsuperscript{117} An 1882 aerial view of the city from the south shows the layout of the Mall as the museum opened. The Washington Monument, Department of Agriculture, and Smithsonian Institution, with their picturesquely landscaped grounds, are approached directly from the city by Fourteenth, Twelfth, and


Footnote 117: U.S. Statutes at Large, 1881, vol. 21, 444.

Seventh Streets. The Baltimore & Ohio Railroad tracks, authorized in 1872, cut through the Mall in the right-of-way of Sixth Street. The Armory building is located on the south side of the Mall adjacent to the Smithsonian and the railroad tracks. The train station is on the north side of the Mall. The Center Market is located directly opposite the new museum building where the National Archives building now stands. These buildings were predominantly constructed with local red brick. Today, the AIB is the only red brick building and the last of those designed by Adolf Cluss and his partners that remains on the Mall (See Figures 40, 41, and 42).

The “White City,” created by Daniel Burnham FAIA (1846-1912), Charles McKim FAIA (1847-1909), Frederick Law Olmsted (1822-1903), and Augustus Saint-Gaudens (1848-1907) for the 1893 Columbian Exposition in Chicago, changed the direction of architecture and city planning in this country. These men, appointed to the Senate Park Commission of 1901 to 1902, planned a monumental redesign of the Mall. Beginning as a return to the intent of the L’Enfant Plan, they proposed a formal green lawn lined by two
rows of elm trees extending on axis from the base of the Capitol to the Potomac. The existing picturesque landscaping would be removed. Public buildings designed in the Beaux Arts style and faced in light-colored stone would replace the existing red brick buildings. The Mall would be extended far beyond the Washington monument by land fill in the swampy Potomac shore. The Lincoln Memorial was planned as a terminus to the axis. Drawings showed the removal of all of the older buildings on and near the Mall including the SIB and AIB. Hornblower & Marshall supported the new aesthetic for the Mall and were selected in 1902 to design the new U. S. National Museum — now known as the National Museum of Natural History. This building conforms to the planning principles of the Senate Park Commission in every way, suggesting that implementation of the Commission’s plan may have spurred the Congress to finally appropriate funding for erection of the new building (See Figure 43).

**Significant Contemporaneous Buildings and Technologies**

International exposition halls and museum buildings developed together in the 19th century. The industrial revolution brought new construction materials and technologies, making new architectural design concepts possible. The architectural and engineering professions merged. Evolving egalitarian social ideals led to the founding of public institutions like museums, libraries, schools, and parks bringing advantages to ordinary people that had previously been reserved for a select few.

**International Exposition buildings**

Iron and glass structures created vast and wondrous exhibition spaces at the many international expositions following the 1851 Crystal Palace in London. In 1853, a Crystal Palace, designed by Danish architect Georg Carstensen (1812–1857) and German architect Karl Gildemeister (1820–1869), graced the Exhibition of the Industry of All Nations in New York City. Designed in the form of a Greek cross, a large central dome and clerestories defined the principal exhibition halls. The building was framed with modular, factory-manufactured iron structural units. Crowds came to watch the innovative construction process. Financially unsuccessful, the New York Crystal Palace remained on its site in present-day Bryant Park until October 5, 1858, when it burned to the ground in 25 minutes. In 1854, in Munich, the Glass Palace, a rectilinear iron and glass structure modeled after the 1851 Crystal Palace, housed the First General German Industrial Exhibition. The Glass Palace remained as a permanent building, the site of art exhibitions and international trade fairs until it burned in 1931 (See Figures 44, 45, and 46).

Cluss cited the one-story plan of the Paris exposition of 1867 as the standard for subsequent expositions and for his design for the National
Historical Background and Context 1.1

1.1 – 41

Smithsonian Institution Arts & Industries Building

Building History, Description and Significance

Historic Structure Report & Conditions Assessment

08.31.2009

Museum. Exposition Commissioner Frédéric Le Play (1806–1882), educated as an engineer at the École Polytechnique, was concerned with social issues and the design of industrial buildings. He designed an enormous structure with dual oval exhibition galleries, one within the other, separated by courtyard gardens. He developed a classification system with which he hoped to encompass the whole of human experience in 10 groups and 95 classes. There were 52,000 exhibitors arranged in concentric aisles around a longitudinal axis. Intermediate connecting aisles confused rather than simplified circulation through the galleries. The distances to be traversed by visitors were daunting. Viewing galleries were provided for spectators. The direct light created by a curved iron and glass roof over the main exhibition area was merciless in intensity, adding to the discomfort of the visitors and creating an imperfect illumination of the exhibits (See Figures 47 and 48).

At the 1873 World Exposition in Vienna, chief architect Karl von Hasenauer (1833-1894) designed the first multiple building exposition. An industrial palace featured a central circular rotunda approached through longitudinal exhibition areas. Intersecting lateral transepts eased access, causing the design to be popularly known as the fishbone plan. Scottish engineer, inventor, and ship builder John Scott Russell (1808–1882) designed a phenomenal iron and glass dome to be placed over the rotunda. This dome was erected with great difficulty by architect Frederich Schmidt (1825–1891) with the assistance of the Johann Caspar Harkort, an iron and steel company of Duisburg, Germany. It was considered the largest dome in the world, 328’ wide and 279’ high, its structure exposed on the exterior for all to see. Two lanterns, one above the other, were surmounted by a jeweled replica of the imperial crown. Visitors could view the exposition from a platform at the first rotunda level or could even climb adventurously to the top. The Industrial Palace was a permanent building, used for trade fairs until it burned in 1937. Separate buildings housed a machine hall, two agricultural halls, and an art gallery. Sited in the Prater, a former imperial hunting park, the exposition included many individual pavilions of varied design, lavish entertainment, and exotic restaurants. The Danube River was diverted to bring exhibits and visitors to
the grounds. The theme of the fair was “Culture and Education.” An exhibit by the Washington D.C. public schools, including a scale model of Cluss’ Franklin School, won a gold medal for “Progress in Education.” (See Figures 49, 50, and 51)

Two of the buildings erected for the 1876 Centennial Exposition in Philadelphia were designed as permanent museum buildings. Horticultural Hall and Memorial Hall were both designed by German-American architect/engineer Herman J. Schwarzmann (1846–1891), chief engineer and architect of the Centennial. Horticultural Hall, designed in a 12th century Moorish style, was a large greenhouse-like structure built primarily of glass and iron like the Crystal Palace of 1851. It was demolished in 1955 after devastating damage caused by Hurricane Hazel. Memorial Hall still stands, used first as the Philadelphia Museum of Art. Converted into a recreation center with offices for the Philadelphia police and parks departments in the 1960s, it has now been restored and rehabilitated as the Please Touch Museum. Designed in a modernized Renaissance style, Memorial Hall is built of granite, brick, iron, and glass. It is a monumental building with full basement and clear frontal orientation. Since it was designed as an art gallery, lighting requirements differed from those in the AIB. A double central rotunda, framed in iron, ingeniously diffused lighting to illuminate yet protect the art within. This building design is close to the Beaux-Arts classicism of the 1893 Chicago exposition, and inspired the design of the Chicago Academy of Art, a permanent building at that fair (See Figures 52 and 53).

Commissioners planning the 1876 Centennial exposition visited the 1873 Vienna fair. They rejected the excessive monumentality of the Industrial Palace as inappropriate for the celebration of the Centennial of the American Revolution. They preferred a direct approach to design with clearly expressed construction details. They felt the design of an exhibition building should not be more important than the exhibits themselves. The Commissioners adopted the multi-building plan of Vienna and endorsed the importance of social interaction at fairs. They planned promenades, avenues, sculpture, fountains, and gardens. The system of classification and
Building History, Description and Significance

arrangement adopted precluded national exhibits, prompting the U.S. government to erect its own building. Women were excluded from exhibiting, so, as a group, erected their own building.

Construction technologies rapidly advanced in the mid-19th century, introduced by inventors and manufacturers at these expositions. Elisha Otis (1811-1861) demonstrated the safety elevator at the New York Crystal Palace in 1854. Sir Henry Bessemer (1838–1888) patented his process for manufacturing cheap steel in 1855, introducing it to the public at the Great London Exposition of 1862. The hydraulic elevator and reinforced concrete were introduced at the Paris Exposition of 1867. The Rotunda of the Austrian Exposition of 1873 was a major engineering achievement, as were the Eiffel tower and Gallerie des Machines at the Paris Exposition of 1889, built shortly after the AIB was opened to the public. In 1884 through 1885, American architect William Le Baron Jenny (1832–1907) designed and built the Home Insurance Company building, considered the first steel frame skyscraper, in Chicago. A new era in building construction had arrived.

52: Horticultural Hall, 1876
Centennial portfolio / Thompson Westcott.
Philadelphia: T. Hunter, 1876.
Philadelphia Free Library.
CEDC No. c090040.

53: Memorial Hall, 1876
Centennial Photographic Co.
Philadelphia Free Library.
CEDC No. c011712.

Historical Background and Context 1.1

Museum Buildings
In 1859, naturalist Louis Agassiz (1807–1873), with both private and state funding, founded the Museum of Comparative Zoology at Harvard College in Cambridge, Massachusetts. Born in Switzerland, he came to the United States in 1846, accepting a position as Lawrence Professor of Zoology and Geology in the Scientific School at Harvard in 1847. Finding no teaching specimens, he provided his own, paying his assistants from his own income. Charles Frederic Girard (1822–1895), one of his students and assistants, came to the Smithsonian in 1850 to work with Spencer Baird. Agassiz was appointed a Regent of the Smithsonian in 1863.

The design of the Museum of Comparative Zoology building was developed by Agassiz with architects Henry Greenough (1807–1883) and George Snell (1820–1893). The requirements were modest. The program required a fire-proof building with rooms for exhibition, working, and lectures. As little as possible should be spent on the building itself, so that the collections would not suffer financially. The museum was to be a teaching facility equal or better
than those in Europe. A rectangular building, 364’ by 64’ with wings 205’ by 64,’ would be built in stages as the needs of the museum increased. In 1859, the cornerstone was laid for a structure only two-fifths the full size of the north wing. Construction began on the second two-fifths after the Civil War, in 1868. The plain brick building contained four floors of museum space including a full basement and gambrel-roofed attic. The plan would eventually include four exhibition rooms two deep at either side of a minimal central entrance hall. There were no lateral halls. The rooms were entered from each other. There were galleries in the exhibition rooms on the first and second floors, expressed on the exterior by ranges of smaller windows with 3/2 sash above the principal windows with 6/6 sash. A large exhibition room on the second floor above the entrance hall was laid out the full depth of the building with light from two sides (See Figures 54 and 55).

The collections of the British Museum, opened to the public in 1759 in London, included zoological, geological, and botanical specimens in addition to rare manuscripts and objects of art. In 1860 the

Trustees of the British Museum, confronting the problem of overcrowding, resolved to remove the Natural History Collection to a separate building. In 1863, the site of the London International Exposition of 1862 was selected for the new museum. Sir Richard Owen (1804-1892), Superintendent of the Natural History Collection, worked actively in the design and construction of the building. The commission was first awarded to Captain Francis Fowke (1823-1865), architect of the 1862 Exposition building, demolished to make way for the museum. After Fowke’s death in 1865, the work was awarded to architect Alfred Waterhouse (1830-1905). Plans were completed in 1868, ground was broken in 1873, and construction was completed in 1880. Described as a “true temple of nature” and “the animal’s Westminster Cathedral,” the museum was partially opened to the public in 1881 (See Figures 56 and 57). Planned returned fronts at either end of the museum were never built.118

The monumental terracotta, iron, and concrete building demonstrated the strength and versatility of modern, British-manufactured building materials.
Owen and Waterhouse found inspiration for the museum’s cathedral-like design in the German *Rundbogenstil* and the brick masonry construction of the 10th to 12th centuries in Lombardy and the Rhineland. Although the construction of the British Museum of Natural History was vastly more expensive and lengthy, it had much in common with the construction of the United States National Museum. Sir Richard Owen and Spencer Baird both worked long and hard to establish national museums of natural history and both worked actively with the architects of their buildings. In both cases modern, manufactured building materials were used both structurally and decoratively. Both drew upon *Rundbogenstil* aesthetics. Baird consulted with the British Museum on the design of museum cases before deciding upon the custom design used in the U.S. National Museum. The monumental design of the British Museum expressed the power of the Victorian British Empire at its height, while the functional design of the U.S. National Museum, with its purposeful absence of monumentality, expressed the concept American openness and individual freedom. The design and construction of the National Museum also displayed typically American ingenuity in solving seemingly insurmountable problems of budget and schedule.

The American Museum of Natural History in New York was founded in 1869 as “an establishment that shall afford opportunity for popular instruction and amusement, and for the advancement of the Natural Sciences.” Albert Smith Bickmore (1839-1914) conceived the idea for the museum while studying with Louis Agassiz at the Museum of Comparative Zoology in Cambridge. Owned by the city and managed by a board of trustees, the planning and construction of the museum was attended by the political maneuvering and controversy surrounding the Tweed administration. Manhattan Square, west of Central Park between Seventy-fifth and Eighty-first Streets, was selected by the city as the site for the museum. Calvert Vaux (1824–1895) and Jacob Wrey Mould (1825–1886) were selected as architects. Calvert Vaux had been a partner of Andrew Downing. Both had collaborated with Frederick Law Olmsted in the design and development of the Greensward project for Central Park.
Vaux and Mould planned a monumental building based on the same J.L.F. Durand idea for a museum that would later inform the design of the Smithsonian’s National Museum Building. A Greek cross inscribed in a square with a central rotunda, the building would be erected in stages, eventually occupying the entire enormous square. The initial construction included the 200’ × 60’ southern arm of the Greek cross plan. Sited near the middle of Manhattan Square it would eventually be an interior wing. Vaux and Mould designed the building in a Ruskinian Gothic manner with facades of red brick accented by light-colored stone. The main facades are organized as a pointed-arch Gothic arcade with rhythmic narrow bays carried vertically the full height of the building. The museum plan included two lofty exhibition floors in addition to a full basement and an attic for workrooms and offices. Broad galleries extended the space of the halls. Narrow slit windows were provided in the piers of the arcaded facades to increase light within the halls. The planned rotunda would eventually adjoin the north end of this wing. President Ulysses S. Grant broke ground for the building in early 1873. Construction proceeded slowly and the museum was not opened to the public until 1877. Today, this original wing can only be viewed from inside the completed building (See Figures 58, 59, and 60).

In 1873, while the natural history museum building was under construction, Calvert Vaux (1824-1895) with engineer George K. Radford (1826- post 1900), entered the design competition for the main building and art gallery at the 1876 Centennial Exposition in Philadelphia. They based their unique design on a pavilion module that could be extended endlessly in all directions, easily and economically constructed, and provide optimum exhibition conditions. The pavilion module was cruciform in plan, reflecting Durand’s museum design. Colossal iron truss pointed and round arches defined each structurally independent module. Constructed in four rows of seven modules each, the design would have created a vast 20-acre open exhibition area with perfect light, unobstructed views and vistas, and myriad garden spaces with plants and fountains within the arms of each pavilion cross. Vaux and Radford won the competition, but, due to political wrangling, their design was not built.
The New York Times critiqued the 44 competition entries, finding only the Vaux and Radford design acceptable. Their comments laid out the requirements for an ideal exposition building appropriate for the celebration of the Centennial of American Independence. In designing the National Museum building, Cluss & Schultz clearly took note both of these comments and the Vaux and Radford design. Cluss' reports touch upon every point, including the preference for the one-story design of the Paris exposition, the creation of perfect light through side lights without the use of skylights, the construction of a vast open exhibition floor with views and vistas throughout, lofty spaces providing for adequate ventilation as well as visual effects, avoidance of long valleys in roof construction, and the use of arched modular design units (See Figures 61 and 62).

In 1869, at the invitation of Emperor Franz Josef I of Austria (1830-1916), German architect, educator, and theoretician Gottfried Semper (1803-1879) joined Austrian architect Karl von Hasenauer to design two museums — one for natural history and one for art history. The museums were part of the Ringstrasse urban renewal project in Vienna which also included the site and buildings of the 1873 International Exposition. Semper developed a plan for a monumental Imperial forum — never completed — which grouped a palace, government buildings, and theater with the museums along an axial, formally landscaped plaza. The two museums were mirror images of each other, facing across the plaza. They were rectangular in plan with courts on either side of a monumental central entrance hall. Semper provided elaborate iconography depicting the progressive history of nature and of art both inside and outside the buildings. The iconography was an integral architectural design element, so much so that the museum buildings themselves became the museum. Ground was broken in 1871, and construction progressed slowly. In 1889, both museums were opened to the public, although not completed until 1891.

Semper had participated in the 1849 uprisings in Dresden, fleeing to London in 1850. Here he designed several of the pavilions for the 1851 Crystal Palace. The much younger Hasenauer temporarily left the project in 1871 to design the buildings for the 1873 Vienna International Exposition (See Figures 63 and 64).
Exposition structures built of glass and iron demonstrated the aesthetic, economic, and structural advantages of these materials (See Figure 65). The fire at the New York Crystal Palace also demonstrated their vulnerability. Charged first and foremost with construction of a fireproof building, Adolf Cluss depended upon an interconnecting brick masonry arcade structural system for the open design of his permanent museum building. Light and airy exposed wrought iron trusses supported the individual roofs of each of the 17 halls. They span the lofty open spaces created by this system while clerestories and lanterns and monitors perfectly light each of the halls. The pavilions and towers function as buttresses for the arcades. The building envelop is rational and self-contained. Although inexpensive and rapidly constructed, the modern Romanesque design complements the adjacent Norman Romanesque design of the SIB.

Machine-made Brick
Twenty new machines for making bricks were exhibited at the 1876 Centennial Exposition in Philadelphia. Coal-burning steam engines, cast and wrought iron machine tools, rail transportation, and continuous belting of various widths made factory production of bricks possible. The clay-tempering brick-making machine of Chambers, Brother & Co. of Philadelphia was said to turn out 50 to 80 bricks per minute or 50,000 to 80,000 bricks a day.122 The Peerless Brick Company of Philadelphia, considered the foremost producer of fine brick, used this machine — combining it with a hand press for face brick. An improved version of this press, the Peerless Brick Machine, was patented in 1882 by John Crabtree of Philadelphia.123

Gleason & Himber, the brickwork contractors on the AIB, described the face brick manufacturing process at the Washington Brick Machine Company as, "After the glutz came out of the steam presses, they were again pressed in a Philadelphia hand press, carefully selected and placed in the kiln to be burnt."124 Bricks manufactured in this manner often contained undesirable striations, making them unsuitable for use as face bricks. The careful selection of only the best bricks was time-consuming and expensive as was the mason’s work in laying them. In 1879, as brick-making technology evolved, there was considerable

Footnote 122: Described in detail in J. S. Ingram’s account of the exposition. 200.


Footnote 124: Minutes of the U.S. National Museum Building Commission, 17 November 1879, 138, Box 7, RU 71, SIA.
Building History, Description and Significance

confusion over the difference between a face brick and a pressed brick. Cluss had specified "Joints of exterior faces, soffits and reveals to be cleared out not less than 3/8" and filled with black pointing mortar compounded of paste of finely ground cement and clean, sharp silicious sand. 2 ½ sand/1 cement paste."125 The joints were to be no more than ¼" wide. The contractors protested:

We took every care and laid them as press bricks. Instead of laying the bricks in common mortar, rake joints and point with black mortar, we buttered every brick separately with black mortar, and laid it carefully in its position; cutting off the superfluous mortar, which was caused to be forced out to bring the brick to its right place and position. And after eight or nine courses of these bricks as above described had been laid we pointed up every crevice that appeared and struck a flat regular joint, making the joints thicker or thinner as the thickness of the bricks required.126

The black mortar was stiff and difficult to spread. The polychromatic design of the brick work also was unfamiliar work for the masons. Cluss had ordered 13,000 buff brick from the Peerless Brick Company and 9,000 sand-blasted blue brick from the Enameled Brick Company — both in Philadelphia. These specialized bricks were rarely used in Washington. Both were difficult to lay with the black mortar. The blackened bricks required extra work. Those above the arches required hand-cutting on site, followed by hauling back and forth to the blackening shed. Red arch brick were ordered purpose moulded. The bricks above the arches required hand-cutting on site. Ornamental work included courses or patterns, pilasters, dentils and corbelled cornices. When the work was completed, The Washington Post commented, “The building is fire-proof and decorated, and not over-decorated, externally with ornamental brick-work, and a ‘master mason’ who was going through the grounds and inspecting the work one day last summer pronounced the masonry to be the best piece of work that he had ever seen.”127

Rolled and Shaped Wrought Iron

The rolled and shaped wrought iron used in the National Museum building was supplied by the New Jersey Steel and Iron Company of Trenton, New Jersey, and the Phoenix Iron Works, of Phoenixville, Pennsylvania, northwest of Philadelphia. Both companies were leaders in the manufacture of rails and structural iron. The New Jersey Steel and Iron Company, organized in 1866, was the successor to the Trenton Iron Company. Founded in 1847 by industrialist Peter Cooper (1791–1883), his son Edward (1824–1905), and son-in-law Abram Hewitt (1822–1903), the Trenton Iron Company began production of wrought iron beams for floor joists in 1852. By 1856, the company was producing the first I beam with contracts for the U. S. Capitol extension, the U. S. Patent Office, and other federal government projects. The Cooper Union building (1859), between Seventh and Eighth Streets at the convergence of the Bowery and Third Avenue in New York City, was constructed with these early rolled iron beams.128 The Phoenix Iron Company was founded in 1855 by David Reeves (1735–1871) and his son Samuel (1818–1878). In the mid-1850s, this company also turned from the manufacture of rails to structural iron. In 1862, Samuel Reeves designed the Phoenix column, widely used in


Footnote 126: Ibid.


Footnote 128: In 1897 Abram Hewitt and his daughters founded the Cooper Union Museum of the Arts of Decoration in this building. The Museum became part of the Smithsonian Institution in 1967. In 1976, the museum, now known as the Cooper-Hewitt National Design Museum, moved to the former Andrew Carnegie residence at Fifth Avenue and 91st Street in New York City.

Historical Background and Context 1.1

Smithsonian Institution Arts & Industries Building

08.31.2009 1.1 – 49
construction of bridges and tall buildings (See Figures 66, 67, and 68).

Cluss & Schulze designed a roofing system in which exposed iron trusses span each of the exhibit halls, resting upon the brick masonry bearing walls of the naves, square halls, and ranges. The system is complicated by large clerestories and monitors and double transitional roofs in the valleys between the main halls and the square halls. A light iron framing system rests upon the trusses, supporting slate and metal roofs. The floors of the towers, pavilions, and annexes are constructed with segmental brick arches sprung between rolled iron beams. This was a fireproofing technique frequently used by Adolf Cluss.

**Slab on Grade**

This new technology eliminated the enclosed joist spaces under floors where fires often originated. It also allowed for installation of extremely heavy new industrial exhibits such as locomotives. Cluss specified hydraulic cement concrete for the museum exhibition area and basement floors. This strong, fast-setting, waterproof material was also used in the foundations. It had been used in the caissons of the Brooklyn Bridge, the foundations of the Statue of Liberty, the Chesapeake & Ohio Canal, and the Washington Monument. Cluss recommended stone aggregate broken by the new machinery of Cranford, Hoffman, and Filbert: “The machinery furnishes a cleaner stone than any broken by hand; the sizes thus furnished are so graduated as to supply pieces sufficiently small to fill interstices to an advantage in the way of a saving in cement. Only costs a little more.”[^129] He intended that the concrete floors be left exposed and covered with asphalt. Senator James G. Blaine remarked in the Senate, June 10, 1880:

---

[^129]: Minutes of Meetings of the U.S. National Museum Building Commission, 16 April 1879, 53. Box 7, RU 71, SIA.
Building History, Description and Significance

They are finishing it with a common concrete floor, just such as you have on the street to drive on. The floor that is now designed and that they must adopt if kept within the appropriation which is now granted them will be a simple ordinary rough concrete floor on which they propose to put strips of boards for walking. I think that would be a great disfigurement to a building which will be greatly visited, which will be an object and center of interest to all the visitors to Washington and to the whole people of the country. I think the beauty of the building, the beautiful design for which it is intended, and all connected with it deserve at least that there should be a good floor in it.130

The Congress appropriated an additional $26,000 “for flooring of marble and encaustic tiles in the large halls of the National Museum building.”131

Glass

Designing a museum building that would provide the “perfect light” for exhibition purposes was challenging. In the museum, many of the exhibits would be small — presented as collections in glass-fronted wooden or metal cases. Most exhibits, large and small, would be subject to deterioration from ultra-violet light. In the Washington summers, heat and humidity could prove unbearable for both museum personnel and visitors and could damage collections. In winter, large expanses of glass could have equally disastrous effects through the transmission of cold. The glazing requirements for a permanent museum building differed somewhat from those of the temporary exposition buildings. At the conclusion of the project, Cluss noted that in the National Museum building:

90,000 sq. ft. of floor space are lit by 12,600 sq. ft. of glass, equal to 1/7 of the floorspace for glass. According to the best authorities 1/9 of floor space is required (under similar conditions for glass) to exhibit art matters properly. The great Rotunda of the Vienna Exhibition buildings had, for a floorspace of 140,000 sq. ft., a glass surface of 12,000 sq. ft. or less than 1/11 of floorspace for glass. This was considered an excellent light although the sills of the gigantic windows were 180’ above the floor.132

In the design for the National Museum, a complex fenestration of clerestories and monitors was developed to bring indirect light into each of the 17 exhibition halls. Skylights were purposefully avoided both for the harmful effects of direct light and for the increased danger of leakage. All exterior windows were vertically installed. All were fitted with double-paned glass for insulation purposes and most were operable. Ground glass was used in the exterior panes of all exhibition hall windows to further diffuse the light entering the museum. The windows of the office and laboratory areas in the pavilions and towers were clear and shaded with awnings in the summer.

At the 1876 Centennial Exposition in Philadelphia, Belgian glass manufacturers exhibited “excellent samples of all kinds of window glass — white, colored, fluted, ground, engraved, enamelled and stained. The glass industry is an important one, and gives support to twelve thousand workmen, the annual value of the products amounting to at least a million dollars.”133 In 1879, the manufacture

Footnote 130: U.S. Senate, June 10, 1880, p. 830.


of window glass of good quality in large quantities was just beginning in the United States. France and Belgium led the world in both quantity and quality of this product. Gradual improvement in the manufacturing process and the construction of improved furnaces and other machines increased production 20% to 25% over a short period of time. In 1877, Belgium produced 18 million to 19 million square yards — nine-tenths of this was exported. In the United States, a heavy duty was laid upon importation of glass. William P. Blake, United States Commissioner at the Paris Universal Exposition in 1878, reported to Congress that the use of gas furnaces had increased production there. He suggested that petroleum, recently applied to the manufacture of iron in the oil region of Pennsylvania, should be used in the manufacture of glass.  

**Systems**

Building systems engineering technologies evolved quickly in the 1862 to 1890 period in which Adolf Cluss was practicing architecture. New methods of heating, ventilating, and plumbing became out-moded almost before the completion of each building’s construction. Cluss stayed abreast of changing technology, traveling to other cities before each major commission to see how others had solved the problems he was about to encounter. He often participated in AIA discussions, speaking on a variety of topics including acoustics, concretes and mortar, chimneys, and clean water supply. He was particularly concerned with the effective and economical heating and ventilation of the large new building types he was designing. The radiators used in the National Museum were not available when he designed the Franklin School. Insulation through use of cavity walls, mineral wool, and double pane glass were not in general use in 1860s. His early schools placed the imperfect water closets of the day in exterior structures connected to the buildings by covered passageways. In the National Museum, ladies’ and gentlemen’s retiring rooms with running water and modern water-closets were available at the Garfield inaugural reception before the completion of the building. The original electrical system in the National Museum building operated the telephone, telegraph, clocks, buzzers, and burglar alarms. Electric light was installed in the photographic studio for cloudy days or at night. Routine electric lighting for the building was not contemplated, but provision for gas-lighting was included. Spencer Baird observed of this state of the art electrical system, “Indeed it is believed that in no building in the world, with the exception, perhaps, of the Grand Opera House in Paris, is there so perfect and complete application of electricity to practical purposes.”

In 1859, William C. Baker and John Jewell Smith established a business manufacturing and installing a patented improved low pressure, self-regulating steam warming and ventilating apparatus. A description of this system was published in 1860, revised and republished several times under varying titles as the business of Baker, Smith & Co. flourished. The 1872 version, *Steam and Water Warming and Ventilating Apparatus: As Manufactured and Erected Solely by Baker, Smith & Co.*, listed addresses in New York, Buffalo, and Chicago. The proposal of Baker, Smith & Co. was the lowest feasible bid of nine offered for the installation of a complete steam heating system for the museum.

---


**Footnote 135:** Baird, AR 1881, 12.
Heating and ventilating the vast open space of the museum with its lofty ceilings, large areas of glass, slab on grade floor, and constant movement of visitors in and out of the building was a formidable task. Four steam boilers were placed in the basement below the South West Pavilion with steam supplied and water returned through underground piping to and from radiators placed along walls throughout the building. Vents in the spires of the towers assisted winter ventilation. Operable sash in the monitors, clerestories at the Rotunda, halls and courts, and the windows at the side walls assisted ventilation as needed. Insulation of exterior enclosure included cavity brick wall construction and double glazing of window sash. Cluss had designed an insulation system for the metal roofs that would have placed mineral wool or some other such material between the roof and a cramped iron ceiling. Meigs proposed a fireproof system of wooden lath attached to the slate and covered by plaster. He maintained that this would be as effective and would cost considerably less. This latter system was adopted. The plaster began to fall while the building was still under construction. Costly removal of the failed plaster caused great clouds of dust, creating a biohazard and threatening the safety of the collections. Another problem was encountered when it was found that the North East Pavilion, the area farthest from the boilers, was not adequately heated. Two additional boilers were added to correct this problem.

Adolf Cluss, serving as engineer member of the Board of Public Works from 1872 to 1874, had been instrumental in modernizing the water and sewer system of the city. In designing the sewer system for the National Museum, 12" glazed terracotta branch sewers, were run beneath the floor slab, which drained 60 conductors from the roof and the soil-pipes of water closets and basins, connecting to the city sewer at South B Street. Vertical conductors of rainwater and soil-pipes were constructed of heavy cast iron piping with air and water tight joints. Water and gas were supplied throughout the building. Cluss commented:

A 12-inch main pipe was tapped outside of the building and near its southeastern corner. Three parallel lines of 3-inch water-pipe running due north through the building were put in with supply for 16 fire-plugs, numerous street-washers, outlets for closets, basins, and bath-tubs, stop-cocks, &c.

The gas main was tapped on B Street, outside of the southwest corner of the building, and two 4-inch supply pipes were put in, one running due north and the other due east through the building, at an equal distance of about 20 feet from the outside walls of the building. Both pipes are continued, of reduced sizes, in a similar way until they meet at the northeast corner of the building.136

Cluss was aware of the potential problems with his multi-roof system for the building. He noted of the valleys between the naves and square halls, "These roofs are in part constructed double, for the purpose of so perfecting the drainage of the roofs that accumulations of ice and snow can nowhere obstruct it."137 In addition, his system of monitors, clerestory, and dome lighting purposefully avoided flat skylights, "which for various reasons it was well to avoid."138 As he ordered all slating halted until the iron dome structure was completed he warned, "Walking over slate causes breakage."139 As the collections of the


Footnote 137: Ibid, 131


Footnote 139: Minutes of the Building Commission, 10 March 1880, 176. Box 7, RU 71, SIA.
National Museum increased, flat skylights would be added to bring light to interior spaces altered for their accommodation. There also would be much walking over the slate and metal roofs for maintenance, construction, and other purposes.

By 1883, the Brush-Swan system of electric lighting had been successfully demonstrated and installed throughout the National Museum building, replacing the original gas-lighting system installed just two years earlier. Charles Francis Brush (1849–1929) was one of the early pioneers and inventors of electric lighting. He completed his first arc light prior to 1869, first dynamo in 1875, and by 1880 invented a 16-hour double carbon arc lamp, an automatic regulator for multiple lamps, and introduced copper plated arc carbons, solving all of the major problems in arc lighting at the time. On April 29, 1879, Brush staged a public demonstration of his arc lights in Monumental Park in Cleveland, Ohio. In 1879, he also installed his arc lights in the John Wanamaker department store in Philadelphia. Brilliant arc lighting was soon replacing gas lighting in the streets of American cities. In 1860, Joseph W. Swan (1828–1914) obtained a patent in Great Britain for a partial vacuum, carbon filament incandescent lamp. In 1878, he patented an improved version and, in 1881, founded the Swan Electric Light Company. In 1882, he sold his American patent rights to the Brush Electric Company. Incandescent lighting was more suited to residential use than was arc lighting and the system demonstrated at the National Museum in 1883 included both. There was understandably fierce competition in the electric light field. The Brush-Swan system became, through mergers, part of the Westinghouse Electric Company. In 1884, Brush built a mansion in Cleveland that included a basement laboratory with a dynamo, which, powered by a windmill in the back yard, generated electricity for his use.140

---

A Description of the Building as InitiallyConstructed

Located at 900 Jefferson Drive, SW, Washington D.C., the AIB was initially conceived as the U.S. National Museum. Following the establishment of the Smithsonian Institution in 1846 and the construction of the Smithsonian Institution Building in 1855, the campaign developed and a design was presented in 1879 for the National Museum. The initial concept was modeled from exposition buildings at the Centennial Exposition in Philadelphia in 1876. That building remains today in Philadelphia and is known as Memorial Hall.

The AIB’s design concept was driven by the need for a fireproof building, open and flexible exhibition spaces, and a building of grandeur appropriate to a U.S. National Museum:

On March 3 1879 congressional authorization was received for:

For a fireproof building for the use of the National Museum, 300 feet square, to be erected under the direction and supervision of the Regents of the Smithsonian Institution, in accordance with the plan of Maj. Gen. M. C. Meigs, now on file with the Joint Committee of Public Buildings and Grounds, on the southwest comer of the grounds of the Smithsonian Institution, the sum of $250,000 is hereby appropriated out of any money in the Treasury not otherwise appropriated; said building to be placed west of the Smithsonian Institution, leaving a roadway between it and the latter of not less than 30 feet, with its north front on a line parallel with the north face of the buildings of the Agricultural Department and of the Smithsonian Institution; and all expenditures for the purposes herein mentioned, not including anything for architectural plans, shall be audited by the proper officers of the Treasury Department.¹

Overseen by the National Museum Building Commission, the building was described by Cluss as … [it] starts on the ground in the form of a square with sides of 327 feet extreme length. This is surmounted by a cross and dome. Within its facades a net area of 102,000 square feet, or 2.35 acres, is contained by roofs.²

The wording chosen by Cluss to describe the vast space contained by roofs is apt as the volumes, although separate spaces, were meant to be visible and understood from the adjacent areas. The concept intentionally mimicked the exhibition hall design concept for its efficiency in the display of artifacts as well as its efficiency in construction:

It is a square building of a single story, consisting of four large naves and a central rotunda in the shape of a Greek cross, with ranges and covered courts filling in the corners, so as to produce a solid or continuous structure every part of which, under the original plan, was well lighted. The ranges have large windows, and the naves and courts both skylights and clerestory windows.³

Interior Spatial Description

The concept was based on an initial set of plans drawn by Quartermaster General of the Army Montgomery C. Meigs. Cluss & Schulze further organized the space within the museum to provide for an open, flexible floor plan with open circulation


Footnote 2: Ibid.

between the exhibit spaces. The museum was not designed with a classical elevation and, with the exception of the planned lofts, the building was not only accessed at-grade with no steps but it also maintained a single primary floor level throughout the building:

On the main floor...17 halls which freely communicate with one another by wide lofty archways, 80,300 square feet of floor space and a proportionate amount of wall space for exhibition purposes.4

With the exception of the mezzanines and limited second floor galleries, the upper levels and two basement areas were administrative or support spaces. There were only three basement or cellar areas when the building was initially constructed:

It contains under ground a coal-cellar of a storage capacity of nearly 300 tons. Besides, there are two cellars, containing 3,200 square feet floor space, for storage purposes. From one of these cellars a subterranean communication with the adjacent Smithsonian building is established, by an arched passage, which, besides ordinary uses, will serve in cases of panic, fire, tumult, robbery, and c.

A basement containing 1,600 square feet of floor space is fitted up for the boiler-room of a steam heating apparatus.5

Later, Smithsonian Secretary Richard Rathbun would state that while the design of the museum was optimal for the visitors and the installation of exhibits, the minimization of administrative, laboratory, and storage space was not ideal and was due to the “smallness of the appropriation” for the project.6 By design, the support and administrative spaces were not at the heart of the National Museum whose large open flexible spaces were arranged to provide flexibility in the floor plan and “proportionate amount of wall space.”

Further, there are available on the main floor and two upper stories 27,400 square feet of floor space, divided off into 135 rooms for administrative functions, offices, working-rooms, photographer, necessary accommodations, and c.

And finally there are about 4,000 square feet of floor space on galleries, formed on a level with the second floor of the offices; these are intended in part for special exhibits and in part to afford an unobstructed view of the ensemble of the exhibits.

On the whole, the one-story plan which has prevailed among experts ever since the Paris exhibition of 1867 has been adopted. But by the introduction of upper stories on those outlying sections reserved for offices, ample office-room has been secured without encroaching materially upon the floor space within the square of 300 feet, to which the building was primarily limited.7

The cruciform layout with a central rotunda with enclosed volumes in the quadrants between the axes of the cross was laid out to maximize the number of exhibit halls.

The Rotunda is the central and primary ceremonial space. At the ground level, it is a 65’ foot diameter


Footnote 5: Ibid.


Building History, Description and Significance

1. Identification plan
Rotunda and halls

The primary feature of the plan consists of four naves or main halls, the largest in the building, which radiate in the form of a Greek cross from a central rotunda to the towers above mentioned. Following the outer walls and extending from the naves to the pavilions are a series of eight ranges, two on each side. This arrangement leaves four courts, enclosed (sic) by the naves and ranges, which are roofed over and form parts of the actual building.8

The concept of mezzanines in the halls, courts, and ranges dividing the space was included in the design of the building from its inception:

In some of the preliminary drawings for the museum building a tier of galleries is shown in each of the exhibition halls, but in the plans as finally adopted and presented to Congress these features were not represented. The height of the several halls, however, was made sufficient to permit of their introduction at any time. In view of the failure to secure early action by Congress toward the erection of a third building, it was decided to urge the construction of these galleries, in order that some additional space might be acquired. The entire sum needed for such a purpose was not requested at once, but the estimates for 1893, 1894, 1895, and 1896 each contained an item of $8,000. These failed


Historic Structure Report & Conditions Assessment
Smithsonian Institution Arts & Industries Building

08.31.2009 1.2–3
to receive favorable consideration by Congress, but the amount named was appropriated in the sundry civil act for 1897, and other appropriations followed, namely, $8,000 in 1898, $10,000 in 1899, and $5,000 in 1902, making a total of $31,000 for this purpose. From this amount galleries were erected in all the halls, courts, and ranges, except the north hall and the northeast and east north ranges. In the southeast range the galleries have been extended so as to form a complete second floor.\(^9\)

In each quadrant an inner court space was nestled at the corner where the halls join the Rotunda. The eight ranges extend from the tower ends of the halls enclosing the court elevations (See Figure 2).

A pavilion and annex terminate the outside corner of the ranges in the building at four locations.

This configuration is clearly expressed in Cluss’ design plan. As the design evolved, the relationship between the courts and ranges differs as the courts become smaller and the ranges transition from L shaped gallery spaces to individual rectangular galleries. As the courts became smaller, the vertical circulation around the Rotunda was modified to be less formal and grand and more discrete. The four stairs were modified from flared straight run grand stairs to four spiral stairs inside the primary piers of the Rotunda structure.

The pavilions and towers are divided into three levels and are designed to serve administrative and laboratory purposes. Basement spaces are accessed through the North East, North West, and South West Pavilions (See Figure 3).

Building History, Description and Significance

4. Identification plan
Rooftops

**Exterior Spatial Description**
The AIB exterior volume reflects and aligns with the interior hierarchy of spaces. The Rotunda is the highest and most prominent feature to the exterior of the building. The ends of the halls with the stone detailing clearly emerge as the entrances to the building. Initially, the building had entrances at the ends of each hall. This was likely changed due to uses in the building and to control access. The current entrances at the ends of the North and East Halls were the primary entrances as early as 1903.

**Roof**
The roof is the appropriate location in this building to transition from the interior to the exterior as the interior forms of the roofs were intentionally left to be understood from the interior of the building. Initially, the roofs had an interior metal lath and plaster affixed to the underside of the purlins; however, due to movement, condensation, and lack of keying, this finish failed almost immediately upon completion. In 1903, Rathbun reported that the finish was completely removed from the ranges and that the painted underside of the structure was “not to be out of keeping with its surroundings.”

The slates are nailed to small pieces of wood, fitted into small L-shaped pieces of iron, and the plaster of the ceiling is laid directly upon the rough inner surface so formed. Besides the lanterns before mentioned, a number of small skylights and ventilators have been built over some of the ranges and courts, especially where the recently constructed galleries have interfered with the lighting.

---


---

Historic Structure Report & Conditions Assessment

Smithsonian Institution Arts & Industries Building

08.31.2009

1.2– 5
court roofs were hipped roofs with a monitor in the center of the space. Similar to the monitors on the hall roofs, the monitors also contained operable windows within metal frames. The monitors on the courts were topped with a painted metal finial. The pavilion roofs were similar to those at the court varying only in proportion and slope. The transition roofs between the halls and the courts were a sloped structure. The exterior volume enclosed a sub layer of structure that was visible from the interior. The towers were capped with slate roofs that also contained circular ventilating louvers. The range roofs were the only tin roofs on the structure. Described as “lean-to roofs,” these structures were a single slope running perpendicular to the court. These roofs also contain ventilators and skylights. Additional skylights were added in the renovations at the start of the 1900’s likely due to the need for more daylight from the construction of the galleries in these spaces.

Several chronologies are included in the appendix of this document. They are provided in three formats. The first is organized by date and includes both the institutional history and the physical changes to the building. The second is organized by elements within the building and the third is organized by individual spaces within the building. While each contains similar information, they provide different contexts for the understanding of the history of the AIB.
Graphic Morphologies of the AIB:
The following series of diagrams illustrate the design significance, material integrity and evolution of the AIB.
Design Significance Diagrams
The following set of plans identifies the levels of design significance within the AIB. These diagrams document the design hierarchy related to the initial design intent of the building. There are three levels of significance defined. Level 1, the higher level of significance, refers to primary and central volumes in the development and experience of the space. Level 2 refers to important spaces or volumes that connect and relate to the Level 1 spaces. Level 3 is used to identify service, support, and ancillary spaces in the volume of the building. Refer to the intervention diagrams for fabric modification recommendations related to significance and integrity.

Basement Floor Plan
The basement plan indicates a high level of significance for the structural walls and perimeter while the cellars have a low level of significance. The cellar spaces were all developed to support utility and service functions for the building.

Ground Floor Plan
The ground floor plan represents the interior hierarchy of the museum such that the Rotunda, halls, and North West Annex are of the highest level of significance. The Rotunda is the centralizing feature and is understood externally and internally as the most prominent volume. The halls, radiating from the Rotunda, are of equal significance as they define the main axes of the building and provide the largest exhibit spaces. The courts follow at this same level of significance as they join the volume of the halls and are the only three-story connections between the halls. The ranges and pavilions also follow in significance. The ranges were designed as single story public spaces to wrap the courts. The pavilions served as the metaphorical and literal corner posts for the structure and museum. They included the offices and labs that maintained the quality of the exhibits and provided for continued scientific research. The North West Pavilion is noted at a higher level of significance as it was the director’s office. The towers and remaining annexes are the least significant spaces in terms of function and design with spaces that served as administrative offices and circulation connections between the pavilions and ranges.
Diagram of Design Significance
Refer to Intervention Diagrams for fabric modification recommendations related to integrity and significance. These diagrams refer to initial design hierarchy only.
Mezzanine Floor Plan
The mezzanine floor plan shows the gallery in the library. As this space is open to the ground floor, it maintains the same significance as the library.

Second Floor Plan with Galleries
The second floor plan continues to illustrate the same hierarchy of space as the ground floor with the exception of the galleries found in the halls. These spaces were not constructed with the initial design and modify the as-built volume of the halls. Earlier renderings did explore the construction of galleries in the halls but it was not executed in the final construction. Galleries in the 1881 plan were limited to ends of the halls and intended as viewing stations and access platforms at the base of the spiral stairs into the towers. Because the construction of the galleries began in 1896, with discussions beginning about the option of galleries soon after the 1881 opening of the building, these elements have an established level of significance within the building as circulation, viewing points, display, and storage areas.
Diagram of Design Significance
Refer to Intervention Diagrams for fabric modification recommendations related to integrity and significance. These diagrams refer to initial design hierarchy only.

Legend:
- 1 (Higher Significance)
- 2
- 3 (Lower Significance)
Third Floor Plan
The third floor plan introduces the high significance of the form of the range roofs and documents the lower significance of the pavilions at this level.

Roof Plan
The roof plan presents the high significance attributed to the entire roof and perimeter of the building.
Diagram of Design Significance

Refer to Intervention Diagrams for fabric modification recommendations related to integrity and significance. These diagrams refer to initial design hierarchy only.

Historic Structure Report & Conditions Assessment
Smithsonian Institution Arts & Industries Building
08.31.2009
Significant Fabric Integrity Diagrams
The following set of plans identifies the overall remaining original fabric from the Period of Significance within the AIB. Original fabric is used to define architectural and structural materials that remain from the Period of Significance. Refer to the intervention diagrams for fabric modification recommendations related to significance and integrity as these diagrams only refer to remaining fabric integrity.

Basement Floor Plan
The basement indicates a high level of significance for the structural walls as they are significant and have not been dramatically altered. Many of the cellar spaces had additive changes but the original fabric remains.

Ground Floor Plan
The ground floor Rotunda and halls retain the highest level of integrity of original materials and finishes. The North West Pavilion is less significant and retains a high degree of significant fabric. The courts, ranges, remaining annexes, pavilions, and towers have had modifications on the ground floor such that the load-bearing masonry walls are the remaining historic fabric. The subfloor structure in the courts and ranges remains however the finishes are modern. The perimeter of the building is documented to show the high level of integrity of materials around the entire perimeter.
Diagram of Significant Fabric Integrity
Refer to Intervention Diagrams for fabric modification recommendations related to integrity and significance. These diagrams refer to fabric integrity only.
Mezzanine Floor Plan
The mezzanine floor plan shows the gallery in the library. The entire space was rebuilt to closely match the original construction. The space in the east tower has been modified and some original fabric remains.

Second Floor Plan with Galleries
The second floor plan illustrates the locations of the remaining galleries. In all locations where gallery floors remain, except the North West Annex and the South West Range, the floor is a part of the entire second floor system that creates two levels out of a space that was a single volume with a gallery during the Period of Significance. The galleries in the North West and North East Courts were removed during the 1973 renovations and new concrete floors span these spaces creating two levels where there was a single volume with a gallery during the Period of Significance. Original material has been moved and modified within all four pavilions.
Diagram of Significant Fabric Integrity

Refer to Intervention Diagrams for fabric modification recommendations related to integrity and significance. These diagrams refer to fabric integrity only.
Third Floor Plan
The stairs in the third floor pavilions remain from the original construction while the spaces are significantly changed. The floors introduced into the courts were completed after the Period of Significance. The range roof cladding was entirely replaced in 1982. The truss girders remain but were also modified at this time. New steel purlins were added between the existing trusses and a new steel beam was installed along the top chord of the trusses. Refer to Section 2.4.1 for a detailed description of the significant modifications to the framing at these locations.

Roof Plan
The pavilion, tower, hall, court, transitional and Rotunda roofs have been re-clad with new materials over time. The pavilions and towers continue to be clad with slate while the other roofs have different materials. All of these locations retain their initial structural support with minor or additive modifications to the framing as discussed in Section 2.4.1.
Diagram of Significant Fabric Integrity
Refer to Intervention Diagrams for fabric modification recommendations related to integrity and significance. These diagrams refer to fabric integrity only.

<table>
<thead>
<tr>
<th>Color</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Higher Integrity</td>
</tr>
<tr>
<td>2</td>
<td>Structure Extant</td>
</tr>
<tr>
<td>3</td>
<td>Surface Cladding Not Extant</td>
</tr>
</tbody>
</table>

Third Floor Plan

Roof Plan
Construction Chronology of the AIB
The following views document the additions and demolition of construction within the interior of the AIB as shown on the Ground Floor Plan and Second Floor Plan with Galleries Plans. These levels reflect the degree of change in the primary spaces of the building. The years selected for the models correlate to “The Arts and Industries Building: Chronology of Interior Changes, 1881-1976” by Victoria Solan, 1994.

1881 Ground Floor Plan
This diagram represents the appearance of this level at the completion of construction.

1881 Second Floor Plan
This diagram represents the appearance of this level at the completion of construction.
1902 Ground Floor Plan
Based on the changes in function the walls along the south sides of the West North Range and East North Ranges were enclosed. Other spaces were enclosed by temporary construction, draperies and exhibits by this time but as they are not represented they are not permanent construction. (Note: This configuration is consistent with the condition of the building from the end of 1902 through 1903)

1902 Second Floor Plan with Galleries
By 1902, all of the galleries shown were constructed and used for storage, display circulation and viewing. At the second floor level, all of the primary spaces were separated from each other partly driven by the need for more wall display space, the separation of spaces due to the changes in functions and the attempt to manage fire and life safety issues by separating spaces with rated and non-combustible construction.

A detailed discussion of the infill can be found in Sections 1.1, 2.8 and 5.3.3. (Note: This configuration is consistent with the condition of the building from the end of 1902 through 1903)
Building History, Description and Significance

1902 Ground Floor Plan

1902 Second Floor Plan and Galleries

Historic Structure Report & Conditions Assessment
Smithsonian Institution Arts & Industries Building
08.31.2009
1925 Ground Floor Plan
Infill between spaces continued within the AIB partly driven by the need for more wall display space, the separation of spaces due to the changes in functions and the attempt to manage fire and life safety issues by separating spaces with rated and non-combustible construction. A detailed discussion of the infill can be found in Sections 1.1 and 2.8.

1925 Second Floor Plan with Galleries
The separation of spaces is modified based on exhibit needs and functions. A detailed discussion of the infill can be found in Sections 1.1 and 5.3.3.
1940 Ground Floor Plan
There is little change in the construction of the building although the functions of spaces and exhibits continue to change.

1940 Second Floor Plan with Galleries
There is little change in the construction of the building although the functions of spaces and exhibits continue to change.
1962 Ground Floor Plan
Increasing use of the space for administrative functions begins and sections of the building are infilled with partitions for offices. Interior spaces have some internal modifications due to exhibit and collections needs.

1962 Second Floor Plan with Galleries
Increasing use of the space for administrative functions begins and sections of the building are infilled with partitions for offices. Interior spaces have some internal modifications due to exhibit and collections needs.
1967 Ground Floor Plan
Increasing use of the space for administrative functions continues and more sections of the building are infilled with partitions for offices. Interior spaces have some internal modifications due to exhibit and collections needs.

1967 Second Floor Plan with Galleries
Increasing use of the space for administrative functions continues and more sections of the building are infilled with partitions for offices. Interior spaces have some internal modifications due to exhibit and collections needs.
Increasing use of the space for administrative functions continues and more sections of the building are infilled with partitions for offices. Interior spaces have some internal modifications due to exhibit and collections needs. Changes focus on the halls, Rotunda and the North East Court for the 1976 Bicentennial.

Increasing use of the space for administrative functions continues and considerable sections of the building are infilled with partitions for offices. Interior spaces have some internal modifications due to exhibit and collections needs.
Building History, Description and Significance

1.2– 33 Smithsonian Institution Arts & Industries Building

Chronology of Development and Use 1.2

1976 Ground Floor Plan

1976 Second Floor Plan and Galleries

Historic Structure Report & Conditions Assessment

Smithsonian Institution Arts & Industries Building

08.31.2009

1.2– 33
Following is a comparison of the building between 1881, 1902 and 1976. They represent the initial design intent (1881), the configuration at the end of the Period of Significance (1902) and the most recent occupied documented condition (1976).
The following plans document changes in the flooring materials on the ground and gallery floor plans.

1881 - Inaugural Ball

General Notes:
1. Materials legend represents finish flooring materials only and does not take into account older finishes under newer materials.

Flooring Type Legend
- Terrazzo
- Concrete/Granolithic
- Wood
- Modern Materials (No Historical Significance)
- Encaustic Tile
- Stone
- Mosaic Tile
1881 - Latter Part of Year

General Notes:
1. Materials legend represents finish flooring materials only and does not take into account older finishes under newer materials.

Flooring Type Legend
- Terrazzo
- Modern Materials (No Historical Significance)
- Concrete/Granolithic
- Encaustic Tile
- Stone
- Wood
- Mosaic Tile
Ground Floor Plan

1869 - Wood floors are removed and replaced with granolithic or terrazzo flooring in unspecified locations.

ca. 1892 to 1896

Flooring Type Legend

- Terrazzo
- Concrete/Granolithic
- Wood
- Modern Materials (No Historical Significance)
- Encaustic Tile
- Stone
- Mosaic Tile

General Notes:
1. Materials legend represents finish flooring materials only and does not take into account older finishes under newer materials.
1.2–39 Smithsonian Institution Arts & Industries Building

**Building History, Description and Significance**

**Chronology of Development and Use 1.2**

**Ground Floor Plan**
- 1896 - Concrete floors replace wooden floors in two ranges.
- 1899 - Two old wooden floors replaced with terrazzo.
- 1901 - Last of temporary wood flooring replaced with terrazzo.

**Second Floor Plan**

**Flooring Type Legend**
- Terrazzo
- Concrete/Granolithic
- Wood
- Modern Materials (No Historical Significance)
- Encaustic Tile
- Stone
- Mosaic Tile

**1896 to 1902**

**Hornblower & Marshall**

**General Notes:**
1. Materials legend represents finish flooring materials only and does not take into account older finishes under newer materials.

Historic Structure Report & Conditions Assessment

Smithsonian Institution Arts & Industries Building

08.31.2009
Ground Floor Plan

- 1915 - Encaustic tile and marble flooring of Rotunda and Main Halls extensively repaired.
- 1930 - Rotunda fountain removed. Floor finished with concrete.
- 1967 - Encaustic tile at Rotunda removed and replaced with concrete.

Second Floor Plan with Galleries

ca. 1903 to ca. 1972

Flooring Type Legend

- Terrazzo
- Concrete/Granolithic
- Wood
- Modern Materials (No Historical Significance)
- Encaustic Tile
- Stone
- Mosaic Tile

General Notes:
1. Materials legend represents finish flooring materials only and does not take into account older finishes under newer materials.
Building History, Description and Significance

1976 to Present

General Notes:
1. Materials legend represents finish flooring materials only and does not take into account older finishes under newer materials.

Flooring Type Legend
- Terrazzo
- Concrete/Granolithic
- Wood
- Modern Materials (No Historical Significance)
- Encaustic Tile
- Stone
- Mosaic Tile

Historic Structure Report & Conditions Assessment
Smithsonian Institution Arts & Industries Building
08.31.2009
The following sections document changes in the decorative wall treatments applied to the primary spaces within the building. The areas rendered with color indicate locations of decorative painting. Images of these treatments can be found in the photographic timeline following these elevations.
Building History, Description and Significance

Chronology of Development and Use 1.2

ca. 1956 to 1972 - No Decorative Stenciling

1976 to Present - Hugh Newell Jacobsen Stenciling
The following timeline documents photographs and events found that relate to the Rotunda during the Period of Significance.
BEAUX ARTS & EXPANSION OF COLLECTIONS

1858 - 1859

1861

1902

ROTUNDA INTERIOR CHANGES DURING THE PERIOD OF SIGNIFICANCE 1881 - 1902

- New railings at Rotunda
- Balconies including light fixtures
- Elaborate scaffolding constructed in Rotunda
- Grace Lincoln Temple design decorative painting
- Rotunda painted Olive at landscape above

08.31.2009
Smithsonian Institution Arts & Industries Building
The following roof plans document changes in the roofing materials and locations of skylights.
1906 to 1909

Notes:
1906: Complete roof replacement—majority of slate roofs converted to tin.

1906 to 1909: Extra skylights installed over all ranges. No locations are specified. Diagram based on historical photographs.

1981 to Present

Notes:

Roofing Chronology

<table>
<thead>
<tr>
<th>Material</th>
<th>Legend</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skylight</td>
<td>Blue</td>
</tr>
<tr>
<td>Modern Metal Roofing</td>
<td>Green</td>
</tr>
<tr>
<td>Lead-coated copper at cornices and hollis</td>
<td>Brown</td>
</tr>
<tr>
<td>Semi-coated stainless steel at cornices</td>
<td>Light Gray</td>
</tr>
<tr>
<td>Historical Tin Roofing</td>
<td>Light Blue</td>
</tr>
<tr>
<td>Slate Roofing</td>
<td>Dark Gray</td>
</tr>
<tr>
<td>Roof Materials Legend</td>
<td></td>
</tr>
</tbody>
</table>
The following elevations document changes to the exterior of the building.
Building History, Description and Significance

Chronology of Development and Use 1.2

- 1889 WINDOW CONSTRUCTED
- 1983 MASONRY RESTORED
- WINDOWS REPLACED IN 1980’S
- GLAZING SALVAGED
- 1901 CHIMNEY MODIFIED

Historic Structure Report & Conditions Assessment

Smithsonian Institution Arts & Industries Building

08.31.2009

1.2 – 51
1.2 – 52 Smithsonian Institution Arts & Industries Building

Historic Structure Report & Conditions Assessment

IRON PIVOTING SASH
1881 @ HALLS
TYPICAL, REPLACED 1970’S
WOOD SASH CONSTRUCTION

WINDOWS @ PHOTO LAB
• 1909 - ADDED
• 1984 - REMOVED,
  WINDOWS RECONSTRUCTED

• 1901 ORIGINAL
  WINDOWS REPLACED
• 1980’S WINDOWS
  RECONSTRUCTED

1881 ORIGINAL
DOORS AND
GATES

1901 WINDOWS INSTALLED

1976 DOOR
RECONSTRUCTED

1985 GATES
RECONSTRUCTED

9TH ST. TUNNEL CONSTRUCTED

1969

ENTRANCE DOOR

SOUTH
The following diagram documents the distribution of collections that were in the AIB with colors to indicate their current museum location. This diagram is provided to illustrate that almost all SI museums began with collections from the AIB.
The AIB is located on the Mall, between Jefferson Drive and Independence Avenue, east of the Castle and west of the Hirshhorn Museum. The north elevation faces toward the Mall (See Figure 1 and Site Plan drawing at the end of this section). Directly to the east is a small garden (See Figure 2) and a parking lot (See Figure 3); the 9th Street tunnel runs directly below this garden and the parking lot. The south façade is recessed only a few feet from Independence Avenue (See Figure 4). The Enid A. Haupt Garden is on the west side of the building (See Figure 5).
small ramp flanked by metal rails connects this area at the entrance to the slightly raised vestibule. The 1976 restoration drawings show that the step covered by the ramp is original stone. West of the north entrance, the area adjacent to the building is paved with concrete; on this side of the building there are two hatches, one allowing access into crawl space under the North Tower and one connecting to the utility trench that runs below the West North Range. East of the north entrance, the area adjacent to the building is planted with grass (See Figure 7).

East of the building, separating it from the Hirshhorn Museum, is a garden that includes relatively large trees in very close proximity to the elevation (See Figures 8 and 9). The area in front of the service entrance on the east elevation is paved with concrete (See Figure 10). South of the entrance, there is a small gated parking lot (See Figure 3). Directly in front of the South East Range, the area between the East Tower and the South East Pavilion is paved with bituminous tiles. This area is separated from the parking lot with a metal fence (See Figure 11).

On the south elevation, the concrete sidewalk runs adjacent to the pavilions (See Figure 4). There is a narrow concrete slab adjacent to the West South Range and a narrow dirt strip followed by grass along the East South Range. The site appears to have a slight slope away from the building. The southeast corner of the building is the lowest point along the building, where the top of the stone foundation is exposed. There are no trees adjacent to the building along the south elevation. One metal hatch is located in front of each of the south ranges. On the west side, the hatch allows access into the basement; on
Building History, Description and Significance

The east side the hatch connects to a utility trench. Connections to utilities are also located along this elevation (See Figure 12). A detailed description is included in the engineering sections.

The site is roughly level along the west elevation, where, with the exception of the area at the west entrance that is paved with brick, there is grass adjacent to the building (See Figure 5). The site is depressed within 1’ to 2’ from the building, approximately aligned with the roof line. Medium-size trees are located within less than 10’ from the façade (See Figure 13). There are no steps in front of the west entrance.

The pavement areas are not historic and have been changed multiple times.

Decorative post-mounted lamps provide for general site lighting, and lighting for sidewalks and parking (See Figure 2). At the north entrance, the two lampposts flanking the steps sit on carved stone bases and seem similar to lampposts depicted in photos from the 1890s (See Figures 1 and 14). Along the north and west elevations are ground-mounted incandescent light spotlights that accent the facades, six are evenly spaced in front of each of the ranges. Similar fixtures, only in groups of two at each location, are installed along the east elevation in front of the North East Range (See Figure 7). A pendant fixture is located in the vestibule of each of the four entrances (See Figure 15). An additional simple globe light is located above the entrance to the North West Pavilion (See Figure 16). None of the existing light fixtures is original to the building.

Physical and Spatial Description 1.3

Massing

The AIB is a large brick structure with a 328’ square plan, with a major 300’ square plan accented at each of the four corners by 41’ square plan pavilions (See Space Identification Plan and Diagrammatic Building Model). The structure retains its original configuration, with four naves radiating in the cardinal directions from a central dome-covered Rotunda. At each of the halls, the gable end opposite the Rotunda is flanked by a three-story tower with a square plan. Along each of the four elevations, between the towers, is a one-story section that houses the main entrance into the building. Square courts are located at the intersection of the naves, spanning five of the nine bays of the naves. Flanking each of the naves and adjoining the court are four-bay deep ranges. The ranges flanking each the North and the South Halls (naves) are seven bays wide. The ranges flanking the East and West Halls are only five bays wide. Three-story, square-plan pavilions are located at the corners of the building, directly adjoining wider ranges and projecting about 13’ from the range walls. The spaces between the pavilions and the short ranges are occupied by square-plan annexes.
The hierarchy of the spaces is expressed in the massing of the structure. The central Rotunda with its 16-sided polygon drum rising 77’ high and the cupola roof rising 95’ high, dominates the composition of the building. The finial topping the roof rises over 102’ high (See Section drawing at the end of Section 1.3). The walls of the rectangular halls are approximately 42’ high and the roof ridge is 55’ high; the top of the monitors rises up to 62’ above the first floor level, the same as the top of the monitor roof at courts. The masonry walls at the towers rise over 51’ from the first floor and the roof finial rises up to 88’, emphasizing the four entrances. In the hierarchy of the massing, the pavilions, with masonry walls 36’ high and the roof rising more than 41’ from the building’s main first floor level, are only taller than the ranges and the entrance vestibules. The top of the monitors at the pavilions does not go above the height of the masonry walls of the towers and seems to align with the lower part of the monitors at the halls and courts.

**Masonry**
The exterior of the AIB is today very much like it was when it was constructed. Between 1881 and the 1980s, several minor alterations of the exterior envelope were undertaken, including: a few new openings in the walls at the North West and the South East Pavilions; a door on the south side of the East Tower that connected to the café; and the enclosed vestibules at the west and south entrances. It appears that, throughout the years, the AIB’s only addition was the one story, brick masonry café that by 1901 extended 77 feet along the South East Range (See East Elevation Chronology in Section 1.2-53). Although not original, the addition was important because it addressed a missing program element, something that did not exist in the SIB and has become a program requirement for the design of most museums. The café was removed during the 1980s masonry restoration project when the original design of the exterior facades was restored. Other masonry alterations were reversed during the 1970s restoration project. The brick masonry was restored in several renovation projects, including those in the late 1960s and early 1980s.

The exterior walls are constructed of several types of brick with a granite base course and a gneiss rubble...
The red brick is laid in a black mortar, typically in a configuration of five courses of running bond and one course of headers. The cornice along the ranges, the pavilions, and the towers consists of a series of cantilevered brick arches (See Figure 17).

The facades are adorned with buff and glazed blue brick mixed with black brick to form decorative patterns. Decorative patterns and variations in the red brick are concentrated in panels below windows, spandrels and arches over the windows, and at the cornice. These decorative motifs occur at all sections: at the Rotunda, halls, ranges, towers, and pavilions (See Figures 18, 19, 20, and 21). In addition, black bricks are used in horizontal bands around the perimeter of the building (See Figure 22). Rising on the northeast corner of the South West Pavilion is a tall brick chimney, richly decorated with colored brick (See Figure 23).

Centered on the gable end of the North and South Halls is an original sandstone inscription that reads: “National Museum 1879”; along the east and west elevations, not facing streets, the inscription reads only “1879.”

The vestibules at the four entrances are finished with glazed brick and they have brick vaulted ceilings. Each of the side walls has a large arch featuring a low section of black brick, topped with a red brick accented by a central decorative motif infill. The upper part of the infill arch has buff brick accented by rows of red and black brick; buff and black bricks alternate along the arch (See Figure 24). The buff brick vaulted ceilings have rows of red brick placed to create the illusion of greater height.

The brick elevations are primarily symmetrical. The entrances into the building are centered on each of
the elevations and are surrounded by a large Ohio sandstone arch (See Figures 25 and 26).

Above the colored glass windows at the end of the hall are carved stone triangles with floral motifs (See Figure 27). The facades at the ranges are accented by precast-concrete trefoil medallions, each with a fleur-de-lis motif, located between the triple windows (See Figure 28). Throughout the building, all windows have sandstone sills; some are original while others are replacements dating to the early 1980s restoration projects.

**Roof**

The roof of the AIB encompasses more than 90,000 square feet and has a unique configuration of 33 roofs at the main spaces: Rotunda, halls, courts, ranges, towers, vestibules between the towers, and pavilions. In addition, there are four transitional roofs between the Rotunda and the halls and courts (See Diagrammatic Building Model). The original Rotunda, halls, courts, pavilions, towers, and vestibules between the towers were covered with blue slate from Ore Banks, Virginia; at the pavilions and towers, the blue slate was accented with red and green slate from Vermont. The range roofs were originally tin; the transitional roofs were also tin. The roof materials at the Rotunda, halls, and courts have changed, but the roof retains its original form unaltered.

The roof of the Rotunda consists of a 16-faced truncated piramid clad with standing-seam, lead-coated copper. A small cupola with 16 small, circular clerestory windows rises at the center of the Rotunda roof. The flat-seam roof of the cupola is topped by a folded structure (See Figure 29). The current roof materials at the Rotunda date to the 1970s restoration.2

Footnote 1: The 1904 AR notes that the tin roof around the Rotunda was repaired. The Superintendent of Construction & Labor report for the same year mentions repairs and painting of the 16,265 sq. ft. tin roof around the Rotunda, in Oehrlein & Associates Architects, Preservation Plan Arts and Industries Building Smithsonian Institution, OPP Project #973316, Prepared for Polshek Tobey + Davis, April 2000, p.4-30.

The halls feature gable roofs with ridges running perpendicular to the Rotunda. Rectangular hipped-roof monitors protrude over the central part of the halls. The halls and the monitor roofs are lead-coated copper with standing seams (See Figure 30). The original slate monitor roofs were replaced with metal roofs in the 1890s, while the original main hall roofs were replaced during the first decade of the 20th century with batten-seam tin roofs (See Figure 31).

The lead-coated, copper hipped roof at courts and court monitors feature standing-seam construction (See Figure 32). The original roofs’ slate was replaced between 1906 and 1908 with tin; the current material dates to the 1970s restoration project. Large pyramidal skylights, first installed in 1900, are located on top of the court monitors (see Daylight section below).

The shed roof at the ranges consists of low-slope, terne-coated stainless steel, with batten-seam construction (See Figure 30). The upper part of the roof terminates directly below the sills of the court windows (See Figure 33). The roofs at the ranges were originally flat-seam tin construction. The current batten-seam construction dates to the early 1980s replacement.

The transitional roofs span the areas between the Rotunda and the courts, and were constructed to provide positive drainage at the intersection between the masonry drum of the Rotunda, the roof of the halls, and the roof of the courts. These low-sloped roofs were originally tin with flat seams. These roofs were in the area where the most leaks occur, and throughout the years were often repaired. The present flat-seam, lead-coated copper transitional roofs were installed in the 1980s. At the same time, the stressed skin panel decks at the dome and transitional roofs were also constructed. The deck at the halls consists of plywood panels laid on wood blocking. (See section Structural Masonry and Roof Deck for additional information.) None of the original decking remains.

The towers’ roofs are covered with dark slate accented with red and green slate (See Figure 34). The steeply pitched roofs have chamfered edges and change slope towards the bottom corners of the roof. There is a painted metal finial at the top.

None of the original decking remains.
of each pointed roof, as well as a painted circular metal dormer vent at each cardinal side. Although the current roof and the decking date to the 1980s, it appears to be a replica of the original roof.

The pavilions have hipped, multi-colored slate roofs with pedimented sections centered on each of the elevations. The monitors centered over the pavilion are covered with relatively low-sloped, hipped, slate roofs (See Figure 35). These slate roofs date to the 1980s; however they appear to replicate the original roofs.

Besides the pavilions and towers, the only other slate roofs are over the entrances, between the towers; the present slate is a replacement. Each of the roofs between the towers is a medium-sloped shed roof with a center-gabled section (See Figure 36). The upper edge of the roof abuts the masonry wall only a few inches below the sill of the large windows at the end of each hall.

**Drainage**

The large roof of the AIB drains through a series of internal and external drains. The Rotunda roof has a hanging, perimeter gutter that discharges on the transitional roof through downspouts located at the corners of the Rotunda’s 16-sided polygon (See Figure 37). There are splash pans at each of the downspouts around the perimeter of the Rotunda. Originally, the cupola had a built-in gutter and interior leaders; the current drains are replacements from the 1970s roof replacement project.

Each of the court roofs has a copper gutter hung along the eaves of the two exterior elevations, discharging through three internal drains along each of the two eaves (See Figure 38). The leaders located at the corner

---

36. Slate roof at entrance
37. Downspouts at the Rotunda
38. Drainage system at court
39. Detail of drainage system at intersection of court and hall roof
40. Drainage system at hall
41. Detail of drainage system at intersection of court and hall roof
between the courts and the halls are large and serve to discharge the rain water from the transitional roofs and the halls (See Figure 39). The current drainage configuration dates to the 1970s reroofing project. Originally, the courts had a built-in gutter along the perimeter that discharged through internal drains. The built-in gutters were covered sometime before the late 1950s, when photographs show hung gutters and external drains; the external leaders had a different configuration compared to the existing layout. The existing leaders penetrate the masonry wall and are connected to internal storm leaders.

The halls have a copper gutter hung along the eave; a leader at the tower end discharges on the range roof in the vicinity of the eave (See Figure 40). The other end of the gutter discharges at the corner between the court and the hall, in the same leaders where the transitional roof and the court roof discharge (See Figure 41). As in the case of the courts, originally the halls had built-in gutters with internal leaders; the built-in gutters were covered when external hung gutters were constructed. Exterior leaders appear in the photographs beginning in the 1950s.

The range roof has a built-in gutter (See Figure 42) that discharges to the sewer through interior cast iron leaders, located at the each end of the approximately 87’ long elevation.

The tower and pavilion roofs also have built-in gutters (See Figure 43). Each of the towers discharges through one leader located in the exterior corner of the tower close to the entrance. Although walls were furred out and the internal leaders could not be observed in all corners, it appears that the pavilion roofs discharge through cast iron leaders located in all corners. The slate roof over the entrances, between the two towers, has a built-in gutter that discharges through two leaders run internally along the wall adjacent to the towers.

Metal counterflashing at the perimeters of the halls and pavilions is stepped, reglet-mounted and is painted; the height of flashing above the metal roofing varies (See Figure 40). At the upper ridge of the ranges and the shed roofs over the entrance, the flashing rises up the wall minimally due to lack of space at the window sills (See Figure 33).
The valleys at the transitional roof, a narrow area along the eaves and ridges, and base flashing at skylights, as well as areas adjacent to masonry walls, have been coated with an elastomeric product.

Lightning protection terminals are located on finials and along the ridge of the monitors at the halls. The court and hall roofs are provided with snow protection systems (See Figure 31). Snow protection systems appear in historic photographs before the late 1950s. There is a heat tape system at some of the valleys between the transitional roof and the roof at the courts (See Figure 44).

**Decorative Metal Features**
Decorative metal cornices run along all the roof edges (See Figure 45). These cornices, as well as all metal decorations at the roof, are part of the original design. Some of the material appears to be original to the construction while others were reconstructed during the early 1980s restoration.

Each of the gable ends at the towers features a metal pedestal. Although the pedestal is present at all four halls, only the pedestal at the North Hall carries statuary (See Figure 46). The metal statuary is discussed in a subsequent section. A metal acroterion decorates the top of the gable over each of the arched entrances (See Figure 47).

Metal acroteria, with a radiating, fan-shaped ornament, sit on top of the galvanized iron cornice that caps the wall over the third floor windows at the pavilions (See Figure 48). Two metal vents flank the acroteria (See Figure 49). Each corner of the monitor roof at the pavilions is decorated with a metal piece similar to the vent but with an added scroll on the side. All decorative vents and acroteria were originally galvanized steel sheet and were reconstructed in the 1980s of terne-coated stainless steel.

There are finials of various configurations at the Rotunda, over the court monitors, as well as the towers and pavilions (See Figures 50, 51 and 52). The finials over the steeply-pitched slate roof at the towers have decorative edging. The finials were reconstructed from 1983 to 1985; the original finish included gold leaf but this was not replicated.

Circular metal louvers decorate each of the slopes of the hipped roof at the towers (See Figure 53).

---


Some of the current decorative pieces were restored during the 1980s project; during that project, missing ornaments were reconstructed.

Other decorative metal features include the cast iron gates at the north, west, and south entrances (See Figure 54). According to the original records, the gate frames are wrought iron. The gates at the west entrance were restored and reinstalled in 1979, while the gates at the north and south entrances are reproductions of original metal gates and were installed in 1986.

Footnote 5: SIA RU 371, Box 3, October 1979, Digital SIA Neg. No. 79-10669-33A

All the windows at the basement and first floor of pavilions and first floor towers feature metal grilles (See Figures 55 and 56). Also, the glass section at the North West Pavilion exterior door is protected by a similar grille (See Figure 57). The current grilles at the windows were reconstructed during the 1980s window restoration project and appear to be a replica of early grilles. Grilles were first constructed at first floor windows in 1881 and were removed sometime between 1925 and the 1950s.

At the basement level of several towers, there are small metal grilles with various decorative motifs (See Figure 58). These are not original to the building but may date to the early 1900s.

Windows, Monitors, and Skylights

The building receives a large amount of natural light via wood windows, clerestory windows, and roof monitors. None of the original exterior window frames or sashes survives. The current configuration of the windows reflects the original design; small variations are addressed in subsequent paragraphs.

The Rotunda features 16 large, semicircular arched, triple windows (See Figure 59). The sash is fixed; historic photographs show that at least one sash at each of the units was operable. There are 16 circular fixed metal windows at the Rotunda cupola. These were the only metal windows in the original design, as the original intent was to have “non-conductive” windows.

The exhibit halls receive light through four sets of triple clerestory wood windows located on the side walls (See Figure 60). The sashes of these units are fixed; in 1881 these windows were fitted with iron sash pivoting in iron frames. Centered on each of the end gable of each of the halls is a tall, triple-arched window with decorative colored glass. Flanking this window are smaller, double-arched windows also with colored glass (See Figure 61); a small circular window is located within the same opening. These windows are fixed; originally some were operable and had iron pivoting sashes.

In addition, each of the four halls features a long monitor, with 15 wood sashes on each of the sides and six sashes at each of the ends (See Figure 62). The current monitor windows are fixed; originally the
windows at the monitors were operable. Mechanisms to operate them from the hall floors were installed in 1905 and a few survive.

The courts feature along each of the two exterior elevations five groups of three arched windows divided horizontally into three sections (See Figure 63). The lower part of these clerestory windows has an operable sash. These windows are similar to the ones along each of the sides of the halls, above the level of the range roofs. Seven windows at the roof monitors allow for additional light into the courts (See Figure 64). Presently, these spaces are used for mechanical equipment and many of the clerestory and monitor windows have been blocked off or the sash has been replaced with metal louvers. In addition, large skylights are located at the center of the courts’ hipped roofs (See Figure 64). These were not original but were constructed in 1899 soon after the galleries at courts were erected, blocking some of the natural light reaching the first floor.7

Large, triple windows, similar to the windows at the Rotunda, allow light into each of the ranges and annexes (See Figure 65). The openings are 8’ 10” wide and 13’ 5” high, with the spring line at 9’ 0”. While originally the windows flooded the one-story exhibit space at the ranges with light, currently all the lower parts of the windows allow light into the first floor spaces only, while the upper parts of the windows light the second floor (See Figure 66). One sash in the central section is operable at the lower part and an additional one is operable at the upper part of the unit. The side sashes are fixed. Historic photographs show that originally side sashes were also pivoting.

The offices in the pavilions and towers feature a variety of wood windows. Arched double-hung,

double windows allow light into the first floor at the towers and pavilions (See Figure 67). Each pavilion (with the exception of the North West Pavilion where there are seven windows because of the exterior door located on the south side) has eight of these windows while each of the eight towers has two of these windows. The windows are 6’ wide and 7’ 7-3/4” high, with a spring line around 6’ 10 ½”. The second floor windows at towers and pavilions are arched windows, featuring a double-hung window flanked by two fixed sash (See Figure 68). Groups of three arched windows are centered on the pavilions at the third floor (See Figure 35). While most are double hung, at each of the pavilions, two of the windows are casement and allow access onto the adjacent roof at ranges or annexes. Groups of three narrow and tall double-hung windows allow light into the third floor rooms at the towers. At the pavilions, the central spaces of the third floor receive light through three windows located on each of the sides of the square monitors rise above the roof (See Figure 35).

The basement spaces feature small, wood casement windows (See Figure 56). Basement windows are located in all the pavilions with the exception of the South East Pavilion; the South Tower at the east entrance is the only tower where there are windows at the basement level. All basement windows were replaced in the 1980s; some of the openings are provided with louvers.

All exterior window frames are painted light green; the sashes are painted darker green; the color scheme dates to the 1980s restoration campaigns. The 2001 Original Interior Finishes study confirmed that originally the sashes were painted grayish olive green and the trim dark grayish green.8 On the interior, most of the windows are painted white, except first and second floor windows in the pavilions and towers, which have a stained finish. The hardware varies depending on the type of window and its location; however, none is historic. Windows are provided with contacts tied into the security system. None of the elements of the original security system survives. (See Security System section below.)

**Interior Windows**

At least at two locations, frames and some of the sash of the windows that opened between the towers and the pavilions and the adjacent ranges have survived.

---


These windows are presently located in closets or above modern ceilings (See Figures 69 and 70). Paint analysis undertaken in 2001 revealed that the original trim was medium blue green and the sash was a bluish black.9

One small casement window allows light from the halls into the small, second floor rooms at the towers (See Figure 71). There are eight such windows in the building. The two windows at the North Tower are original while the six others were replaced during the early 1970s restoration project.

Two narrow, arched, double-hung, stained windows allow light to penetrate from the halls into the offices at the first floor under the end gallery (See Figure 72). Such windows are located at the north, west, and south end of the halls, but not at the East Hall. The initial design included such windows; however, all present windows date to the 1970s restoration project.

Daylight
Natural light was an important consideration when the building was designed. Windows were located more than 7' high on the walls and monitors were provided in the roof to allow natural light into exhibit halls. With the exception of the skylights added at the courts, none of the many skylights added after galleries were constructed survive.

The only space where the way light penetrates the interior has not changed since the original construction is the Rotunda. In the halls, natural light penetrates into the building today as it did in the early 1900s after the galleries were constructed. Much of the natural daylight filtered into the public spaces indirectly, through the large arches that once separated the halls, courts, and ranges, or smaller arched windows between pavilions, towers, and ranges. With the infill of these arches and openings, the only source of light remained direct natural light.

The courts have experienced the most modifications. Many of the windows have been replaced with louvers when mechanical equipment was installed. With the construction of additional floors, many of the original openings, including the 1900 skylights, are now above ceilings or are blocked-off, limiting the amount of daylight that penetrates the courts. The skylights at the courts have been painted or covered with a bituminous material. Much of the glass has been replaced and it remains unknown if any of the glass is original. The painting of the glass might be a more recent attempt to minimize the heat in the third floor spaces of the courts.

In the ranges, with the construction of the floor infills and the division of the spaces, many of the spaces not adjacent to the exterior walls do not have natural light. Originally, these spaces had side light, with windows located above the eye level to minimize glare.

The offices in the towers have good natural light, especially rooms on the third floor of the towers where there are windows on three of the four walls. Most of the offices in the pavilions have good natural lighting; the staircases are not naturally lit.

Natural Ventilation
Originally, most of the windows at the public spaces were fixed, as designers may have attempted to minimize dust and smoke from outside air. For ventilation of the halls, the windows at the monitors
and side walls were fitted in 1881 with metal pivoting sash. The sashes at the double hung windows at the pavilions and towers with offices were intended to be operable. Due to their high location, many of the windows at the monitors in courts were provided with long handles and later mechanical equipment to facilitate their operation; many of the windows at courts and halls still have the operable mechanism in place, but the mechanisms are disconnected.

Currently, all the windows at the Rotunda, halls, and courts are replacements from the 1980s and, with the exception of a few emergency exits at courts, are fixed. The windows at the ranges have operable sash. Replaced in the 1980s, after the second floors were already built, the windows at the ranges were designed to have two operable hopper sashes, one at the lower part and one of the upper part (See Figures 73 and 74). Though no supporting documentation was located, it appears that at the ranges initially only one pivoting sash was added per unit; later photographs show four pivoting sashes.

Some of the sashes at the basement windows were replaced with louvers.

At the roof level, each of the pavilions has twelve vents: one at the corners of the monitor roof, and one at each of the edges of the small gables over the third floor windows. Although there is some reference about vents used for the second floor rooms, additional research is needed to determine how this ventilation system at the pavilions worked and why it was necessary at the pavilions. The only roofs that have attic spaces are at the towers; each has round louvers allowing for ventilation of these spaces.

**Awnings**

Presently, there are no awnings or other exterior shades at the buildings. All the windows were replaced during the 1980s project and no signs of early awnings are visible. However, beginning with 1882, historic photos show that various windows along the building at towers, pavilions, and ranges were fitted with awnings; the color of these remains unknown. It appears that at no point in time did all the windows have awnings simultaneously.

The first and second floor pavilion and tower windows have stained wood louvered shutters installed during the early 1980s window replacement project. It is not clear if there was any historical precedent for these interior shutters.

**Glass**

With the exception of the windows at the gable end of the halls, all the windows at the public spaces have insulated glass with a layer of mylar UV light filter, similar to the translucent glass appearance original to the construction of the museum. Original windows had double panes separated by a $\frac{3}{4}''$ space to minimize heat gain and loss.\(^\text{10}\) It appears that the interior pane was ground glass while the exterior was.

---

\(^{10}\) General Meigs notes that although 1” would have been better, $\frac{3}{4}''$ was “quite sufficient” in *Minutes of Proceedings of the Institution of Civil Engineers* (Published by the Institution, London, 1883), 174.

\(^{11}\) Sketches of existing conditions dating from the 1980s restoration project show that at windows where two panes of glass still existed, the interior pane was ground glass (unknown which side, presumably the exterior).

Presumably when two panes of glass became a maintenance problem, removal of the interior pane resulted in clear glass windows. This might be the reason why some of the “double thick glass” was replaced with plate glass ground on one side, as stated in the 1908-1909 Annual Report of the Superintendent of Construction & Labor.
At the end gable of the halls, the insulated glass includes in one layer original yellow and purple color glass reset in the new sash during the 1980s project (See Figure 61). None of the glass panes that had the inscription indicating the cardinal direction of the hall has survived nor were they reconstructed during the 1980 windows restoration.

At the pavilions and towers, the original windows had clear glass and all the reconstructed windows are currently fitted with insulated glass.

**Exterior Doors**

The only original entrance door is a wide mahogany single door flanked by side lites and topped by a transom located on the south elevation of the North West Pavilion. This door has a wooden lower panel and a large glazed panel protected by an iron grille and appears to be original (See Figure 57). Some of the hardware appears to be historic.

There are four entrance doors centered on each elevation, between the two towers. All of these entrance doors are replacements from the 1970s restoration project. These entrances consist of a pair of stained double wood doors flanked by identical single doors opening into the small vestibules (See Figure 75); a similar assembly is located at the other end of each of the vestibule, connecting to the hall.

The doors have lower wooden panels and arched clear beveled glass upper panels and are surmounted by a four-lite glass transom (See Figure 76). Originally, only two of the four sets had a transom, presumably the ones at the north and south entrances. The original doors had a white pine skeleton with walnut veneers and oak panels. According to drawings from the 1970s project, the doors are red oak with walnut trim and all have a stained finish; the glass lites are laminated glass. The service entrance doors on the east elevation have a similar design but are constructed to allow each half of the assembly to swing, thus opening the entire width of the vestibule (See Figure 77). The hardware on these doors varies,
but none is historic. The north and west entrances were made ADA accessible in the early 1990s.

**Statuary**
The statue marking the north elevation, placed over the gabled top of the hall is “Columbia protecting Science and Industry” (See Figure 46). Designed by artist Casper Buberl (1834–1899) in 1879, the statue was installed in 1881. Made of zinc, the three figures and their bases were apparently fabricated from small cast sections soldered together.13 “Columbia,” the standing figure, is approximately 11’ high and has her arms stretched over the other two figures. “Science,” on the left, is seated, reading from a large book in her lap; two books lay in front of her and an owl, symbolizing knowledge, gazes up from behind her. On the right, “Industry,” also seated, holds a surveying tool in her left hand and a hammer in her right hand; a gear lies in front of her and an anvil is located in the back (See Figure 78).

The statue is painted white. The statue was first repaired in 1903 and, subsequently, in 1933–1934 and in 1993–1994 (OPP project # 913322). During the 1994 restoration project, the external armature was removed and replaced with an internal armature. 14

**Signage**
One original stone ornament is centered on the gable end at each of the halls. On the north and south elevations, the sign identifies the structure as the “National Museum” and notes the year —“1879”— of its inception (See Figure 79); on the east and west elevations the sign identifies only the year (See Figure 80).
East of the north elevation entrance is a bronze plaque noting that the building has been designated a National Historic Landmark (See Figure 81). The plaque replaces the one installed in 1977. On the opposite side of the entrance is a plaque identifying the building and its address: “Smithsonian Institution Arts and Industries Building 900 Jefferson Drive.” (See Figure 82)

Spatial Organization
The core of the interior of the AIB consists of original exhibit spaces. The Rotunda (See Figure 83) and the halls retain a high degree of integrity. (For description, refer to section 1.2.) The only original element missing at the halls is the lower section of one of the brick piers in the North Hall, which was removed when the current partitioning in the northwest quadrant was constructed (See Figure 84). In three of the halls — East, South, and West — the five arches at the bays closest to the Rotunda, which originally opened into the adjacent courts, are now all infilled (See Figure 85). The arches below the exterior clerestory windows at the bays adjacent to the ranges were infilled in all four halls, impeding all the original views, circulation, and continuity between the halls and all of the ranges and courts. Both the Rotunda and halls retain their original roof structure.

The original one-story ranges and courts, once public spaces that were continuous to the halls, are now completely separated and independent areas. A second floor was added into most of these spaces, which are currently subdivided and modified to house support spaces such as offices, storage, and service spaces. Although many alterations were made to these spaces, they were additive. All the original masonry arches separating the main spaces remain. In the courts, the original structure of the roof survives; in the ranges, the roof trusses were retrofitted in 1982 (see Section 2.4.1).
The structure of some of the galleries at the courts and ranges constructed around the turn of the 20th century, including a few of the cast iron columns, survives encased in the new structure (See Figures 86 and 87 for the conditions at the South West Range and South East Court respectively, and Polshek Tobey + Davis Drawing XA123, Existing Ground Floor Plan, Column Survey – Circa 1903). However, none of the historic railings survives and some of the cast iron columns have been replaced with steel or concrete columns (See Figures 88 and 89).16

In the South West Court, several floors were added, including a mezzanine level (See Figure 90). A third floor was added in the North East and the South West Courts (See Figure 91). Partition walls of various materials were built throughout the courts and ranges; some of the exterior walls were furred out, mostly to hide mechanical systems. The North West Court houses exclusively mechanical and electrical equipment (See Figure 92). Mechanical spaces are also run on the first floor and the mezzanine of the South West Court, as well as in spaces above the second floor ceilings at the South East Court (See Figure 93). In the other courts, there is a mix of office space and support spaces. In all spaces housing offices, suspended ceilings were constructed, visually hiding the upper part of the arches (See Figure 94).

Except in the South West Range, a second floor has been added in all ranges. The floors were constructed at the same level as the galleries along the main halls. In the South East Range, the floor was added before 1900; in all other ranges, the infill floors date to after 1950 (see Structural section later in the Existing Conditions of this report). Where second

Footnote 16: SI has in storage some crates with original railings, presumably removed from the North East and North West courts in 1973 when the galleries were demolished.
floors were added, suspended acoustical tile ceilings were also constructed at both first and second levels. On the first floor, these ceilings hide the structure of the early galleries (See Figure 95). On the second floor, the added ceilings cut the original arches and hide the metal trusses and the shed roof decks, as well as the arches and the top of the pilasters that originally separated the ranges from the courts (See Figures 96 and 97). The materials in the partition walls throughout the ranges vary but in many cases include glass to allow for natural light to penetrate deeper into the ranges (See Figures 98 and 99).

Designed to house offices and other support spaces, the pavilions and towers experienced minimal functional changes. The original masonry, load-bearing partitions have experienced minimal changes. In all the pavilions, some of the original rooms were subdivided. Many of exterior walls were furred out and chases were constructed to minimize the visibility of the systems. The third floor partitions and ceilings at the pavilions are all non-historic.

**Circulation**

Originally, all public spaces had one contiguous floor and the circulation was unrestricted between the arches dividing the Rotunda, the halls, courts, and ranges. Small galleries aligning with the second floor of the towers were located at the end of the halls, near the entrances and in the four corners of the square circumscribing the Rotunda. The circulation between the Rotunda and halls has not changed since the construction of the galleries. However, the horizontal circulation pattern between the halls, the ranges, and courts has changed dramatically. With the construction of partitions and the closing of the
arches, many of the original spaces no longer have direct connections (See First Floor Plan at the end of this section); other are connected by single or double doors.

On the first floor, the circulation between the halls and the towers occurs either directly, from halls, as originally designed — at the South Hall, and at the East Hall — or indirectly, via the entrance vestibule. Originally, the first floor of the towers was a few steps above the level of the halls. In the current configuration, at several spaces in the towers, the floor level was lowered to match the floor level at the halls. At the tower flanking the east entrance, on the north side, lowering the floor level allowed for the construction of a mezzanine floor in the East Tower; this dates from before 1972. The first modifications to the circulation pattern between the towers and the halls were introduced before 1903.

Horizontal circulation inside the ranges occurs along narrow corridors (See Figures 100 and 101) or directly between offices. Existing partitions within the ranges and courts lead to a cumbersome circulation, long corridors, and convoluted and through-traffic circulation within offices. On the second floor, the horizontal circulation is even more difficult, as there are changes in the floor level between some of ranges and pavilions.

Originally, three of the pavilions, except the South East Pavilion, connected to the adjacent annexes via a small stair, since the floor of the pavilions was at a higher level. With the exception of the stair between the North West Pavilion and the adjacent annex (Rare Books Library), none of the two stairs between pavilions and annexes have survived. At the North East Annex, the floor level currently matches the pavilion level.17

Although many new floors were added and rooms created, only two stairs were added to provide for vertical circulation in the North East and South West Courts, running all the way to the third floor. No stairs were added in the ranges and in the South East Court; there are only metal stairs in the North West Court (see Stairs section). Besides the two stairs in the courts, there are no enclosed stairs. The third floor rooms at the towers have only one means of egress. The egress from the third floor of the pavilions is via a non-compliant stair; currently, the second exit is allowed via a casement window that opens over a roof.

With the exception of the South East Pavilion, where there is no basement, the first floor of the pavilions is raised five steps over the main floor of the halls, courts, and ranges. The vertical circulation in the pavilions did not change over the years. However, with the construction of a second floor at ranges and annexes, new doors were opened in the pavilions. While the second floor of the northern annexes is at the same level as the floor of the pavilions, most of the second floors are at a different level, a few steps lower (North West Pavilion and the ranges in the northwest quadrant, North East Pavilion to East North Range — See Second Floor Plan at the end of Section 1.3).

The North West, North East and South West Pavilions have original basement floors currently housing equipment and building systems and storage, all accessed via cast iron stairs from the first floor of those pavilions (see engineering sections). A few additional basement spaces were dug around the turn of the 20th century, including the southern-most tower on the east elevation,18 accessed currently only from the exterior via a hatch, and the North Tower.


Footnote 18: In 1882, windows were constructed at the basement level below the south east tower and the café kitchen was located in the space.
Building History, Description and Significance

102. Floor at East Hall

103. Detail of fossil at North Hall floor

104. Encaustic tile at the Rotunda

105. Detail of encaustic tile at the Rotunda


Footnote 21: SIA RU 640, Box 3.


Footnote 21: SIA RU 640, Box 3.


Physical and Spatial Description 1.3

Glen’s Falls Quarry, New York; gray Vermont marble; and red Vermont slate. According to the study undertaken by art and architectural conservator John Scott in 2001, the black Glen Falls stone is a dolomitic limestone while the Red Vermont stone is a limestone and not a marble.\(^\text{20}\) The fossils noticeable in the stone are a proof that the limestone did not metamorphose to become marble (See Figure 103). The decorative motif consists of a square of black units surrounded by four units of white “marble,” forming a larger square. Rows of black and red stone separate the white squares in both directions. There are 13 of the square black-and-white patterns across the width of the halls; there are 24 such squares along the length of each hall. The floors are laid with very narrow joints that almost disappear when looking at the floor.

Floors

The floors in the main halls consist of decorative multicolor pattern “marble” units surrounded by a dark slate edge and a border of tinted concrete adjacent to the walls (See Figure 102). The marble floor dates to 1881, when it replaced the original wood flooring that was installed for President Garfield’s inaugural ball. The original intent had been to have a concrete floor in all exhibit spaces.

The 1881 specifications required: American-Italian white marble; black marble equivalent to that of Glen’s Falls Quarry, New York; gray Vermont marble; and red Vermont slate. According to the study undertaken by art and architectural conservator John Scott in 2001, the black Glen Falls stone is a dolomitic limestone while the Red Vermont stone is a limestone and not a marble.\(^\text{20}\) The fossils noticeable in the stone are a proof that the limestone did not metamorphose to become marble (See Figure 103). The decorative motif consists of a square of black units surrounded by four units of white “marble,” forming a larger square. Rows of black and red stone separate the white squares in both directions. There are 13 of the square black-and-white patterns across the width of the halls; there are 24 such squares along the length of each hall. The floors are laid with very narrow joints that almost disappear when looking at the floor.

The 1881 historic encaustic tile floor at the Rotunda was removed in 1957.\(^\text{21}\) The present encaustic tile floor is a replica manufactured by H. & R. Johnson, in England, and was installed by Standard Art & Marble Co. in the 1970s \(^\text{22}\) (See Figure 104). The main pattern consists of an arrangement of octagonal buff tiles surrounded by four hexagonal brownish tiles and four small black
square tiles (See Figure 105); the floor is laid out with very narrow joints. Small square white tiles are located between the described pattern. The perimeter of the Rotunda has a border with different motifs. Around the fountain, there are two square motifs rotated 45 degrees between each other. The motifs include light blue tiles and floral decorative motifs.

The only other areas with encaustic tile are the floors at the exterior vestibules at the west and south entrances. Installed in the 1970s, these floors are also replicas of the 1881 floors (See Figure 106). The exterior vestibule at the east entrance is concrete; the original encaustic tile was not reconstructed. At the north entrance, the exterior vestibule floor was originally laid with ornamental marble. The current marble floor is finished with red marble with a grayish marble surround.

The floor in the interior vestibule at the north and west elevations is finished with red marble with a green marble surround (See Figure 107). These floors were installed in the 1970s restoration project. At the south and east entrances, the floor of the interior vestibule is finished with concrete scored to resemble stone (See Figure 108).

The terrazzo floor at the galleries along the halls is original to the construction of the galleries; hall galleries were completed before June 30, 1898.23 The floor has white and yellow color aggregate set in light grey mortar, poured roughly in two-foot squares (See Figure 109). Along the railing side, there is a band of red-colored terrazzo (See Figure 110). The two surfaces are divided by a row of small squares of white stone. At the top of the stairs in the southeast corner of the Rotunda, the floor of the gallery is a dark set with black aggregate terrazzo; this section dates from 1956 when the South East Court was renovated.

The galleries at the end of the halls were originally concrete finished with wood boards. The wood floor at the end balcony in the East Hall was the first one to be replaced in 1917 with a terrazzo floor. At the West Hall, the current terrazzo dates to 1918 when the original wood boards were removed. At the South Hall, the terrazzo floor dates to 1925 when wood boards were removed and the new finish constructed to match the terrazzo at the side galleries. The balcony at the north end is currently finished with carpet but it appears that the wood floor was removed and the carpet is set directly on the concrete surface.

In the courts, all the original wood at the first floors was replaced before 1902 with “artificial stone” or terrazzo. In the South West Court, there are several floor finishes, including a reddish concrete and concrete tiles laid in a diamond pattern dating to 1892 (See Figure 111). The “granolithic” units are stamped “Richardson’s Pat. Oct. 89 Carbonized Cement Stone Manf’d at 210 N. St. SW, Wash, D.C.” The first floors of the North East and the South East Courts are currently finished with carpet and vinyl composition tiles. The first floor in the North West Court is concrete, dating to the 1976 restoration project. Terrazzo floor galleries were constructed at all four courts in 1898; the galleries at the South East and South West Courts remain but they were covered with non-historic materials when the second floors were infilled in the 1950s. At the North East and North West Courts, the galleries were removed in 1973 when they were replaced by full second floor construction; in these courts, the sections adjacent to the North Hall are finished terrazzo and date to the 1970s restoration project. The third floors at the courts date after the 1950s and are all finished with non-historic materials, including carpet and vinyl composite tiles.

The original wood floor at the ranges has not survived. Between 1896 and 1902, most, if not all, of the wood floors were already replaced with terrazzo or “granolithic” floors. Many of the ranges are currently covered with non-historic materials, including carpet, pattern vinyl composition tiles, and ceramic tiles (See Figure 112). However, at least in the West North Range, some of the terrazzo floor still exists under the current finish floor (See Figure 113).
Between 1898 and 1902, terrazzo floor galleries were constructed at several of the ranges, including the West North, West South, East South, South East, South West, and North West. At the North West Range, the gallery extended only along the north wall, while in all other ranges the galleries extended along three of the halls. With the exception of the second floor at the South East Range, where a complete second floor was added in 1900, all the second floors at ranges were infilled between 1951 and 1972. Some of these terrazzo floors have been confirmed in various ranges at the second floor under non-historic materials (See Figure 114). In some of the ranges, the terrazzo floor is laid in small squares (See Figure 115).

Most of the floors in the pavilions and towers are now carpeted, but it is likely that some of the original narrow wood pine board flooring might be preserved under the carpet (See Figure 116). In the North West Pavilion, the office directly accessible from the exterior has a small, white, ceramic mosaic tile floor with a colored geometric surround (See Figure 117). This type of floor finish was apparently common at entrances in public buildings around the turn of the 20th century. At the North Tower, the rooms flanking the vestibules are paved with the same marble as the vestibule floors; at the west entrance, the rooms flanking the interior vestibule are terrazzo, with a similar design as the gallery floors (See Figure 118).

There are ceramic tiles floors where restrooms are located in the building, apparently all dating to 1970s and 1980s restoration projects. The floors at the basement level are concrete or are finished with vinyl composition tiles.

**Original Interior Walls**

Originally, public spaces were divided through a series of plaster finished brick arches supported on tall piers. The lower section of the walls had a very thin and hard layer and was separated by a hard molded-in-place horizontal plaster bead from the softer upper wall plaster section. On the lower section, a grey, very hard and sandy Portland cement and lime first coat covered a thin, unsanded lime putty or lime wash or soak brush over the brick. The second, finish coat at this register was a purplish-red coat of lime and sand, gauged with gypsum plaster or cement.
120. Infill wall at the East South Range

121. Vaulted ceiling at the first floor of the North West Pavilion

122. Vaulted ceiling at the first floor of the South West Pavilion

123. Ceiling at galleries, East Hall

with a sand-finished texture. Above the molding were one or two brown coats with lime, sand, hair, and gypsum plaster. The composition of the finish coat was similar, only with higher proportions of lime, gypsum plaster to the sand, and very little hair. The capitals were constructed of pure, unpigmented gypsum plaster molded in advance.

The interior of all the walls in the public spaces had a sand finish on the plaster with a texture that resembled a stone surface. Originally, the piers and some of the area above arches had tool joints lined in black to simulate stone coursing (see Finishes section).

In the halls, courts, and ranges, the arches between the piers began to be filled-in early in the building’s history in an effort to minimize the potential for fire spreading between exhibit halls. Beginning in 1906, reports note the use of “macite,” a 3” thick gypsum block, for infills. It appears that macite was used in constructions projects beginning in the early 1900s as a fire proofing material, including at what would later be known as the National Museum of Natural History. These infills are still present throughout the building. With the exception of the arches at the North Hall, there are no original large arches left open (See Figure 119). The openings between piers continued to be infilled throughout the years; many of the additions were designed to incorporate a similar horizontal bead as the original walls (See Figure 120).

In a few places, the original wall construction is currently not visible because the walls have been furred out. However, the only place that it appears the original pier has been removed is the west side of the North Hall.

At the pavilions and towers, the few original load-bearing interior walls have generally retained their original configuration. Many of the exterior walls and some of the original partition walls have been furred out to allow the running of mechanical systems. Most of the non-structural interior partitions in the pavilions have changed during the years. Many of these walls are finished with plaster, but their structure is unknown. More recent walls, especially at the third floor pavilions, are finished with gypsum boards. The interior partitions in the ranges and courts are of various non-historic materials and do not have any historic value.


In many spaces, both public and offices, the original concrete baseboards still survive; however, many have been replaced with wood or vinyl baseboards.

Interior basement walls are made of brick with stone foundations. Some of the stone foundation walls have a whitewash coat; the brick walls and the brick vaults are plastered or simply painted white.

Ceilings
Currently, the ceilings in the Rotunda, halls, and courts are corrugated metal panels. In the halls, the metal panels replaced the original plaster finishes in 1882. In the halls, in the area below the transitional roofs, 29 gauge beaded sheet iron panels were installed in 1912–1913. The current plywood panels below the transitional roofs were installed in 2004. In the Rotunda, the 26 gauge beaded metal panels were installed in 1922–1923, replacing the original plaster.

In the courts and ranges, the original plaster ceilings were replaced with beaded metal panels because of plaster failure. At the ranges, all the original decking was replaced when the current roof was installed in 1980s. Acoustical tile ceilings were installed in most of the ranges during the 1970s restoration project and subsequent renovations. At the courts, some of the corrugated metal panels date to the 1910s, while others, particularly in the South East Court, are recent replacements.

The ceilings at the first and second floor of the pavilions and towers and the third floor of the towers are shallow brick vaults built on iron beams and finished with plaster (See Figures 121 and 122). The ceilings are original, with the exception of the areas filled in after the cast iron stairs at three of the towers were removed during the 1896–1902 changes. The third floor of the pavilions originally had exposed roof deck but all are currently plastered. In several spaces in the towers, the original vaulted ceilings are hidden behind acoustical ceilings. The current finishes date to the 1980s roof replacement.

In the halls, the original plaster ceilings were replaced with a metal roof underdeck, described in a different section of the report. The ceilings under the galleries are concrete (See Figure 123); at the North East and North West Courts, adjacent to North Hall, the ceiling

above the galleries have a plaster finish dating to the 1970s restoration project (See Figure 124).

**Interior Doors**

The original construction included interior doors only at the office areas in the towers and pavilions. Wood-paneled single doors topped by a glass transom connected the rooms in these spaces. The wall openings had an arch top; the sides featured an acorn detail (See Figure 125) or simply a corner bead. The original frames were simple with no trim. Few historic doors and frames have survived. Several of the original doors in offices in the pavilions are four-panel wood, single doors with glass transom above; however, more studies are needed to confirm which are original and which are replicas from the 1970s restoration project. Some of the wood panels of the historic doors have been replaced with wired glass (See Figure 126).

Several original openings have retained their frames but not the original doors; in other cases, the original openings have survived, but neither the frames nor the doors are historic. Many of the doors and frames are replicas installed during the 1976 restoration project. There are several old wooden panel doors similar to the original ones. These doors do not feature an independent transom but operable glass panels within the door (See Figure 127). Several other types of doors are present at the pavilions. Historic photos show that from an early point in the building’s history, a number of types of doors were used.

Originally, there were no second floors in the spaces adjacent to the pavilions; when these floors were constructed doors were installed in some of the early arched windows (See Figure 128). Although not original, several of these doors might be historic.
In the East and South Towers, connecting to the halls are four-panel, wood doors; these are not original but reconstructions from the 1970s restoration project. At the North and West Towers, the doors opening from the vestibules may possibly have been reused from other locations (See Figure 129). On the second and third floors, opening onto the balcony or directly onto the stair landing are also four-panel, wood doors (See Figures 130 and 131).

As walls were added between the halls, the courts, and the ranges, many doors were constructed. Most of the doors in the infill walls along the halls are double and single four-panel, wood doors with an arched top, built to match original four-paneled, wood doors at pavilions. Some of the doors have trim around and the wood panels are accented with darker trim (See Figure 132). Besides these doors, currently, there are a wide variety of doors at the infills in the ranges and courts.

The doors feature miscellaneous types of hardware, and many of them have replica brass rosette knobs (See Figure 133). It appears that the original doors are hung on two hinges with acorn ends (See Figure 134).

Replica doors are hung in general on three hinges, some with an acorn tip pin (See Figure 135).

Some of the transoms have their original mechanism, however none is in operable condition. The decorative glass at some of the transoms is a replacement from the 1970s restoration project. Some of the doors retain the plates installed in 1911–1912 (See Figure 136).

Doors finishes are discussed under the Finishes section.

Galleries
With the exception of the North Hall, all other halls have a U-shaped, perimeter gallery. The galleries at the end of the halls are original to the construction of the building. The end hall galleries were constructed over the first floor offices. The central section of each of the galleries protrudes into the halls and is supported on decorative double brackets (See Figure 137). The galleries are approximately 16' over the level of the halls. The railings and floors finishes at these galleries have been replaced and are discussed in different sections.
The galleries along the sides of the halls, designed by Hornblower & Marshall, were added before 1902. Approximately 14’ wide, these galleries have a structure of concrete on steel joists that run along the width and have one end encased in the masonry wall and the other supported on a steel beam. The beam rests on four cast iron columns (See Figure 138), with the ends resting in masonry wall pockets. Presently all the side galleries have terrazzo floors; with the exception of the north balcony floor where there is concrete finish, the galleries at the end of the halls have terrazzo floors.

The railings in all of the galleries consist of cast iron panels with a geometric decorative pattern that span between square-section posts. The number of panels between the posts ranges between two and four (See Figure 138). Designed by Hornblower & Marshall, these railing are not only alongside the added galleries but also along the balconies at the end of the halls where the original Cluss railings once stood. The metal railings are approximately 40” high and are topped by a stained wood handrail. Historic photographs indicate that at least in the South Hall there was briefly a railing with a simpler design (See Figure 139). In the early 1900s, every alternate post along the gallery featured a tall lamp post; when these where removed in the 1930s, caps were likely reconstructed.

Side galleries were not constructed in the North Hall. The galleries currently opening into the North Hall were constructed during the 1976 restoration project; at the time, sections of the galleries constructed in 1899 around the perimeter of the North East and the North West Courts following the Hornblower & Marshall design were removed. The two galleries constructed in 1899 at the perimeter of the South East and South West Courts remain today encased in a later infill of the second floor. (See Figure 87) The structure of several of the galleries constructed at the ranges before 1902 also survives encased in a later second floor infill. Some of the original cast iron columns remain, while others were replaced when the floors were infilled (See Polshek Tobey + Davis Drawing XA123, Existing Ground Floor Plan, Column Survey – Circa 1903 in the Appendix). None of the original railings at the galleries survive in the courts or ranges. In the South West Range (Discovery Theater),
there is a section of railing with an identical design to the railing in the halls (See Figure 140); however it remains unknown if this is a replica or a salvaged railing, since photographs show that in the 1950s this space had metal pipe railing with diagonal wire mesh panels.33

**Stairs**

The current cast iron stairs located in the four corners of the Rotunda and leading onto the galleries replaced the original spiral stairs that led to the small balconies at the Rotunda (See Figure 141). The rails along the stairs display the same decorative geometric design as do the gallery railings designed by Victor Mindeleff (See Section 1.1). Originally, there were no other public stairs since all the exhibits were on a single level.

The pavilions and the towers were originally the only multi-story spaces in the building. The stairs in these spaces are original, although some have experienced small alterations. At the pavilions, stairs are located in the corners adjacent to the courts. With the exception of the South East Pavilion, which is at the same level as the public spaces, the first floor of the pavilions is raised five steps (approximately 2’-10”) above the level of the exhibit spaces. These flights of stairs connecting the pavilions to the exhibit spaces are wide and constructed of wood (See Figure 142). Connecting to the second floor is an L- or U-shaped cast iron stair with cast iron railings and handrails (See Figure 143). Some of the handrails were later retrofitted with wood handrails. In the North West Pavilion, the cast iron newel post was replaced with a wood newel post in 1890–1891 at the same time the oak handrail was added (See Figure 144). The pavilion stairs are only 2’-10” wide. In the South West Pavilion, one of the landings of the stair is significantly reduced by the location of the chimney in the northeast corner of the pavilion.

From the second floor, narrow two-flight cast iron stairs located in a space adjacent to the main stairway lead onto the third floor (See Figure 145). Although not all of these stairs leading onto the third floor are original, they all have similar decorative motifs and they all date to before 1900. A single flight cast iron stair connects to the basement in the North East, South West, and North West Pavilions (See Figure 146).

Footnote 33: See photograph SIA RU 95, Box 43, Folder 5, Neg. No. 94-13359.
The three-flight cast iron stair located on the east side of the North Tower allows access to the gallery at the north end of the North Hall. The stair is original, but has experienced some alterations at the section between the first and second floors. Ghosts of a previous railing configuration suggest that the intermediate landing was also modified, together with the railing at the gallery level, when the door connecting to the second floor of the East North Range was constructed in 1955. From the north gallery, a straight-flight stair connected to a spiral stair rises to the third floor of the North Tower; the center post of the spiral stair runs all the way from the first floor (See Figure 147).

Similar original cast iron stairs located at all other towers and connecting the first and second floors have been removed after the galleries along the sides of the halls were erected. The steel structure that framed each of the stair openings at similar locations at the end of the other three halls can still be observed. The spiral cast iron stairs rising to the third floor have survived at all four locations.

In each of the halls, at the opposite tower, three of the four cast iron stairs have a spiral configuration (See Figure 148); the fourth one, at the South Tower (east side) is a combination of a straight-flight wood stair and a spiral stair (See Figure 149).

The railing of all original stairs consists of simple vertical cast iron rails located approximately 10” on center and cast iron handrails. The cast iron treads throughout the building have rubber coverings.

The halls and the first floor of the towers are at different levels. In most of the cases, the floor level difference is
small and there are only two or three steps without any rails. At the East Tower; a five-step wood stair with wood rails connects the tower and hall levels (See Figure 150). The North and West Towers are accessed from the vestibule areas. The wood stairs at these towers were located originally in the halls; the current ones date to the 1970s restoration project (See Figure 151). The East and South Towers are accessed from the halls; the wood stairs at these locations are reconstructions from the 1970s restoration project (See Figure 152). None of the stairs leading into the towers are original. Additional stairs on the first floor of the East Tower, including stairs to the mezzanine level, are relatively recent and do not have historic value.

In the Rare Books Library, a narrow wood-stained stair located in the northwest corner connects the first floor and the mezzanine level (See Figure 153). This stair appears to be original. The wood railing at the mezzanine is original.

A few of the original stairs were removed, including the stairs that once connected the North East and South West Pavilions to the adjacent annexes.

Various other non-historic stairs are located in the court spaces, including an enclosed concrete stair in the North East Court.

Elevators
Historic documents report a “portable elevator” purchased in 1898. This elevator does not survive; it remains unclear in what space it was constructed.

Presently, there are two elevators in the building, a passenger elevator in the North East Court and a freight elevator in the South West Court. The elevators represent non-historic additions. The information included below has been compiled from the November 2006 report produced by Facilities Engineering Associates, P.C.

The hydraulic passenger elevator has a 4,000 pound capacity, was manufactured by Esco, and was installed during the 1970s restoration project (See Figure 154). It has not been modernized since its installation. The elevator room is located below the lowest landing.

Footnote 34: Oehrlein & Associates Architects, Preservation Plan Arts and Industries Building Smithsonian Institution OPP Project# 973316, Prepared for Polshek Tobey + Davis, April 2000, p. 4-28.

Originally installed in the 1950s, the hydraulic freight elevator has a 2,000 pound capacity (See Figure 155). It was modernized in 1988 and has Blain equipment and Harris Preble power bi-parting doors and a two-speed vertical lift car gate. The elevator machine room is located below the lowest landing.36

Finishes
The Original Interior Finishes report identified seven architectural colors used in the public spaces.37 Originally, the plaster walls exhibited a sand finish that had exposed grains of sand and was scored into “blocks,” with lines painted with black oil paint to imitate stone masonry construction (See Figure 156). This decorative plastering technique was relatively common throughout the 19th century, though it was not very common in the interior of buildings.38 The original light yellowish gray color was considered ideal for museum walls even years later: “Dull gray-yellow has the advantage over a white background that it is not blinding, does not tire the eye by reflecting the light too strongly. […] it does not […] disturb the pure and full perception of the exhibited objects.”39 The wainscot in the exhibit spaces was originally a dark grayish red, modified soon after construction, in 1883, to a grayish red oil paint running up to 12’ high.

Currently, throughout the building, the plaster walls and ceilings are painted in light colors. The Rotunda and the North Hall walls are painted with a yellowish color. The lower 3’ of the Rotunda walls are painted in a brownish color. There is no wainscot in the North Hall. In the other halls, the walls under the galleries are painted white or a light color. In these halls, the second floor walls are painted in a yellowish hue, similar to the surfaces in the North Hall. The pilasters, shafts, and capitals at the galleries are painted with accent colors (See Figures 72 and 85). The horizontal bead dividing the two sections of the plaster wall of the East and South Halls is the same color as the wainscoting below; in the west halls there is a darker color at the wainscot. In the ranges, the walls are mainly painted one color, although there are areas where the lower and the upper sections are painted different colors. The original scoring above arches and windows is still visible at many locations, although the black lines have been covered with subsequent layers of paint (See Figure 157). The current paint scheme does not replicate the original colors.
The *Original Interior Finishes* report identified ten different patterns, six in the Rotunda and four in the halls; the pattern used in the courts was identical to one of the patterns used in the halls. Currently in the Rotunda, the decorative paint is located above the large arches, along the frieze above the arches, and at the niches; there are no decorative patterns in panels below the upper windows, the spandrel area above them, or the upper frieze (see pages 1.2-42 and 1.2-43). In the halls, on the wall common with the Rotunda, the areas with decorative paints are located above the large arch, in the lunette above the smaller arch, and in a square area on each of the pilaster shafts between the two arches. All the decoration has a floral or geometric pattern. It appears that the original paint decoration motifs were stylistically similar to other decorative elements in the building for the decoration of the cast iron steps, the brackets at the original balconies, some of the glass at the end hall windows, or the ornament at the original gates. The present decorative polychrome painting scheme at the Rotunda (See Figure 158), at the end walls of the hall adjacent to the Rotunda (See Figure 159), and in the spandrel area at the arches that originally separated the halls and the courts (See Figure 85) date from the 1970s restoration project. Developed by Hugh N. Jacobsen and from historic photographs, this work is "not sympathetic to the original in the choice of colors or in the execution of the artwork itself." Folks

The current paints are oil based, while the original ones were water-based, glue-bond, calcium carbonate paints (calcimines). Apparently, oil paints do not adhere well on calcimine paints. The original decorative color scheme included 40 bold colors. According to the *Original Interior Finishes* report, “of the 40 colors used to create all the patterns associated with the decorative painting, none are more striking and unusual than the varying shades of bold purples (lavender) and strong yellows. These two colors dominate the whole palette that in turn is accented with darker reds and browns for outlining, lighter greens and olives for relief and strong reddish oranges and whites for contrast.”


Footnote 41: Ibid, p. 16.


The plaster surfaces (walls and ceilings) in the pavilions and towers are mainly painted white, either with a flat or low-gloss finish. There are no decorative paintings in these spaces. Originally, these spaces had calcimine paints but no decorative motifs. At a later date, some of the offices had decorative strips painted on the ceilings, or banding along the walls;\(^ {45}\) none of these accents survive today.

The metal trusses and metal ceilings in the Rotunda and the halls are painted the same yellowish color as some of the walls in the halls (See Figure 160). Originally, the ceilings in the halls were painted with a darker color (dark olive green) than the trusses (light gray).

Most of the wood doors are stained. In the pavilions, some of the historic doors and frames are painted (See Figure 126). In the towers, some of the doors are painted to simulate wood grain (See Figure 131). Originally, some of the doors and frames were only varnished.

All the exterior windows, with the exception of the windows at pavilion monitors, have frames painted light olive green, and the sash dark olive green (See Figure 161). At the pavilion monitors, the exterior of the windows is painted grey (See Figure 162). All exterior windows are replacements. The interior of windows in the ranges, and the clerestory windows at the halls and courts, both frame and sash, are painted white (See Figure 163) or cream, the same color as the walls. The interior windows on the first floor at the end of the halls as well as the windows in the pavilions and towers have the interior surfaces stained (See Figure 164). The 2001 report identified the original color at the interior windows separating one of the ranges from one of the towers, and found that they were painted and not just stained.\(^ {46}\) Prior to replacing the windows, exterior paint samples were taken and analyzed from one clerestory window and a court window; however, no samples were taken of the interior colors at these windows.

The cast iron columns, beams, and rails at the galleries balustrade are painted olive green. All the cast iron elements at the stair are painted in various colors: dark green in the halls and Rotunda, and black or white in the pavilions. The color scheme does not match the original one, with some elements in sharp

---


Interior Lighting

None of the original gas light fixtures survives in the building. Most of the existing light fixtures appear to date to the 1970s restoration project. It is unclear how many of the historic-looking fixtures in the pavilions are replicas or date prior to the 1970s.47

Dating to the 1970s restoration project, the mirror pendant light fixtures in the halls are suspended by cable from the trusses (See Figure 85). All pendant fixtures were removed from the North Hall. Similar modern lights, as well as track lights, are located underneath some of the galleries at the halls, above the gallery at the North Hall, as well as on the first floor of the West Tower.

There are eight incandescent light fixtures in the Rotunda in front of the arches, suspended by cable from a steel rod that is anchored to the wall below the clerestory windows (See Figure 165). None of the lights installed around 1900 along the rails in the balcony in the Rotunda or the galleries in the halls has survived.

In the pavilions and towers, most of the light fixtures are fluorescent, and some of these are very obsolete. Others are more recent replacements. Some are directly attached under the ceiling, while others are hung (See Figures 166, and 167). In most of the pavilions and towers, a few spaces are lit by chandeliers of various configurations, with three, four, or six arms (See Figures 168, 169, 170 and 171). The

Footnote 47: Polshek/Tobey + Davis Architects, Existing Lighting Survey – Pavilions, Towers, Halls and Rotunda did not definitively identify any historic fixtures; however the survey lists all the chandeliers that could be historic.
chandeliers have a brass finish and white, frosted glass globe shades. None of them appears to be original; some of the chandeliers might be replicas of earlier fixtures. The 2000 Preservation Plan states that the fixture in the North West Annex (See Figure 172) is historic, possibly moved there from another location. The fixture is not identical to the one shown in the 1887 photograph, nor with the ones installed during the 1974 restoration. No photographs dating to the early 1900s have been located.

In a few instances, spaces are lit by bare bulbs (See Figure 173). A few of the spaces have pendant fixtures with ceiling fan.

Light fixtures in the ranges and courts are a mix of fluorescent lights installed in acoustic tile ceilings (See Figure 174) and fluorescent tubes attached directly under the vaulted ceiling (See Figure 175). The basement is lit with fluorescent fixtures.

**Fountain**
Centered in the Rotunda is the fountain reconstructed during the 1970s restoration project. The fountain includes a cylindrical pedestal/base surrounded by an octagonal basin (See Figure 104). The original granite-base fountain was removed in 1929 and, according to the restoration drawings, the fountain was reconstructed on the original foundations. The 2000 Preservation Plan notes that the white marble Foley fountain installed during the restoration project once stood in the center of the Horticultural Hall at the Philadelphia Centennial. Presently, the sculpture that was installed during the 1976 restoration has been removed and only the base is still extant. The basin concrete wall has a granite coping. The floor is constructed of concrete. Hung around the interior perimeter of the basin is a sheet copper planter box. The soil and plants have been removed.
Currently, there is no statue decorating the fountain. The original plaster statue “America,” designed by Caspar Buberl, was removed in August 1881, before the official opening of the museum. In December 1890, another statue was installed “Liberty,” also named “Freedom,” the original full-sized plaster model of the bronze statue created by Thomas Crawford (1814–1857) for the dome of the Capitol. Stored in the basement of the Capitol in 1860, this plaster statue, 19' 6" high, was donated to the Smithsonian in 1890 by the Architect of the Capitol, Edward Clark, and was restored by the museum prior to its installation on a brick and cement base in the center of the Rotunda. “Freedom” remained in the center of the Rotunda until 1967, when it was removed. The statue is currently on exhibit in the U.S. Capitol Visitor Center.

Library
The North West Annex served as a library since the AIB’s initial construction. Initially, the library occupied the first floor and the mezzanine, but soon after construction, in 1882, the library expanded onto the second floor. The stair that was added between the mezzanine and the second floor in 1882 was removed during the 1970s restoration project. The wood bookcases with glass panels are a replica of the original furniture and date to the 1970s project (See Figures 172 and 176). The original wood bookcases were removed in 1932 and replaced with steel shelves.

Structural System
The structural system of the building consists primarily of a series of wrought iron roof trusses supported by load-bearing masonry walls over a stone (gneiss) foundation. In the halls, courts, and ranges, roof trusses are original; the roof framing of the Rotunda, pavilions, and towers is also original. The trusses at the halls have been reinforced in several repair campaigns, beginning in 1890. At the ranges, the original trusses were retrofitted during the 1982 roof replacement project, including strengthening of a central diagonal member and field welding to reinforce some of the connections. During the 1980s roof replacement project, the trusses at the annexes were replaced with 14" beams (See section 2.4.1).

Over the years, a series of structural interventions have been incorporated to construct galleries at original exhibit spaces and infill original floor openings. The newer steel and concrete structures exist alongside and independent of historical building fabric.

The foundation system consists of a granite plinth over a (mostly) below-grade stone foundation wall. The foundation wall sits on a heavy bed of hydraulic cement concrete bearing on solid ground below the frost line.

The floors of most ground-floor spaces are slab on grade. Pavilion and tower upper floor framing typically consists of brick vaults with concrete fill spanning between I-beams. The floor construction of the Homblower & Marshall-designed galleries consists of cast iron columns with concrete arches and steel beams.

Except for galleries and infill areas, load-bearing masonry walls located along the perimeter of the original 17 exhibit spaces provide vertical structural support. The load-bearing masonry consists of a series of masonry piers with large arched openings that correspond to roof framing support locations. Most of the arched openings have been filled over the years, but their outlines remain visible.


Footnote 52: Smithsonian Institution Archives Record Unit 95, Box 32, Folder 35.
Roof structure varies per location, but generally consists of iron trusses at hall, court, range, and pavilion areas. The Rotunda roof is composed of iron beams and incorporates compression and tension rings. Please see the structural existing conditions section for an in-depth description of the existing structural systems and its components.

Mechanical System
Originally, the museum used steam for heating both the exhibit spaces and the offices. The 1879 specifications required the building to be heated to 72 degrees Fahrenheit, the halls to 68 degrees Fahrenheit, when the external temperature was at zero degrees Fahrenheit. Four low-pressure steam-boilers were originally installed in the basement of the South West Pavilion “having seventy-two tubes of 3 inches in diameter. [...] Two main-supply steam-pipes were 8 inches in diameter; the total radiating surface of the steam-coils was 13,680 square feet.”\footnote{53} “Bundy” radiators were placed around the base of the walls in the exhibit spaces. Heating by direct radiation was considered the cheapest and, generally, the most comfortable. No smoke or dirt and no risk of fire were among the main advantages of this system, while condensation deposited on walls, dry air, and unsatisfactory ventilation were the main drawbacks of heating by steam.\footnote{54} In 1881, a furnace was added in the basement of the North East Pavilion. Around 1900, two new high-pressure boilers were added in the basement of the South West Pavilion.

None of the original or early heating systems remains. Beginning with the 1950s, window air conditioners were installed at various locations around the building to cool the air in many of the exhibits spaces and offices. These were removed during the 1970s restoration project. By 1967, steam was piped from a central plant and some areas had air handling units.\footnote{55}

The current mechanical system of the AIB is a combination of larger air-handlers and equipment for larger-scaled spaces and individual fan coil units at smaller-scaled spaces. Natural ventilation, the original means of building ventilation, is no longer used. Instead, fresh air is typically ducted to heating and ventilating units, with conditions varying by location. The building perimeter heating system consists of 4-pipe fan coils. The majority of the building is served by constant volume air handling units.

Central chilled water is used from the GSA system. The North West Court chillers and cooling towers were abandoned when the building switched to the GSA service. Low-pressure and high-pressure steam is supplied from the Castle and GSA system, respectively. Please refer to the mechanical existing conditions section for an in-depth description of the mechanical system and its components.

Electrical and IT Systems
Electrical service to the AIB is provided by primary feeders originating in the National Museum of Natural History (NMNH) as part of the “museum campus” distribution system. Service is routed through a common ductbank. The primary feeders serve six service transformers. Power is distributed throughout the building to distribution panels, power panels, lighting/appliance panels, and motor control centers. A diesel generator provides emergency power to the fire pump, jockey pump, elevator, sump pump, egress lighting, and...
other miscellaneous, non-life safety loads. The existing lightning protection system consists of air terminals, base copper conductors, and ground rods.

Lighting varies per location. The major halls (with the exception of the North Hall) use decorative incandescent chandeliers. The North Hall uses incandescent track lighting. Rotunda lighting consists of incandescent glass globe fixtures. Generally, lighting at the tower and pavilion spaces consists of decorative iron and brass luminaires and chandeliers. Remnants of theatrical lighting can be seen in the Discovery Theater in the South West Range. The remainder of lighting is generally provided by miscellaneous fluorescent luminaires throughout the office and infill spaces in the building.

Emergency and egress illumination is typically provided by incandescent emergency fixtures with integral batteries, charging units, and multiple heads. Exit luminaires are generally incandescent.

Exterior lighting consists of at-grade uplighting at the north and west sides of the building, pendant fixtures at the tower arched entryways, and two lampposts at the North Tower terrace.

The current incoming utility services that support telephony and data communications services enter the building at the tunnel between the AIB and the Castle. Analog/voice communications services are distributed via category-3 cable to IDF closets located throughout the building. The AIB formerly housed the central data center for all SI buildings on the Mall. That data center has been relocated elsewhere, but the existing cabling structure remains.

See the electrical and IT conditions assessment for an in-depth review of electrical and IT systems and their components.

**Plumbing System**

The original building had public restrooms located in the South East Pavilion. The building was also provided with a storm drainage system that included internal drains.

The plumbing service was expanded over the years, when additional restrooms and small kitchens were installed in annexes or ranges. Pavilion restrooms were updated as part of the 1973 renovations. Plumbing was also extended when the mechanical system was installed in the 1970s. Domestic water enters the building in the southwest quadrant and is routed via copper piping to fixtures, water heaters, and HVAC equipment. Domestic hot water is provided throughout the building by local electric water heaters.

Roof drainage is accommodated by a series of gutters and both internal and external downspouts and is connected to the underground storm water system.

Please refer to the plumbing conditions assessment portion for an in-depth description of the plumbing system and its components.

**Life Safety and Fire Protection Systems**

Factors contributing to the life safety and fire protection systems of the AIB include building materials, code requirements, egress capacity and configuration, and fire alarm and sprinkler systems.
AIB walls are masonry and floors are concrete. Roofs and mezzanines are supported by unprotected steel/iron. Building construction type is based on the least protected elements. Because of the unprotected columns and roof, the building construction type is Type IIB per the International Building Code (IBC) and Type II (000) per NFPA 101, The Life Safety Code (LSC).

Although currently vacant, per the IBC, the AIB is an existing mixed-use/non-separated Group A-3, Assembly and Group B, Business with accessory storage. A similar categorization according to the LSC is: mixed use Existing Assembly and Existing Business occupancy.

The AIB’s exiting scheme is, essentially, unprotected exit access to the four main tower grade-level exterior exit doors. An enclosed exit stair is located in two of the courts and each of the pavilions. (Of note, the halls vertically connect two floors.)

The building is fully sprinklered with numerous wet-pipe automatic sprinkler systems. The approximate installation date is 1975 with several more recent modifications. Fire hose valves are provided in the courts, ranges, and pavilions.

The building is provided with a manual and automatic fire detection and alarm system. Alarms are initiated by waterflow switches, manual pull stations, and complete area detection. A Fire Command Center is located in the North Tower.

Security System
For a discussion of the historic security system, see Section 1.1.

As the AIB is not currently occupied, the security system description as reported in the BBB Mothballing Report is no longer used. All access to the AIB is through the underground tunnel between the AIB and the Castle basement, and is monitored by the OPS office adjacent to the tunnel entrance.

Existing security measures include an alarm system with door and window contacts, approximately seven video cameras, a control room (Security Operations Room 1102), and decorative wrought-iron grilles at most first floor windows. There are ornamental iron gates at each of the tower entrances, but these remain in an open position.
Building History, Description and Significance

Physical and Spatial Description 1.3

PARTIAL ROOF PLAN
ROOF PLAN
SECTION THROUGH SOUTH HALL FACING NORTH

SECTION THROUGH NORTH HALL FACING NORTH
Existing Ground Floor Plan, Column Survey
(Polshek Tobey + Davis, 2000)
Statement of Significance
The AIB, built between 1879 and 1881 and originally known as the National Museum Building, was constructed to house the vast foreign and domestic donations to the United States (U.S.) government of exhibits from the 1876 International Exposition in Philadelphia, which commemorated the Centennial of American Independence. It also was built to house the growing Smithsonian Institution collections that could not be accommodated in the Smithsonian Institution Building, now known as the Castle. It was the first of a group of purpose-built museums built by the SI with a combination of federal and private funding. The AIB possesses integrity of location, design, setting, materials, workmanship, feeling, and association. The building was listed in the District of Columbia Inventory of Historic Sites in 1964 and, in 1971, it was listed on the National Register of Historic Places and designated a National Historic Landmark.

Historical and Institutional Significance
The AIB was constructed to receive, exhibit, and preserve the collections of the natural resources, arts, and industries belonging to the national government and was the beginning of what is now one of the greatest museum complexes in the world. In this building, the SI developed methods of museum administration, specimen preparation and preservation, classification and labeling, exhibition, and education outreach that became standard practice in museums worldwide. Sharing exhibits, plans, and publications with museums in other cities and countries, the National Museum served as a model institution assisting in the development of other museums. The natural resources, arts, and industrial innovations of the United States were introduced to cities across the nation and world-wide through the participation of the SI and the National Museum in the great international expositions of the 19th and early 20th centuries. And, the National Museum contributed immeasurably to the understanding of this country’s cultural history — particularly that of Native American and Pacific Rim societies — through its preservation of the collections from U.S. government-sponsored expeditions of exploration of the 19th century, as well as the collections of various government departments. The museum also has been a vital cultural force in the nation’s capital through a series of both popular and professional lectures and publications, instituted at the very beginning of the SI’s occupation of the building. In the 20th century, demonstrations, classes, and publications extended the educational advantages provided through the Institution and the museums.

Architectural Significance
The AIB is a fine and unique example of early, innovative museum design inspired by the design of international exposition buildings following the 1851 success of the Crystal Palace in London. Through the adroit manipulation of mass, scale, line, proportion, and color, the design avoids the monumentality typical of museum buildings, welcoming the public to explore, celebrate, and learn about the natural resources, arts, and industries of the United States. It is an early example of a building in which integrity of form is expressed directly through structural and functional clarity. The AIB also exemplifies the use of new building technologies and design attitudes to quickly, inexpensively, and ingeniously construct a new building type. The building — the
last remaining brick building facing the Mall — is an exceptional example of brick masonry architecture, in both design and craftsmanship, as used in a major government building in a city where monumental stone architectural design prevails for such buildings. Finally, its modern Romanesque style purposefully complements the historical Norman Romanesque style and scale of the Smithsonian Institution Building.

The AIB is a major work of the notable Washington architectural/engineering firm of Cluss & Schulze with Adolf Cluss, FAIA, as architect-in-charge. Cluss was the premier architect in Washington during the Civil War and Reconstruction period, designing model urban public schools and markets for the city. Among his best known works are the old Department of Agriculture Building, the National Museum, and the Army Medical Museum on the National Mall. He also was well-known for many private commercial, institutional, and residential buildings in Washington, D.C.; Baltimore, Maryland; and Alexandria, Virginia.

The design of the AIB reflects a close, 25-year working relationship between Cluss and Smithsonian Secretary Spencer Fullerton Baird, during which time the programmatic requirements for a national museum gradually and thoughtfully developed. Cluss’ relationship with General Montgomery C. Meigs also is significant to the building and evident in the initial exchange of design sketches between the two men, the structural solutions developed, and the design of the AIB’s heating system.

Identification of Primary Period of Significance

Period of Significance is defined as an extent of time when a property attained its most important characteristics or was associated with important events, activities, or persons. Because the significance of the AIB includes both institutional and architectural significance, the primary Period of Significance for the building must represent not only the character-defining features of the design and construction but also reflect the influential changes in the Institution. The primary Period of Significance is, therefore, between 1881 and 1902 as it represents both the architectural and institutional significance of the AIB.

1881 to 1896: A Museum for the Public

The initial years after the building’s completion reflect the physical realization of the building’s design concept at a time before the roles of the SI were formalized. The need for the building was catalyzed by the acquisition of the Centennial Exhibition collection. The design and funding of an appropriate structure also contributed to and allowed the expansion of the mission of the SI. This commitment and undertaking by the SI is remarkable given the Institution’s mere 35 years of existence. (The design intent and influences on Cluss are examined in the section of this report on the history of the building and its context. The critical roles of the building commission and the SI secretaries are detailed in the Historical Background and Context section where the detail of their missions, contributions, and goals for the collections are enumerated.)

Joseph Henry (Smithsonian Institution Secretary from 1846 to 1878), while leading the establishment of the SI, set forth the need for a more modern museum building than the first Smithsonian Institution Building. Spencer Fullerton Baird (Smithsonian Institution Assistant Secretary until 1878 and Secretary until 1887) played a significant role in the establishment

Footnote 1: In the late 19th century, several other brick buildings were located along the Mall, including the Old Department of Agriculture, the Army Museum, and Central Market, all buildings designed in the office of Adolf Cluss.


Footnote 3: USNM AR 1897, PT II, 225.

Footnote 4: March 1, 1882 Report of the Assistant Director of the United States National Museum, for the Year 1881, report by G. Brown Goode, Assistant Director, US National Museum (SI-AHHP, Box 12). May 31, 1882 Excavating was begun April 20th for the coal vaults for [the] Museum building and is now underway....

Footnote 6: January 1, 1886 Letter/semi-annual report submitted to G. Brown Goode (SIA, RU 158, Box 22, USNM 1881-1964, Curators’ Annual Reports). Aug: “...The leaky condition of the skylight in the laboratory was repaired without any material cost. Sept. 17: Many repairs have also been necessary to the roof of the National Museum Building, occupying much time of the tinner. Dec. 2: The two dark rooms on west balcony have been made serviceable by placing skylights in each room. There was also a skylight placed in the dark room on south balcony...


Footnote 8: June 30, 1889 Semi-annual report (SIA, RU 158, Box 22, USNM 1881-1964, Curators’ Annual Reports). June 24 - Owing to the narrow stairway and the inconvenience of getting large objects to the 3rd floor north west Pavilion, a large window has been cut in the wall leading to the Roof on the east side, where large objects can easily be hoisted to the Roof, and put through this opening, this affords more convenience and better ventilation. The east window 2nd floor Natural History’s Laboratory has also been enlarged about double the original size, affording much better light to the Artists occupying the room.”

of the museum prior to 1881 with his development of the U.S. exhibits at the Centennial Exposition and his success in convincing many of the exhibitors to donate their exhibits to the SI. These materials, in combination with his political efforts to create a National Museum, were realized in 1881. The AIB was born from a series of collections that revealed ethnological history through manmade objects combined with natural history exhibits. Samuel Pierpont Langley (Smithsonian Institution Secretary from 1887 to 1906) continued to manage the growing collections within the building and maintain the mission of the SI.

George Brown Goode, the Smithsonian’s assistant director and later director during its first 15 years, defined and shaped the policies and organization of the SI. He described the importance of museums as “a necessity in every civilized community” that existed to “serve the needs of the general public through the display of attractive exhibition series...and thus stimulate and broaden the mind...”

The inaugural ball for President Garfield contributes to the significance of the museum as both the site of that important presidential inaugural event and the opening event for the museum. The selection of the new museum building for the ball reflects President Garfield’s connection to the Smithsonian Institution as a Regent and, therefore, his investment in the development of the first public museum contributing to the mission of the SI. Remarkably, there are photographs documenting the temporary decorative treatments and finishes created to accommodate the event.

While, initially, Goode was pleased with the building, his later writings indicate that he struggled with the building’s ability to support the model of a public museum. The growing SI led him to make physical changes to the building from 1882 until his death in September 1896. During these years, Baird, as Secretary, and Goode, as Assistant Secretary in charge of the National Museum, directed the changes, described in the Semi-Annual Report of the Superintendent of Buildings, indicating that the original concepts based on the exposition building model did not fit the needs of a contemporary museum. In Goode’s estimation, “A single entrance and one consecutive line of progress through the halls is most advantageous, both to administrator and visitor, and should be duly considered......” The four entrances and open plan based on models of exposition buildings did not provide this arrangement, and the changes made to enclose spaces into distinct galleries reflect Goode’s view and were a significant departure from the original Cluss plan.

Early building changes to accommodate changed functional needs obscured the entirely open character of the building envisioned by Cluss, which reflected his commitment to the democratic ideals. The open physical and visual connections between the interior spaces derived from the exposition building model, which were fully realized by Cluss, were muted by the infill of many of the arched openings in order to approach an exhibition model reflected in the design of most major museums of the late 19th and early 20th century. The continual changes to the National Museum Building may have been arrested if requests for funding for another museum building were not repeatedly turned down or reduced by...
Congress. In 1882, according to Spencer Baird, the size of the building was already "inadequate" (reprint USNM AR 1903, 263-6), but this, combined with the programmatic changes, meant that the pure volumes of space were altered along with the experience of the building. This change set the stage for alterations that would continue throughout the 19th and 20th century.

The exterior of the building experienced minor changes between 1881 and 1896 and none of these modifications radically compromised the integrity or the significance of the massing, volume, material, and detailing of the exterior. Modifications to the exterior at this time included: excavation for the coal vaults, repairs to the slate roofing, repairs and additions to skylights, additions to skylights and the cutting of the opening in the east elevation for the café, and the removal of the second layer of glass on the double-glazed single sashes. The most significant changes relate to changes in the material integrity of the exterior with the openings for the café and North West Pavilion window and the removal of the second layer of glazing within the double-glazed windows. None of these changes impacts the significance of the initial design of the building.

The interior of the building experienced changes reflecting the increasing expansion of the collections. All of the interior changes that decreased the transparency of the spaces were reversible. Changes in the interior finishes that contribute to the significance and integrity were minor and due to their functional failure. The plaster on the underside of the structure was removed and replaced with corrugated iron sheets. This change did not diminish the clarity of the expression of the exposed structure within the Rotunda, halls, courts, and ranges. Finish floor materials were changed as the exposed concrete slab was not considered an appropriate finish and the wood floors installed for the inaugural ball deteriorated due to moisture penetrating the concrete slab-on-grade. The temporary statue of "America," erected for the ball, was removed from the Rotunda and replaced in 1881 by a fountain and basin, which later, in 1890, was surmounted by the plaster cast of "Freedom."

The Cluss-designed National Museum retains a high degree of integrity of its material, massing, and scale. Its significance is related to the structural and material clarity. Changes to the building are incurred from two primary forces: the increased demand on the space, and the failure of some of the original materials and technology integrated into the construction of the building.

1896-1902: Growth of Collections and Hornblower & Marshall
This period represents the rapid expansion of the SI and its new mission and vision under the direction of Samuel Pierpont Langley. During this time, the SI continued to seek funding to expand to a third museum — this would later become the National Museum of Natural History — while the National Museum continued to be modified to contain an increasing collection, staff, and research programs. Most significant to the changes to the architecture of the building were the additions made by the architects Hornblower & Marshall that include galleries, skylights, building systems improvements, and the modifications to the interior finishes within the main public spaces.

Footnote 9: August 29, 1896 Letter/annual report for fiscal year ending June 30, 1896 to Dr. G. Brown Goode from Henry Horan, Superintendent (SIA, RU 158, USNM, 1881-1964, Curators’ Annual Reports, Box 23). Dec. 4th: "One light of glass [has] been removed from the sash in several of the offices of the Museum. In their present condition (double lighted) the only way to clean the glass, was to remove one light. This always kept the glass in a dirty condition on the inside, and made the windows unsightly. By the change, they can be cleaned whenever necessary..."

Footnote 10: February 28, 1890, Letter from Edward Clark, Architect of the Capitol, February 28, 1890 and Senate Doc. 2740, 5pt Congress, 2nd Session, April 8, 1890. "Building had reached extremely overcrowded conditions."

Footnote 11: April 16, 1890, Letter from Lester F. Ward, Dept. of the Int. U.S. Go. Survey to Prof. Goode (SIA, RU 198, Box 13) Complained of crowded towers and balconies; requested curtains or shades to be furnished along the large south windows of the balconies to protect from sunlight.

Footnote 12: 1884 William J. Rhees, Visitor’s Guide to the Smithsonian Institution and United States National Museum in Washington, Washington, DC: Judd & Detweiler, Printers (SI-AHHP, Box 4). On the main floor there are seventeen halls which freely communicate with one another by wide and lofty archways, furnishing 80,300 square feet of floor space.
Of these changes, the most significant physical and spatial changes extant today are the result of the introduction of the galleries in three of the halls. The construction of galleries was accompanied by more infill of the arched openings and the addition of skylights to improve daylighting, in advance of the ongoing electrification of the building to provide for artificial light. These galleries were a departure from the Cluss final design.

Among numerous early plans, renderings and written records, an 1878 Cluss rendering shows galleries in the halls (See Figure 1). It is unknown who asked for the rendering or whether the concept was generated to add programmatic space within a limited footprint or as a spatial/architectural concept.

The design of the new railings and the new decorative painting scheme depart from the Cluss design and represent a transition into the Beaux Arts style, popular for public architecture at the time. Grace Lincoln Temple developed an interior finish scheme that aligned with the changes proposed and completed by architects Hornblower & Marshall.

The additions and modifications that follow 1902 do not have significance as they eroded the initial design and modified the structure of the building. Infill and separation of exhibit halls removed the sense of openness and the spatial transparency developed in the Cluss design.
The building was claimed to be the most economically constructed public building ever undertaken by the U.S. government. Construction was realized with inventive uses for slab-on-grade, iron trusses, day lighting, steam heating, and, except for some select materials, use of regional and local raw materials and labor.

The Greek cross plan and visible iron work structure were influenced by the construction of exposition buildings, including the Crystal Palace in London and the Halls of the Centennial Exposition in Philadelphia. These structures displayed a variety of types of open web steel trusses. The AIB was documented in several reports as using the recently developed Pratt type truss at the suggestion of General Meigs; however, analysis shows that trusses over the halls may be a particular custom hybrid type. The framing of the transition from the Rotunda to the courts and of the courts also is a unique construction as discussed in the structural section of this document. The double layers of custom-fabricated trusses that transition from the Rotunda walls to the Court roof systems have been problematic. The combination of the connections to other portions of the structure with the actual bearing conditions are some of the possible causes of the issues with these trusses. A full structural model will document the issues with the trusses, the masonry structure and the roofing system. The Court roof systems also have caused issues as their compression ring system for the monitors have been altered to address load-bearing and water degradation.

The 2000 Preservation Plan provided a concise history of the development of the National Museum, SI, and the evolution of the building’s name to the AIB:

The National Museum was established in 1846 by the Federal Government to display the Wilkes Exploring Expedition collections which was transferred to the care of the Smithsonian Institution in 1858. Overcrowding of Renwick’s Smithsonian Institution, or the Castle as it is better known, prompted the Smithsonian to request appropriation from Congress to construct a new building to house its growing collections of natural history. The A&I Building, completed in 1881, was known as the National Museum Building until 1911 when Annual Reports began referring to it as the “Old Museum Building” or Old Building” to reflect the construction of the Smithsonian’s National Museum of Natural History. The name Arts and Industries Building first appears in the 1916-1917 Report of the Superintendent of Buildings and Labor.22

The AIB is a significant example of a public building designed by one of the most prominent and prolific architectural firms in Washington, D.C., Cluss & Schulze. The designs from their office included many Washington, D.C. civic landmarks including: Franklin School, the old Department of Agriculture, Eastern Market, and Calvary Baptist Church.

The AIB was listed on the National Register of Historic Places and designated a National Historic Landmark in 1971.

The nomination for listing the AIB in the National Register of Historic Places in 1971, summarized earlier in this document, states that the significance of the building is in the areas of Architecture, Art and Industry and is “the best preserved” example in the United States of 19th century world exposition

Footnote 17: Plaster model of the statue of Liberty, on the dome of the US Capitol, by sculptor Thomas Crawford, given to US National Museum to exhibit (AR 1891, 88)

Footnote 18: November 14, 1900, Letter from Rathbun to S.P. Langley, Secretary, re: Lecture Hall in the East North Range. (SIA, RU 31, Box 56) Utilized painting advice from Miss Temple.

Footnote 19: August 25, 1902 Letter to Miss Temple from W. Racceuil (SI-AHHP, Box 15) Grace Lincoln Temple designed decorative work and color scheme for stenciling rotunda, south, east and west halls, ranges and courts of the National Museum. It is unknown how much work was completed in the courts and the ranges.

Footnote 20: 1902-1903 Annual Report of Superintendent, 1902-03 (SIA, RU 157, Building Management Department, 1881-1973, Box 1). July 1902: Painting of the interior of the building was started during this month. Elaborate scaffolding was constructed in the Rotunda.
Building History, Description and Significance

Footnote 21: 1903-1904 Annual Report of Superintendent of Construction & Labor, 1903-04 (SIA, RU 157, Building Management Department, 1881-1973, Box 1). Interior: work included painting; erecting “two new Paradigm skylights” over WN and WS ranges; stenciling of walls in Rotunda; covering of iron beams and other unsightly areas in exhibition halls with compo-board; removal of double glass from double glazed windows; and elaborate scaffolding was reconstructed in the Rotunda for use in stenciling walls (June 1904).


architecture. It states that the building reflects the three aspects of this style of architecture: enclosure of a large volume, tasteful and dramatic detailing, and economy of construction.

Cluss stated that the style of the building was:

A modernized Romanesque style of architecture adopted for the new building in order to keep up a relationship with the Smithsonian building, which is designed in Norman, a variety of this style. To modernize this style was found necessary on account of the different building material, and to do justice to the purposes of the building with its modern demands of perfect safety and elegance of construction, of greatest possible available floor space, of easy communications, efficient drainage, a well calculated and pleasing admission of light, free circulation of air, and all other hygienic dicta. The external architecture is based upon the general arrangement of the interior, and shows plainly the prominence of the four naves and the careful management of the light for the central portion of the building.23

The effect of the “admission of light” and “free air circulation” created voluminous spaces culminating impressively with the rotunda. The 2000 Preservation Plan accurately describes the character of the space as:

...soaring halls, with their clerestory windows and monitors, created an experience that was not easily forgotten and offered a formal setting for display of the world’s treasures.24

The 1884 Visitor’s Guide to the SI and the United States National Museum concisely identifies the primary purposes of the building as:

It is a Museum of Record, in which are preserved the material foundations of an enormous amount of scientific knowledge...

It is a Museum of Research, by the policy which aims to make its contents serve as fully as possible as a stimulus to and foundation for the studies of scientific investigators...

It is an Educational Museum of the broadest type, by reason of its policy of illustrating by specimens every kind of natural object and every manifestation of human thought and activity...

This was the beginning of a new era for museums, modeled from the SI mission and taking its physical manifestation from the design, massing, and function demonstrated in the AIB. The AIB’s influence also extended to many of the Smithsonian’s other museums and the Zoological Park, which can trace their inception to collections in the AIB. The AIB remains a significant landmark in the United States of America, not only in association with the formative years of the Smithsonian Institution, but also through its role in the earliest years of American museology.
Architectural Significance
Architects and Engineers
General Montgomery C. Meigs, Adolf Cluss of Cluss & Schulze, and Joseph Hornblower and James Rush Marshall of Hornblower & Marshall comprise the group of engineers and architects associated with the development and modifications to the AIB during the primary Period of Significance. All of these men were significant in the development of the building and were well known and recognized professionals of their time.

General Montgomery C. Meigs was well known and politically connected within Washington, D.C. Trained at West Point, Meigs continued as a career officer in the U.S. Army. He is recorded as having developed some initial concepts for the museum but, rather than directly designing the building, it is more likely that he influenced Adolf Cluss in the building’s design.

Adolf Cluss, of Cluss & Schulze, was the primary architect and engineer as detailed earlier in this text. Cluss had many significant contributions to the development of Washington, D.C. and its architecture. He was recognized for working with brick and integrating innovative building heating and ventilating systems within his architectural solutions. Both of these areas of expertise are expressed and continued in his design for the AIB. It is likely a combination of the welcoming character of the exposition architecture and Cluss’ intent that this become a museum for the public that developed the form and materials used in this building.

Joseph Hornblower and James Rush Marshall were established professionals known for their Beaux Arts style of architecture. They had several commissions with the SI, including the renovation of the National Museum and the design of what would become the New National Museum. Their galleries and modifications within the AIB represent a departure from the final design concept of Cluss.

Architecture
Site
The location of the museum was selected and defined by its relationship to the SIB, as well as its relationship to the National Mall. The Mall was initially conceived by Pierre Charles L'Enfant in 1791 as a part of his plans for Washington D.C. L'Enfant envisioned a 400' wide open space, one mile long, “agreeable and convenient to the whole city which …will have an easy access to this place of general resort.” L'Enfant envisioned various public buildings along the Mall that would be “attractive to the learned and afford diversion to the idle.”

The Smithsonian Grounds, given by the Congress to the SI, were part of the original public reserve intended by L'Enfant in the original plan of Washington that was first identified as “The Mall” in 1802 map.

L'Enfant’s vision for this “Grande Avenue” did not materialize, and for many years the area was not developed. The SI’s role in the development of the Mall began with the construction of the SIB (1847–1855). In 1851, architect and horticulturalist Andrew Jackson Downing designed a landscape plan for the original public reserve intended by L'Enfant; however, not much was implemented due to lack of funding. The plan included landscaping of what would later become the Smithsonian Grounds. At the time the National Museum opened, the Smithsonian Grounds were closer in appearance to the naturalistic garden Downing had intended, with “broad lawn surfaces

Footnote 25: Later known as the National Museum of Natural History (NMNH)


Footnote 27: Mathew Carey’s 1802 map first identified the area as “The Mall.”
Building History, Description and Significance

When the AIB was planned, the SIB was the only building on the grounds. The selection of the site was completed after examination of options for additions to the SIB. The site adjacent to the SIB was mandated within the existing parcel of the Smithsonian Grounds established in 1847. Legislation located the building 50' off the southeast corner of the first SIB, and not to block the view of it from the Capitol. The AIB continued the tradition of accessibility to the public that L'Enfant had envisioned for buildings along the Mall. While the grounds were to provide recreation, the museum was intended to perform activities to educate the citizens. A park in the vicinity of the museum was considered an important feature and was a common setting for museums of this era, beginning with the Museum of Natural History in Paris, France.

The AIB reinforced the democratic ideals symbolized in the original design of the Mall by L'Enfant, which intended to reflect the democratic ideals of the new nation. The first found site plans for the AIB indicate curvilinear paths and a protected entrance at grade with the surrounding landscape, easily accessible from the Mall (See Figure 3).

It was not until the beginning of the 20th century that the McMillan Commission created a plan that lead to the development of the National Mall as it appears today (See Figure 4). The McMillan plan transformed the picturesque and informal Mall into a formal and monumental Beaux Arts composition. Beginning with the National Museum of Natural History edifice that opened in 1912, the buildings that continued to be added along the Mall were more formal and monumental.


The hierarchy of this building is the expression of the arrangement of the volumes and it represents the importance and relationship of the interior spaces. The rational volumetric hierarchy and the arrangement of these volumes are primary character-defining features of the building. The composition of volumes also plays a role in minimizing the impression of a massive building — the museum, with its 2.3-acre footprint, was rather a large building — and in reducing it to the scale of more common buildings.

Since the National Museum Building was designed prior to the widespread use of artificial light and mechanical ventilation, the volumes are further articulated by a picturesque roofscape of clerestories and monitors that brought-in ample daylight and induced air movement.

As described in earlier sections, the halls of the AIB radiate from the central Rotunda capped with a dome-like structure and a cupola with a folded metal roof and finial reaching 108’ above grade (See Figure 6). The hierarchy of the interior volumes is clearly expressed as the halls project in each of the four primary cardinal axes. The towers at the ends of the halls rise next in height to indicate the initial four primary entrances of the building and the corner pavilions and annexes with tall tapering towers maintain the four corners of the square structure (See Figure 7).

The entire composition of spaces revolves around the Rotunda, the tallest, most decorated and representative space in the building. The Rotunda was the symbolic aspirational “center” and served for reference and orientation, particularly during the time it housed the “Freedom” statue.
The initial design intent of the interior transparency between the halls and courts is echoed on the exterior of the building with the variety of roof heights and forms, choice of roofing materials, and placement of monitors at the high points of these roofs.

Physical elements
The integrity and context of the physical components are critical to establishing the period of significance for the building. Critical to the integrity are both the degree to which material is extant from the Period of Significance and the condition of this material.

Masonry
Red brick was the building material of choice for Washington in the 1860’s through the 1880’s. Brick was considered a modern material, fireproof and economical, and Cluss preferred to use brick to show that buildings were “not tied to other cultures, classes and styles.” It was an aesthetically versatile material, because it could be manufactured in several colors and finishes at local brickyards.

The structural polychromy used on the exterior of this building is a character-defining feature that maintains a high degree of integrity today. The use of brick as a common material helped the public to relate to other common buildings such as markets and schools. The large areas of red brick combined with the stylized color details that accent the structure make this building unique.

The repetitive uses of decorative masonry elements are an indication of building economy; however, there is no lack of detail or interest in the composition of any of the exterior building. The arches vary in scale according to location, and are accentuated by the ornamentation and the use of pattern and color. The arched openings translate in form and scale to the interior spaces of the building (See Figure 8).

On the exterior of the building, the integrity of masonry materials is high with limited exceptions. The majority of the red, black, and buff bricks remain as original materials with limited areas of repairs since the construction of the building. The blue glazed brick was replaced to an undocumented extent in 1969; the color is noted as slightly lighter than the original glazed brick but this could be due to the patina of the glazing or accumulation of dirt. The analysis of the color difference is not stipulated in the documentation about the scope of work. The composition of the exterior brick patterning and detail retains its original intent and integrity.

Since the construction of the building, there is little documentation, with the exception of minor repair, for any work on the granite and gneiss stone elements. The sandstone sills and door surrounds show repairs, replacements, and repeated waterproofing treatments. Although the sandstone has had numerous repairs, the work and replacement do not diminish the importance of this material in the composition of the exterior façade.
Roof

Draped over the varying heights and volumes, the roof is comprised of gable, dome, hip, shed, and pyramidal forms. Seen as a composition, they express the scale and relative importance of each space inside as well as the challenge to bring daylight and air into each space through clerestories, skylights, monitors, and vents. Roof surfaces were originally covered with three colors of slate except at the ranges and the low sloped transition areas where flat-seam tin metal was used. Although the materials themselves are not unique, the form of the roof and the connectivity of the types of roofs are significant to the understanding, history, and technology of the building. The current covering systems, while not properly functioning to maintain a waterproof envelope in all locations, do not drastically change the appearance of the initial construction. Slate remains at towers and pavilions while a variety of metal roof systems have been employed reflecting a continual effort to keep water out of the building (See Figure 9).

The materials are not unique in themselves but the expanse and composition of these roofs over the truss system is significant to the building. The visual integrity of the original materials has been compromised as batten roofs rather than original flat-seam roofs cover the ranges. Numerous repairs over time to address structural and environmental issues compromise the visual integrity of these roofs primarily at perimeter flashings and valleys. Overall, the significance of the form of the roof and the relationship to the interior of the building remains unchanged and the composition of the roof planes, volumes, and forms is a strong character-defining feature of the AIB.

Monitors and Skylights

The significance of the monitors in the roof is that they provide a texture to the expansive roof planes and they are critical to the function of the interior of the space. The use of this vertical translucent glazing was a topic under discussion in the development of museums in the late 1800's. At that time, research was beginning to be developed for the impact of unfiltered daylight on collections. Cluss was familiar with the use of indirect lighting and ventilation with monitors in his public market structures. The application of indirect lighting combined with ventilation is not apparent in other museums of this period.

Construction modifications have been made to the monitors since their initial construction. The windows featured wood sashes that were replaced by metal, and openings were often altered for modern ventilation. The range roofs were modified as the galleries were built inside the museum in order to increase daylight in the spaces. Dating to 1900, the court skylights are significant because they reflect the changes to the museum building around the turn of the 20th century, when, with the construction of galleries, more light was needed in the exhibit spaces (See Figure 10).
Exterior Doors
There are four main entrances to the building and one side entry off the first floor of the North West Pavilion. All five entry points have existed since the original construction. Many of the initial design features were executed as detailed by Cluss with the exception of the decorative etched glass on the four tower entrance doors. The location of entrances on each elevation reinforces the designer’s intent to create the feeling of openness and to welcome the public into the building.

The function and detailing of the south and west entrances changed through time. Soon after opening as a museum, the only functional doors were at the North and East Towers and there was a door off the North West Pavilion. The entrances eventually became specialized, however, with the only public entrance on the north elevation and the only service entrance on the east elevation; the door at the North West Pavilion served the museum director’s offices.

Though all entrances were not consistently in use as public entrances, all entrances have been restored and reflect the expressive character of the initial. With the exception of the gates at the west entrance, which have been restored, the present gates and doors are replicas.

Facing the Mall, the north entrance was intended and has remained the primary entrance, reinforcing the importance of the location of the building along the Mall (See Figure 11). This entrance was differentiated with the Buberl statue, a roof mounted flag pole, and a stone entrance plinth paved with red, white, and black marble, with three steps leading from the sidewalk to the area in front of the entrance.

Glazing and Windows
The window openings are critical to the character-defining features of the AIB. They punctuate the masonry skin, create rhythm on the elevations, and allow for a lightness of form and physical translucence of the space. The window system of the AIB serves to provide both light and ventilation.

Constructed with double glass panels separated by a 3/4” wood stop, the windows were early examples in the search to provide some insulating value and reduce the heat load requirements for the building.31 The references to the window glazing note a distinct design intent to provide transparent glass at the pavilion and tower work areas; light-diffusing glass at all the exhibit spaces, including the Rotunda, was described in documents as ground, milk, and etched. Decorative colored glass was limited to the windows over the entrances at the end of the halls, again emphasizing the economy of ornament consistent to the initial design. The decorative and

Footnote 31: SIA RU 71, Box 10.
ground diffusing glass was set in both wood and iron frames. Wood frames were used in lower areas and iron in clerestory and monitors.

The original windows in the 17 original exhibition spaces were double glazed for insulation and set in wood frames, incorporating ground glass at one face of one pane of the glazing assembly to achieve a translucent finish. This “frosted” effect diffused and scattered light. Besides allowing light, windows helped with the air circulation and ventilation of the interior of the building. Windows were designed to be a part of the ventilation system, at offices were double hung while at the public spaces, windows had steel some pivoting sash.

Although the openings for these windows retain their significance and integrity, the units and their frames were all replaced with insulated glass in new wood sash during the 1980’s restoration project. Decorative colored glazing, at the ends of the four halls, was retained and set in new wood frames during this renovation (See Figure 12).

The window assemblies articulate a progression from the monumentality of the façade to the human scale. The windows in the towers and pavilions are divided in one, two, and three panels of various widths while the windows in the ranges are typically divided vertically into three equal widths. Their scale is further reduced through horizontal dividers into smaller panes of fixed and operable panels. These proportions and geometries are based on Cluss’ “modernized Romanesque style” (See Figure 13).

The variation in window types throughout the building indicates a variation of interior uses. Like the masonry system, the window system is rich in detail while addressing economy through the repetition of form. With the exception of the Rotunda, each primary building element (halls, ranges, courts, pavilions, and towers) is repetitive, thus each window type is found in numerous locations throughout the building. Although the existing window frames, sash, and glass are replacements, the proportion and detailing were maintained and they are a character-defining feature of the building.

Awnings were significant features that began to be installed at windows soon after the museum opened, first at the office windows (See Figure 14) but later, even at the ranges. Awnings were likely added on an as-needed basis, and at no point did all windows feature awnings.

Ornament and Details
The use of ornament is significant to the style of architecture and the architecture of Cluss. It is also indicative of the expressed economy of the building and stands in contrast to the more romantic style of the Smithsonian Castle. Decorative features on the
exterior of the building were integrated into the color of some of the materials used, including buff, blue glazed and blackened bricks. Masonry decorative features include sandstone trefoil medallions and other decorative sandstone ornaments.

Other ornament is focused around the entrances to maximize impact. Details in carved stone, stained and painted glass at the end of the halls, and the iron gates provide a definition of character for the structure. The most prominent decorative entry element is the metal Buberl statue over the north entrance of the building, facing on the National Mall. The significance of the roof ornament is that it accentuated the hierarchy established by the volumes and heights of each roof. Initially cast iron, the metal finials on the courts, Rotunda and towers provide the appearance of focusing the forms of the monitors and roof planes to a single point.

Between the towers, additional detail was placed for visual emphasis and is consistent with the economy of ornament typical of Cluss’ work. Acroteria topped the stone-framed entrances, the peaks of the pediments of the pavilions, and at the corners of the pavilion monitors. Other galvanized iron ornaments included functional vent stacks placed at the bottom corners of the pavilion pediments (See Figure 15).

Buberl Statue
A painted zinc sculpture was installed above the north entrance in 1881 prior to the completion of the cladding of the roof (See Figure 16).

The statuary grouping is critical to the definition of the north entrance as the primary entry and is a direct reference to exposition architecture as represented by the Rotunda of the 1873 Vienna Exposition (See Figure 17).


Footnote 33: David Ovason, in The Secret Architecture of Our Nation’s Capital: The Masons and the Building of Washington, DC, (New York: HarperCollins Publishers, 2002), 29, speculates that the material was chosen as an "homage" to Smithson and his scientific discoveries related to zinc. Calamine, a type of zinc ore, was renamed smithsonite in Smithson’s honor in 1832 by a French scientist. Smithsonite was a principal source of zinc until the 1880s.
were introduced to the U.S. by German sculptors who immigrated after the 1848 Revolution.32,33 One of Buberl’s first major works is a 10’ zinc statue of Robert Fulton, constructed in 1872 in Fulton Park, New York. He went on to work with Montgomery Meigs on the Pension Building in 1882, creating the entire frieze of that structure followed by several significant Civil War and military monuments and memorials. The statuary at the AIB appears to be his largest and most prominent commission at that point in his career.

**Interior**
The character-defining features of the interior of the AIB include the hierarchy and organization of the volumes, the visual transparency between the spaces, and the decorative treatments of the main public spaces.

**Spatial Organization**

**Rotunda**
The Rotunda is the central and ceremonial focal point of the structure and, as such, is a space of primary significance in the building. It served as the point of reference and orientation within the open, flexible floor plan.

In the center of the Rotunda, the placement of “America”, a plaster statue designed by Buberl and installed before the Garfield inaugural ball; the fountain; and, between 1890 and 1967, “Freedom”, the plaster model created by Thomas Crawford for the casting of the statue that tops the dome of the Capitol all emphasize the significance of this space.

**Halls**
The halls retain their significant expressive volume although their verticality and openness to the courts was altered by the addition of the galleries. Because of the age of these modifications and the relationship to the function of the history of the building, the galleries retain significance in their own right. The halls were designed to be vast open rooms with significant height not only for the awe of the open structural volume but also to allow for dispersion of daylight and the greatest flexibility for exhibits. These spaces were filled with a variety of cases and objects from skeletons to airplanes based on the exhibition needs of the SI. Between 1896 and 1902, the galleries were designed and constructed by Hornblower & Marshall. The “Union Jack” design railing system included post-mounted lighting at alternating stanchions. That these spaces provided both exhibit space and storage for the museum suggests that their construction was undertaken primarily to relieve pressure on the Institution for much needed space rather than any desire to address original design intent of the building.

**Courts**
Original renderings of the halls show intended views and easy spatial flow between the courts, the halls, and the ranges. The courts were intended as tall volumes lit from above to provide additional daylight into the adjacent halls and ranges while providing ample daylighting and ventilation within the court volume proper. Between 1896 and 1899, galleries were constructed, modifying the original spaces. Skylights were added to increase daylight as the construction of the galleries blocked some of the daylight from reaching the exhibits and less light was shared with adjacent spaces.
Building History, Description and Significance

The expression of the volume of the courts is not easily understood in the building as it exists today. The infill of floors and use of this space for shafts and vertical circulation has compromised this significant feature of the interior hierarchy and flow of space in the building. These areas are the most spatially-compromised, but are of primary significance to the original spatial intent of Cluss.

Ranges
These eight rectilinear spaces flank the courts and are adjoining the halls. The shed roofs allow for a clear span from the court and hall masonry walls to the exterior structure. All of the interior walls were pierced with large openings to provide ample daylight as well as movement and visual continuity between the spaces. With the increase of collections, the ranges also were altered by the Hornblower & Marshall design to include galleries; the South East Range included an entire second floor. The wall openings between these spaces have been opened and closed many times over the years as needed by changing interior functions. The volume of the ranges is now only understood from the exterior. The spaces have been subdivided for administrative and other assembly functions. The former Discovery Theater space is the only location where the interior volume of the range can be read.

Towers
Towers are present at the end of the halls. They were intended as shelter for the entrance doors and provided support space on the upper floors. These spaces, while retaining their structural components, have been partitioned for administrative uses and walls have been furred out for mechanical ventilation systems.

Pavilions
The pavilions retain all the original bearing walls and the vaulted ceilings, as well as the original cast iron stairs, which are character-defining features for these spaces. Although partitions were added, modifying the spaces, the first two stories still retain a good degree of integrity. Of all the pavilions, the North West Pavilion, which housed the offices of the director of the museum and had more detailed finishes, retains a higher level of integrity.

Circulation from these spaces was altered with the installation of the galleries and full second floors at the ranges and annexes. The third floor of the pavilions does not retain historic fabric. The most dramatic modification at third floor level occurred at the South East Pavilion, when a photography laboratory was installed in 1908–1909. It included the demolition of the exterior wall and the installation of a large angled skylight in the 1980’s. This modification has since been reversed.

Annexes
With the exception of the library, in the North West Annex, the other annexes were intended for secondary functions to the museum and have suffered significant modifications. Because of its function and the restored configuration, the library is the only annex space that is significant.

A hierarchy of significance is noted in the following floor plans:
Diagram of Design Significance
Refer to Intervention Diagrams for fabric modification recommendations related to integrity and significance. These diagrams refer to initial design hierarchy only.

Basement Plan

Ground Floor Plan

Level of Significance:
1 (Higher Significance)
2
3 (Lower Significance)
Diagram of Design Significance
Refer to Intervention Diagrams for fabric modification recommendations related to integrity and significance. These diagrams refer to initial design hierarchy only.
Diagram of Design Significance

Refer to Intervention Diagrams for fabric modification recommendations related to integrity and significance. These diagrams refer to initial design hierarchy only.

Legend:
- **1** (Higher Significance)
- **2**
- **3** (Lower Significance)
Building History, Description and Significance

Structure
The character-defining features of the AIB structure are in the openness maintained by both the load-bearing masonry and the trusses supporting the roof of the AIB. The original roof cladding systems are significant for their experimental attempts to enclose the expansive and varied roofs of this building; however, these systems have been modified.

Masonry
The masonry arch systems are significant in that their implementation has been pushed to a point where the open space defined is stronger than the solid used for the structure. Open arcades between the Rotunda, halls, courts, and ranges maintain sightlines and visual transparency within the building.

Trusses
The roof structure plays a significant role as a character-defining feature of the AIB. The trusses and purlin systems exhibit functionality and material honesty indicative of Cluss’ work. The truss components were designed efficiently and expressively for their particular role within the truss system. The individual pieces are sized as required for the loads they handle without additional ornamentation or decoration. The truss components and trusses themselves are repetitive and economical and yet they transcend this functionality and economy, creating a picturesque effect where the only ornamentation to the architecture is the beauty of the structure itself. Spanning approximately 62’, and supported at the ends on the masonry walls, the trusses at the halls are of a hybrid, unique double Fink/Pratt design. The structural system of the roofs at the square courts is unique, with four intersecting wrought iron trusses spanning the same distance as the trusses in the hall and supported in the masonry walls. The trusses in all public spaces were spaced 13’ on center.

Although the forms of roof trusses vary per location and application, the lightness of the truss system is an elegant counterpoint to the robust masonry system of the original exhibit hall walls below, particularly at the primary halls (See Figure 18). Historical photos taken prior to the Hornblower & Marshall gallery intervention show soaring spaces, where air and light flow freely between the exhibit spaces, and into the heights of the halls. Though the building has changed over the years and spaces are no longer open to one another as they once were, this quality is still evident at the hall spaces where the original intent of open volume still exists. Like other building systems, the roof trusses first and foremost function structurally as they ought to, while defining the quality and character of the spaces below.

The same can be said of the Rotunda structural system. The roof beams are plain, repetitive,
The small beams are arranged logically, spanning from the center oculus to the 16-sided rotunda wall with an intermittent ring allowing the depths of the beams to be consistent. However, the effect of the Rotunda roof is the highlight of the space, befitting the focal point of the entire building. Light shines in through the clerestory windows below the dome, seemingly lifting the roof from the wall structure below. Light through the oculus lifts the monitor roof in a similar fashion, pulling the planes of the dome apart and extending the volume of space upward. The beams radiate from the center of the dome, in a sunburst pattern, functioning not only structurally, but decoratively as well (See Figure 19).

Corrugated Iron Roof Panels
Originally, the AIB ceiling had a plaster finish that began failing and, in some cases, falling shortly after the building was completed. The plaster was considered fire resistive and appears in early photographs as a dark surface above the light color plaster masonry walls. The iron ceiling panels were either applied over plaster that remained in place or used to cover areas where it had been removed.

Since there have been numerous re-roofing projects, it is not known whether the current corrugated iron panels in many locations are original to this early retrofit or how much plaster, if any, remains.

Similar to the other structural roof components, the iron panels are repetitive elements that serve a function and contribute to the quality of the space below. In the primary hall spaces, the linear corrugations of the iron panels combined with the structural purlins between the roofing system and trusses create a pattern and “density” at the ceiling plane (See Figure 20). This density, combined with the lightness of the roof trusses allows the trusses to visually disappear against the backdrop of the ceiling, heightening the effect of the vertical spaces of the halls (See Figure 21).

The roof decking above the iron panels are not believed to have any historical significance since numerous replacements and repairs to the roof have occurred throughout the history of the building.
Stairs and Railings
A number of stair systems exist within the AIB. The most significant systems date to the time of original construction and the subsequent Hornblower & Marshall alterations and additions. Like numerous other building elements, the stair systems consist of a series of repetitive elements with some decorative qualities that contribute to the character of the building.

The following series of photographs shows the evolution of the South Hall and railings in this area of the building. The railings, as designed by Cluss, consisted of a simple pipe rail with a decorative fan at the stanchions and a decorative lower panel that skirted along the floor (See Figure 22). As galleries were added in the building, the initial railings were pipe rails with an upper and mid-rail horizontal pipe spanning between simple unadorned stanchions (See Figures 23 and 24).

The Hornblower & Marshall stair and railing additions and alterations were part of a larger building intervention that consisted of the addition of mezzanine galleries in three of the four halls, most of the ranges, and in all of the courts. They should be seen in conjunction with simultaneously occurring decorative treatments to the floors and plaster surfaces. The original primary spiral stairs, located in the Rotunda, between the arched openings to each hall, were replaced with two-flight stairs in the same location. The railings line the stairs as well as the edge of each mezzanine floor plate (See Figure 25). Simply due to their presence in so many exhibit halls, ranges and courts, the railings attached to the mezzanines have a significant impact on the character of the exhibition spaces. The lamp portions of the posts no longer exist. Current research has not revealed the detailing of these railings and how power was delivered to the stanchions. In the halls and Rotunda, these railings modified the transparency of the Cluss railings. Many of the railings in the court and range galleries were case railings.

From a functional perspective, the stair and railing system components were designed for versatility and can accommodate multiple configurations as seen in various locations. From an architectural perspective, the repetition of the ornamental components adds...
a visual richness to the interior environment. The significant existing original stairs generally occur within the pavilions and at the ends of the primary halls between the second and third floors. The pavilion stairs are typically straight-runs with landings, the hall stairs are spiral. Each consists of a series of cast iron treads, risers, balusters, and handrails with decorative elements at the vertical surfaces, and eyelets for baluster support (See Figure 26).

The stair systems are another example of architecture itself constituting the building’s decoration in that their functional and decorative nature greatly contribute to the character of the spaces where they are located.

Ceiling Finishes
The ceilings cannot be considered independent of the delicate iron truss roof structure. While, initially, ceilings in the 17 galleries were finished with plaster, this quickly changed. Ceilings in the Rotunda, halls, courts, and ranges are currently an expression of the roof structure and iron purlin system. Initial early changes to remove the failing plaster and replace or cover the material with corrugated iron panels does not hinder the significance of the context of the hall or Rotunda. The ceilings, as initially designed in the courts and ranges, are not extant nor understood in the current configuration of the building. In the halls and courts, the original ceilings were painted a dark color, in sharp contrast to the light-colored trusses, while in the ranges the ceilings were the same light color as the trusses.

Most of the ceilings of the towers and the pavilions retain their plaster-finished brick vaulted; a few were modified as the spaces were reconfigured and include some acoustical tile systems.

Wall Finishes and Plaster
A number of wall finish and plaster details contribute to the character of the original 17 exhibit spaces, including decorative stencil painting and scoring of the plaster surface to resemble stone masonry joints. The character of the interior spaces is a direct result of the plaster surfaces on masonry bearing-wall system. The scale of the masonry piers and arched openings between them relate to the volume of space they enclose and the openness between spaces as originally intended. There is a progression from heavy to light as the masonry makes its way vertically up to the Rotunda. The subtle detailing of the applied orders, recessed planes, scored coursing, decorative paint, and plaster finishes with clerestory windows above add a delicacy to the structure as it moves up before transitioning to the lightness of the ceiling. While still apparent in the halls today, the original intent can be seen in historical photographs taken prior to the Hornblower & Marshall interventions, where the large-scaled openings allowed cross views from halls into courts and ranges, and the true
Building History, Description and Significance

28: Detail at Rotunda
Circa 1902 (SIA AIB File, Folder: Rotunda)

character of the spaces is revealed (See Figure 27)

The decorative stencil painting at the AIB has been altered through the years. It currently exists in the Rotunda and the halls. The original stenciling consisted of three-dimensional designs of geometric patterns coupled with floral motifs and calligraphy, with multiple precedent sources and influences. Several of the motifs of the original decorative paint were also encountered in other decorative elements, such as the brackets at the balconies, the colored glass, the gates, the medallions, and the ornamental stone signs above each of the entrances. As seen in historical photographs, the extent of the original stenciling was greater than currently exists, encompassing the panels below the Rotunda clerestory windows and the spandrels above (See Figure 28).

The original decorative painting design appears to have been influenced by principles set forth by one of the most influential books on interior decoration, \textit{The Grammar of Ornament} (1856) by Owen Jones. A British architect, interior decorator, and one of the superintendents of works for the 1851 Exhibition, Owen Jones thought that “form without color is like a body without soul.” \footnote{Encyclopedia Britannica, 1911, p. 500.} In the book, Jones lays down 37 propositions for the arrangement of form and color. Many of his principles were derived from detailed observations of Oriental art, particularly the Moorish art as seen in the Alhambra, which, in Jones’ opinion, encompasses “the speaking art of the Egyptians, the natural grace and refinement of the Greeks, the geometrical combinations of the Romans, the Byzantines, and the Arabs.” Some of the decorative motifs at the AIB resemble plates of Moresque ornaments in the book. \footnote{http://digital.library.wisc.edu/1711.dl/DLDecArts.GramOrnJones}

The second stenciling scheme was designed by Grace Lincoln Temple in 1903, at the time of the larger Hornblower & Marshall interventions, and incorporated more geometric motifs with semi-circular arches rather than the original decoratively-painted pointed arches. This treatment is more visually consistent with the gallery column and railing details which, taken together, transform the interior decorative treatments from the Cluss scheme to a more Beaux Arts influenced scheme. The Lincoln Temple painted decoration was applied to the Rotunda where it was limited to the lower section of the walls. Overall, there were fewer spaces with decorative paint compared to the original decorative scheme. Historic photographs do not show the 1903 decorative paint at the spandrels in the halls and courts.

The original scoring of the plaster surfaces of the Cluss design and minor changes in plane on the interior of the building subtly break down the scale and mass of the wall surfaces and define the character of the original exhibit spaces. The scoring contributes to the reading of scale of the interior spaces in addition to the functional role it plays as control joints to prevent cracking of the plaster surfaces. The scoring is intended to resemble stone
joints. The “stones” are proportional to the scale of the applied orders and reinforce the geometries of the massing and openings within the massing. For example, scoring exists at arched openings, outlining their shape for tectonic effect. This is particularly evident in the original 17 exhibition halls in historical photos (See Figure 29). Due to the infilling of openings between the spaces and the application of new finishes, the scoring is no longer a prominent feature. Traces of the scoring still exist, differentiating the original fabric of the building from later alterations.

The pilasters are further detailed with a plaster bead within a reveal approximately 4’ 9” from floor level at the original masonry walls and piers. This detail has been replicated frequently on numerous infill walls. Within the larger context of the exhibition spaces, the bead acts as a “base” element for the masonry piers and the applied orders of pilasters. Its location is based on the overall proportions of the walls of the exhibit spaces. From a functional perspective and in relation to human scale, the bead acts as the upper boundary of the wainscot at the Rotunda, and can be seen in historical photographs dating into the 1920’s (See Figure 30).

The tall arched openings, taken together with the decorative treatment of plaster and applied stenciling, are character-defining elements in the scale of the monumental volumes of the Rotunda, halls, and courts (See Figure 27).

Floor Finishes
The quality of materials, finish, and decorative elements of floors is proportional to the hierarchy of the spaces where they occur. The replica patterned encaustic tile floor of the Rotunda is the most decorative and detailed, appropriately installed in the focal point of the entire building (See Figure 31).

The marble floors in the halls, with the polychrome motif, are the next most elaborate and refined floors (See Figure 29). Less expensive, simple terrazzo floors were installed at the courts and ranges around the turn of the 20th century, replacing the original wood floors. The floors at all the galleries added following the Hornblower & Marshall design in spaces were finished with terrazzo.
Building History, Description and Significance

A recurring theme in Cluss’ work is the functionality of design elements. According to architectural historian Tanya Edwards Beauchamp, “Cluss’ aesthetic persuasion was picturesque and he worked toward intricacy and variety of massing, surface, texture and color, and silhouette. He abhorred what he considered meaningless ornament, however, and attempted to involve all design elements in the function of the structure.”36 She adds, “…concern for modernity, for craftsmanship and honesty in the use of materials, leads away from the Romantic historicism of the ante-bellum years to more relevant contemporary concerns.”37

The floors of the AIB have been through a number of material changes through the years. The hall and Rotunda floors were originally intended to be troweled concrete with wood floors in the remaining spaces. By February 1881, temporary wood flooring over a base of concrete was installed in the halls and courts for the Garfield inaugural reception (See Figure 21).

The current encaustic tile floor at the Rotunda dates to the 1970’s renovation project. The hall and floors went through extensive repairs, but still retain a good degree of integrity. The terrazzo floors at galleries retain a high degree of integrity. The integrity of the terrazzo floors at the courts and ranges is unknown, as many of the floors are currently covered by modern flooring materials.

The flooring in the Rotunda and halls is significant either because of the original fabric that remains or the good replica of original materials. These floors convey to the visitor the importance of the space and create visual interest without being overwhelming or in competition with collections.

Fountain and Statuary

The original statue “America,” and later the octagonal fountain and statue “Freedom,” emphasized the centrality of the Rotunda. “America,” holding a very innovative electrically-lit torch that was “to revolutionize the world and make dark places to shine”38 remained in the Rotunda only for a brief period, “Freedom” decorated and provided orientation in the Rotunda for 77 years. Removed in 1967, this statue is highly significant to the understanding of that space during the Period of Significance because of the symbolic message it carries, as well as the fact that it is the model for the statue that sits atop the U.S. Capitol dome.

The 1881 fountain was removed in 1929 and reconstructed during the 1970s project. Together with the plantings and the settees introduced in the Rotunda, the fountain was intended to provide a relaxing respite for the visitors in route to various exhibits. For periods of time over the years, fish swam in the fountain. Today, the fountain remains as a primary contextually-significant feature in the Rotunda. However, the absence of “Freedom” hinders the understanding of the place of the Rotunda in the hierarchy of public spaces.

Systems

The building was to house the collection of the National Museum and its designers were determined to provide a healthy environment for the collections and a pleasant experience for the visitors.

Use of cavity masonry walls to limit moisture in a building was not a new method of construction. In 1859, Andrew J. Downing was reporting that

---


“hollow walls have long been the favorite mode of construction in various parts of Europe and in some places in this country.” However, hollow masonry construction was increasingly used not only to minimize dampness in the walls but also for the insulating properties of the air in the cavity. Cluss anticipated that the heating load would be minimized if hollow walls were used.  

Literature published in the 1880s warned against walls becoming damp not only from water rising from the ground but also from exposure to weather outside or water vapor inside, suggesting, that by “leaving in the interior walls a cavity two inches across, and communicating by ventilating holes with the outer air, any moisture which penetrates the brick is rapidly evaporated.” 

Heating by direct radiation through radiators was considered the cheapest and, generally, the most comfortable. No smoke or dirt and no risk of fire were among the main advantages of this system, while condensation deposited on walls, dry air, and unsatisfactory ventilation were the main drawbacks of heating by steam. General Meigs designed the steam heating system at the National Museum and the 1879 specifications called for the offices to be heated to 72 degrees Fahrenheit and the halls to 68 degrees Fahrenheit when the external temperature was at zero degrees Fahrenheit. Steam had been used in the U.S. since the 1840s, and General Meigs was involved in the construction in 1856 of a steam system in one of the wings of the Capitol. Four low pressure steam boilers were originally installed in the basement of the South West Pavilion “having seventy-two tubes of 3 inches in diameter. [...] Two main-supply steam-pipes were 8 inches in diameter; the total radiating surface of the steam-coils was 13,680 square feet.” “Bundy” radiators were placed around the base of the walls in the exhibit spaces. In 1881, a furnace was added in the basement of the North East Pavilion.

To further reduce the load for heating, General Meigs called for installation of double-glazed windows. “With regard to the saving of heat by double glazing, General Meigs has pointed out that about one-third of heat is lost through two glasses placed within one-fourth of an inch between them than though a single glass.”

Beginning with the first year of museum operation, awnings were installed at locations determined solely by the request of the occupants of the interior spaces. There are some images of awnings installed on the ranges but this was not as common as installations on the pavilions and towers. From the images, it does not appear that this was a planned design change to the building. This helped reduce the solar gain and possible bright light and glare entering the building, particularly at the towers and pavilions where office were located.

Originally, the building had a sophisticated security system. Theft was an issue at several institutions in D.C. The museum had an early security system tied into the communication system. Three hundred windows and eighty-five doors in the AIB were connected to an electric 100-drop annunciator that indicated to an attendant at the main office which window or door was open. Specimen cases were connected to an 81-drop annunciator. In 1883, the journal *Nature* was reporting that the museum “is one of the best cases in the Unites States of the practical application of electricity. In so large a building it


Footnote 40: Letter from Cluss & Schultze to General W. T. Sherman, December 8, 1879. (SI-AHHP Box 12)


Footnote 42: Minutes of Proceedings of the Institution of Civil Engineers (Published by the Institution, London, 1883), 164.

Footnote 43: Minutes of Proceedings of the Institution of Civil Engineers (Published by the Institution, London, 1883), 172.

Footnote 44: Bundy radiators were made of vertical iron pipes, cast in couples or loops, Minutes of Proceedings of the Institution of Civil Engineers (Published by the Institution, London, 1883), 172.

Footnote 45: *Steam-Heating Problems, or Questions, Answers, and Descriptions relating to Steam Heating and Steam Fitting*, from the Sanitary Engineer. (New York: The Engineering and Building Record, 1889), 49.
Building History, Description and Significance

32: Roof
Court roof, May 2009

33: North Hall
Circa 1885-1890 (SIA RU 95, Box 42, Folder 13, Neg. No. 4319)

was found advisable to take advantage of the best means of communications, first being its systems of telephones and call-bells, by which those in any room can communicate with every room in the building.\footnote{47}

In addition to the electric security system, the first floor windows in the pavilions and towers were provided with metal grilles.

Daylighting was originally the primary means of illuminating the AIB and was a major force in shaping the form of the building and its roofscape (See Figure 32).

Windows and clerestories flooded the volumes of the exhibit spaces with natural light. The tops of display cases were glass to allow the ambient natural light to illuminate the collection pieces on display (See Figure 33).

Originally, nighttime illumination of the exhibit spaces was unnecessary since nighttime use of the exhibition spaces was never contemplated. The selection of the site and the large footprint of the building that resulted in the dense 300' × 300' block made daylighting more difficult, resulting in the varying heights of the different roof elements that are a major character-defining element of the building exterior. Windows punched into the masonry bearing walls used translucent glazing at ranges, taller building masses with clerestory windows at halls, and monitor windows at the interior court spaces. Large, clear glass windows in the relatively small spaces of the towers and pavilions and Rotunda windows high above the floor in the center of the building provided daylighting while defining the form of the building, and in turn, its character.

Electricity was initially provided for the 1881 presidential inaugural ball; however, it was limited to two “powerful” lights in the Rotunda and a few lights outside. This was one of the first times a public building in Washington displayed electric lights.\footnote{48}

Lighting in the offices was provided by gas fixtures; gas piping was installed in all halls for possibly lighting of the exhibits at a later time.\footnote{49} In 1883, the Brush Company organized an exhibit in the lecture room (West North Range) of the Brush storage battery system. A battery was placed in the room and connected to 40 Swan incandescent lights. After the exhibit ended, the dynamo remained into place.\footnote{50} By 1890, it was reported that the main halls, the East North Range, East South Range, and North West Court were lighted by electricity, while gas fixtures were added to several other ranges.\footnote{51} In 1901, $3,500 was appropriated for the installation of permanent wiring for lighting the public halls. Additional funding was received during the next year for fixtures and lamps.\footnote{52} By 1902, funding was secured for “a complete installation of wires and fixture throughout the Museum building.”\footnote{53}


Footnote 48: Not even the Capitol preceded the AIB. The first attempt to install electric lights in the Capitol dates to March-May 1882, when the American Electric Light Co. installed an experimental plant to light the restaurant. For several years manufacturers installed temporary systems at their own expense trying to convince the government to invest in electric lights. The Electrical Engineer, February 1888, p. 70.


Existing Conditions Assessment
A survey was performed to document physical spaces and elements in the Arts & Industries Building (AIB) and to assess the current condition of building materials and systems, including: the building’s exterior and interior materials, features, and finishes; interior spaces and layout; structural systems; mechanical, electrical, and plumbing systems; fire detection and security systems; and communication systems. The survey also was intended to determine the historic integrity of the structure and to establish a baseline of conditions that would inform decisions related to the future restoration/rehabilitation of the AIB.

The field investigation team from EwingCole visited the site between March 17, 2009 and April 7, 2009 to assess the architectural and engineering conditions of the structure. This assessment was complemented by field investigations undertaken by two consultant teams: Simpson Gumpertz & Heger inspected the masonry and roof deck conditions and Thornton Tomasetti inspected the general structural conditions of the building. The methodology for these surveys is included in the respective sections of this report.

The field investigation included a visual inspection of accessible spaces and building elements. Observations of exterior envelope conditions were performed from grade, from interior spaces, and, partially, from the lower sections of the roof. Binoculars were used to perform the assessment of the exterior envelope. The upper sections of the roofs were not accessed due to the lack of a safety system. For the interior spaces, a 90-foot electric lift was used to access the underside of the roof in the Rotunda. A 65-foot lift was used to access the underside of the roof in the main halls.

No samples were removed and no material testing was performed as part of this assessment. Basement spaces were inspected only if accessible from the interior of the building. No spaces were accessed from the exterior hatches around the building. Attic spaces were accessed at two of the towers using ladders. At various locations throughout the building, acoustic ceiling tiles were lifted to observe the condition of the ceiling and roof deck above.

The team inspected conditions adjacent to the structure that directly affect the condition of the exterior envelope. However, inspection of the immediate site or site landscape was not in the scope of work.

Information gathered during the survey was documented with field notes on baseline drawings provided by the Smithsonian Institution (SI) and developed by Polshek Tobey+Davis during a 1999 project. Minor adjustments were made to the base drawings based on observations, but no field measurements were performed. In addition, existing conditions and configurations were recorded and documented with digital photographs. SI engineers were interviewed regarding existing systems. A list of the documents consulted for this project is provided in the Appendix.
1: West North Range
Mud stains at base of wall due to poor site draining

2: Stairs at North West Pavilion showing non-compliant railings

3: Paving at North Entrance Showing cracking, staining, and open joints in stone

4: West Entrance Gate Close up of failing wall anchor

5: South Entrance Gate Showing some rust and open joints

The field investigation team inspected site conditions directly adjacent to the AIB that impact the exterior building envelope. The team also reviewed existing documents that noted conditions of the site. A general survey of the site was not part of the scope of work.

The site does not drain properly, particularly on the west elevation, where water ponds and splashes onto the face of the building (See Figure 1). The deterioration of the granite base on the south elevation also is likely due to lack of proper drainage.

The stairs on the south side of the North West Pavilion are in fair condition (See Figure 2). However, the railings are not properly anchored and do not comply with American with Disabilities Act (ADA) guidelines for handrail extension.

The pavements around the building are not historic. The stone units at the steps and the pavement at the north entrance exhibit cracking, staining, rust staining from the metal rails, and open joints (See Figure 3). Various other pavements adjacent to the building (concrete, bituminous tiles) do not have a positive slope to allow for proper drainage.

Medium-size trees are located too close to the façade. These impede proper ventilation along the elevation and may be causing some of the wood rot found in window frames and moisture-related deterioration in the masonry wall.

The metal gates at the north and west elevations are in good condition. At the west entrance, the anchoring in the masonry wall is failing (See Figure 4). At the south entrance, the gates exhibit some rust and open joints (See Figure 5).

None of the light fixtures is historic. The exterior light fixtures appear to be in good condition.
Masonry
Generally, the brick is in good condition. Minor brickwork damage — cracked and loose bricks — exists, as well as staining caused by water runoff/roof drainage deficiencies. (See section Structural Masonry and Roof Deck for a detailed description of masonry conditions.)

Cast stone medallions at ranges and spandrels at tower arch-top windows are in generally good condition. Two medallions at the West South Range exhibit some physical damage and there is some evidence that they may have been removed and reset into place.

The Ohio sandstone entrance archways are in fair to poor condition. Significant water staining exists, particularly below the pediment transition from a sloped to flat surface. Evidence also exists of past repairs and patching to the sandstone, spalling and cracking, and biological growth, especially at the North Tower.

The sandstone window sills are in consistently poor condition. Almost all sills are stained. Many sills exhibit some form of spalling, cracking, and open joints between sill pieces, as well as biological growth in locations with less exposure to sunlight. There is evidence of previous patch/repair work in some locations. Some of the stone sills have been replaced.

The granite course at the foundations is generally in fair condition, with staining, open joints, and some spalling occurring in various locations, particularly along the east side of the south elevation.

The exposed gneiss foundation walls are in fair to good condition. The exposed portion at the east side of the South East Pavilion extends beyond the face of the building wall and is rough and damaged in some portions. There is evidence of patching between the gneiss and granite band above. The exposed gneiss on the south side of the South East Pavilion is more closely aligned with the face of the granite band and is in better condition.

Roof
The intent of the roof survey was to record existing conditions that would inform the design of a new roof system. It consisted of a visual survey from tower and pavilion upper story windows and limited access to the West South Range, South West Range, North West Range, and West North Range roofs, as well as the review of numerous roofing studies performed over the years. The Rotunda, court, and transitional roofs were not accessible.

The roof consists of a series of different type roofs and the transitions between them. In general, the metal roofs appear to be in fair condition. It is unclear if the evidence of water infiltration at both the ceilings and adjacent walls has continued after the last roof repairs. Based on previous reports, SI is aware that the roof will need to be replaced. The condition of each roof type is described below.

Hall Roof & Lantern, Court Roof & Lantern
The standing-seam, lead-coated copper roofs at the halls, courts, and lanterns are in fair condition. Some of the deterioration noted in the 2006 study has been corrected by the construction of a single-component, water-based, acrylic coat at selected portions of the
copper roof with 1” high seams. The Architectural Sheet Metal Manual published by the Sheet Metal and Air Conditioning Contractors Association, Inc. (SMACNA) recommends up to 20-3/4” pan widths for the same.

**Transitional Roof**

Of all the building roofs, the transition roofs appear to have had the most significant issues over the years. The standing-seam metal roof has a low pitch slope, which is less than the minimum 3” per foot recommended for standing-seam in areas where ice, snow, and heavy rain conditions occur. Some of the leaks were temporarily addressed by coating the standing-seam roof with an elastomeric product (See Figure 4).

**Range Roof**

The batten–seam, terne coated stainless steel roofs at the ranges are in fair condition. Following a rainfall, water may be trapped in the seams (See Figure 5). The high points of the roofs align with the bottom of the court window stone sills. However, the roof slope is very low and cannot be lowered to increase the clearance between the roof and the sills (See Figure 6). The Hoffman Architects roof report notes: “Walking

---

Footnote 1: 2006 Mothballing Study prepared by Beyer Blinder Belle Architects & Planners, LLP.
Existing Conditions Assessment

7: North Tower
Interior of steeple roof

8: Typical Tower Entrance Roof
Showing broken, chipped, and missing slates

9: North Tower Entrance Roof
Showing severe biological growth

10: Stepped Flashing
The height of the stepped flashing is lower than the recommended 10” minimum height.

on the roofing pans created a bellows effect, from the natural oil canning of the metal. As air was forced out from under the pans, moisture was also noted. Many of the seams have received [an] exterior applications of sealant.”2

Rotunda Roof & Cupola
From the range roofs, patching similar to the material mentioned above at the hall roofs is evident at the cupola roof. The roof was last replaced in 1982; the estimated life span of flat-seam roofs is approximately 50 years. The Mothballing Study notes that the roof was constructed with overlapped seams, soldered but not locked.3

Pavilion Roof
Viewed from the adjacent range roofs or from inside the towers, the slate roofs at the pavilions appear to be in generally good condition. There are a few slates that have slipped and a few that are chipped and broken.

Flashings
The flashing and counterflashing are in fair condition. Some of the height of the stepped flashing is lower than the recommended minimum 10” height (See Figure 10). Some of the reglets exhibit multiple generations of sealants that have failed. Some of the metal panels are flapping (See Figure 11).


Footnote 3: 2006 Mothballing Study prepared by Beyer Blinder Belle Architects & Planners, LLP.

Tower & Entrance Roofs
Viewed from the upper story tower windows, most tower slate roofs — with the exception of the North Tower — are in good condition. The roof at the North Tower is in fair condition. Viewed from several locations, the deck of the tower roofs is in good condition (See Figure 7). The shed roofs over the entrances are in fair condition. There are a number of broken, chipped, and missing slates (See Figure 8), and severe biological growth at the north entrance roof (See Figure 9).

Drainage
The storm drainage system is in poor condition. Many gutter joints leak; signs of water leakage appear at the eave, including rusting and water stains at the cornice. Staining and joint failure also appears at the brick masonry below. Debris is accumulated
(See Figure 12) in the gutters and most gutters lack strainers (See Figure 13). Several of the gutters do not drain properly, as evidenced by visible stagnating water (See Figure 14). Not all gutters have sufficient stiffeners and some are deformed (See Figure 15). Several of the brackets at hung gutters are loose, broken, or bent. Where metal fascia exists behind hung gutters, there are signs of paint failure, rusting at seams, and open joints at corners, as well as deterioration of wood blocking behind.

Water staining is visible at sections connecting gutters to internal leaders. Where exterior leaders are close to the masonry, there is evidence of masonry deterioration behind the leaders, especially at the Rotunda. Leaders from the Rotunda roof are inadequately secured. Splash pans at the Rotunda leaders are not secured. Extensive deterioration of plaster in the vicinity of the internal leader suggests that the condition of these leaders is poor. It appears that the gutter sizes and number of downspouts are appropriate for the building with respect to flow capacity, but it remains unknown if the flow in these downspouts is unrestricted or if they back up during storms due to other conditions along the path of water flow.

**Decorative Metal Features at Roofs**

The paint at the metal pedestals over the center gable of the entrances and over the gable roofs at the halls is in consistently poor condition (See Figures 16 and 17). The paint is failing — particularly at joints — at most of the other decorative metal features, including roof cornices, anthemia, vents, and finials (See Figure 18). Some of these metal ornaments have open joints (See Figure 19). Existing original decorative features are galvanized iron; the acroteria and vents are terne-coated stainless steel.
 Existing Conditions Assessment

17: Typical Hall Pediment
Showing paint failure

18: Metal Cornice
Showing paint failure at joints

19: Corner Detail, Metal Cornice
Showing open joints and paint failure

20: Court Roof
Showing missing and damaged snow guards

21: Pavilion Roof
Example of discontinuity of lightning protection system

22: Range and Court Roofs
Showing non-compliant access ladder

Snow Protection System
Many snow guards are either damaged or missing (See Figure 20). The snow melt system at valleys is discontinuous.

Lightning Protection
Lightning protection terminals are secured with nails and screws through the metal roofing. At several locations, the connections have failed, creating openings through the metal roofing. The lightning protection line also is discontinuous at several locations (See Figure 21). (The lightning protection system is further discussed in the Electrical section.)

Roof Access and Safety
Access to the roofs at the ranges is provided via windows in the pavilions. Metal ladders allow access onto the roof of the courts. The ladders do not comply with OSHA regulations (See Figure 22). None of the roofs has a fall arrest system or tie-offs compliant with OSHA regulations.

Windows, Monitors, and Skylights
All the windows are replacements dating to the 1980s restoration projects. The condition of the windows ranges from fair to poor. The extent of deterioration varies by location around the perimeter of the building, but appears to be directly proportional to the amount of weathering and exposure at each side. All window frames, sashes, sills, and trim have fading paint, with peeling paint occurring at most windows. Peeling paint is most evident at the wood window sills, vertical frame members, and where vertical mullions meet stone sills. The wood sills are in fair to poor condition; paint failure exists at most of the sills, which
has led the wood to crack from exposure to ultraviolet light and moisture. Minor splitting due to expansion and contraction is prevalent at the intersection of various wood window components, e.g. between the bottom rail and stiles of sashes, at the springlines of the window frame jambs and arched heads, etc. Open joints also exist where sealant has failed between wood window trim/frames and masonry openings.

Rotunda
Viewed from the range roof level, the triple arched windows of the Rotunda appear to be in fair condition, with general paint peeling and some wood rot at the wood sills and lower portion of the vertical mullions and jambs (See Figure 23). Some of the wood sash exhibits the same conditions. The round metal windows at the cupola appear to be in fair condition, with water staining around the perimeter of these windows.

Halls and Monitors
Many of the frames at the clerestory windows exhibit extensive paint peeling and wood rot, as well as splitting at wood window components (See Figure 24). In many cases, the sealant between the frames and the masonry wall has failed.

The monumental arched window assemblies at the end of each hall are in poor condition, with significant paint peeling and wood rot, particularly at the West Hall. Sections of muntins between panes of glass also are missing (See Figure 25). Biological growth appears on the sills on the north elevation (See Figure 26).
29: Court Clerestory Windows
Showing open joint between glazing bar and sash

30: South East Court Monitor
Windows are in poor condition and exhibit significant deterioration.

31: Roof Access Window
The window pictured exhibits biological growth and does not operate properly.

32: North East Range
Windows are in poor condition and are missing frame components

33: North East Range
Showing window sash splitting

34: Operable Windows at Ranges
The inability of the operable sash to close properly causes water infiltration and damage to the window components.

The sash at the monitors is in very poor condition. Most of the bottom rails are deteriorated (See Figure 27).

**Courts and Monitors**
Many of the frames at the clerestory windows exhibit wood deterioration and rot, especially in the lower sections (See Figure 28). Many windows have open joints. An open joint also appears between the glazing bar and the sash at many of the windows (See Figure 29). Court monitor windows are in generally poor condition, exhibiting paint failure, wood rot, open joints, and missing pieces, especially at the South East Court (See Figure 30). The clerestory windows at the courts are not operable; the windows that allow access onto the roof do not close properly and there is biological growth on the sash (See Figure 31).

All of the monitors in the South West Court and some of the monitors in the North East and North West Courts have been replaced with louvers. Approximately half of the South East Court clerestory windows have been replaced by louvers.

The skylights at the courts were not accessible for inspection. Previous reports noted bituminous repairs, glass replacement and cracked units. Some water infiltration problems may have been addressed to some extent in the process to mothball the building.

**Ranges and Annexes**
The window frames and sashes at ranges and annexes are in fair to poor condition. Some sections of the frames are missing, especially at the windows in the North East Range (See Figure 32). Several interior sashes at the ranges are cracked (See Figure 33).
The operable sash at the large range and annex windows is in very poor condition. Many of these windows do not close properly and/or are cracked, which allows water infiltration (See Figure 34). Some of the windows are painted shut. Many windows lack appropriate hardware (See Figure 35).

**Pavilions and Towers**
The double-hung windows at pavilions and towers are in fair condition. The wood sills are in fair to poor condition, with paint failure at most of the sills. This has led the wood to crack from exposure to UV light and moisture (See Figures 36 and 37). The window frames and sashes at the South West Pavilion are in worse condition, with more severe cracking and paint failure (See Figure 38). The sashes in all pavilions and towers are generally operable, although many sashes have missing chords. The locking hardware in these windows is in poor condition. The wood sash of the casement windows that open onto the roof from the third floor pavilions has swollen, which limits the windows’ operability (See Figure 39).

Stained wood louvered shutters were installed at the first and second floor pavilion and tower windows. It is not clear if there was any historical precedent for these interior shutters. The wood shutters are in fair condition, with some loose blades. Several other windows have rolled shades in fair condition.

Pavilion monitors generally appear to be in fair to good condition. They exhibit some signs of paint peeling and staining where metal fascia components meet.

Basement windows at the pavilions are in fair to good condition. The wood sill of the window assembly sits on the granite plinth. Approximately half of the arch-top
Existing Conditions Assessment

40: Interior Windows
Existing original windows between the South Tower and West South Range

41: Interior Windows
Existing original windows between the North West Pavilion and North West Range

windows have been replaced with some type of louver assembly. The window units that remain exhibit the typical failures listed in the beginning of the section.

Exterior metal grilles are present at the first floor windows and the basement windows at the towers and pavilions, as well as at the door at the North West Pavilion. The grilles are in good condition. Hardware or connectors are not evident at any of the windows.

Finishes at Windows
All exterior window frames are painted light green; the sash is painted darker green. On the interior, most of the windows are painted white, except the first and second floor windows in the pavilions and towers. These have a stained finish. The interior coatings are in fair condition, with signs of paint failure mainly at areas of wood decay and open joints. Mold is present on the frames and/or sash in a few areas where moisture infiltration is evident.

Interior Windows
The arched, double-hung, stained, interior windows located on walls between the entrance vestibules and the halls are in good condition. In the South Tower, the frames of the original pair of windows opening into the West South Range have survived and appear to be in good conditions (See Figure 40). The sash is no longer extant. One other interior window, between the North West Pavilion and the West North Range has retained its sash and it is in fair condition (See Figure 41).

The wood casement windows at the second floor tower rooms opening into the halls are in good condition, although some do not close properly.

Daylight
Over the years, infill additions have closed off visual and spatial connections between many of the original spaces in the building. However, despite these changes to natural light penetration, many spaces still receive generous daylight. These spaces include the four halls, Rotunda, tower spaces, pavilion and annex spaces, and the spaces along the perimeter building wall at the ranges.

Ventilation
The entire building relies mostly on mechanical equipment for ventilation.

All windows in the Rotunda are currently fixed, which prevents natural ventilation in this space. Typically at the halls, the three clerestory windows in the bays closest to the tower-side of the hall appear to be operable. These are awning windows with pivot points towards the middle of the window and exposed hardware at the window heads. These windows are out of reach, however, and their functionality could not be determined. Hall monumental windows are currently fixed, but historical photographs show operable panels.
There is no natural ventilation at the courts. While “chain and pulley” opening mechanisms are visible at the hall and court lantern windows, these windows do not appear to be operable. Many of the windows at the court and court monitors were replaced with louvers for mechanical ventilation.

Range window assemblies include two operable hopper panels. Both occur in the central portion of the window: the lower of the two at sill level; the upper below the fixed arch-top panel, with a fixed panel between the two. Range infill floors currently divide the upper portion of the window assembly from the lower portion at the interior. The hoppers are still operable, but they are generally in poor condition.

The double hung windows in the pavilions and towers are designed to be operable. However, many of the windows do not open.

Glass
With the exception of the monumental windows at the end of the halls, windows in all original public spaces — Rotunda, halls, courts, ranges, and monitors at halls, courts and pavilions — have insulated translucent glass, with a layer of mylar UV light filter. The layer of mylar is in poor condition, with crazing and staining evident (See Figure 42). The glazing stop has open joints. Several of the glass panes are broken (See Figure 43). The insulated glass windows have reached the end of their life expectancy (Windows manufactured in the 1980s generally had a 25 year warranty).

At the end gable of the halls, the insulated glass includes in one layer original stained glazing reset in the new sash during the 1980s project. Not all original glazing has survived. Among the missing panes are those that originally included letters identifying the hall (See Figure 44).

All glazing at tower and pavilion windows is clear. In general, this glazing is in fair condition. Some glazing units show signs of air and moisture infiltration presumably caused by deterioration of the seal between the panes of glass. A few panes of glass are cracked. As noted above, the insulated glass windows have reached the end of their life expectancy.
Exterior Doors

The exterior doors at the main entrances are generally in fair to good condition, varying slightly by location. Staining occurs where the door surround plinth block touches the stone floor and at the bottom rail of the center doors, likely from moisture migrating through the wood (See Figure 45). Daylight is visible through the gap between the operable door leafs and open joints at mitered panels (See Figure 46) and at trim. Discoloration also is evident. In addition, the doors at the east entrance are damaged from a metal hold-open. The glazing at the doors is in good condition.

The door at the North West Pavilion is in fair condition. The door frame and the lower section of the door exhibit some deterioration and wear (See Figure 47). Putty at the sidelights is in poor condition (See Figure 48). The varnish finish is in very poor condition, with wood almost exposed to the sun and ultraviolet light, which could lead to splitting and additional deterioration. Doors are provided with various mismatched hardware. The hardware does not meet ADA guidelines.

Statuary

The Buberl statue over the North Hall was restored in 1994. Viewed from grade (front) and from the West North Range roof, the statue appears to be in fair to good condition, with some minor paint failure evident (See Figures 49 and 50).
Existing Conditions Assessment

1: South Hall
Showing flooring conditions

2: Marble Floors
Many marble pieces are either: broken, cracked, spalled, or chipped.

3: Marble Floors
Many marble pieces are either: broken, cracked, spalled, or chipped.

4: Marble Floors
Weathering at red squares

5: Marble Floors
Repairs are either failing or aesthetically incompatible.

6: Marble Floors
Showing scratches and grooves in stone

7: Marble Floors
Showing sections replaced with metal panels and concrete

8: Marble Floors, West Hall
A portion of the floor has heaved as a result of a steam pipe explosion.

Floors
The survey of the floors in the halls was intended to note the range of conditions and significant changes since the 2001 detailed condition assessment study by Dell Corporation. It did not include annotating the condition of each individual stone and did not attempt to duplicate the Dell Corporation study, which included sounding of the floor units.

The South Hall was not surveyed during the 2001 Dell Corporation study. The raised floor has since been removed and large portions of the marble floor are still covered with vinyl tiles, carpet, and medium density fiberboards (See Figure 1).

The marble floors are in poor condition. A large percentage of the marble units — especially white and black — are broken, cracked, spalled, or chipped (See Figures 2 and 3). Many of the units, especially the red squares, are very weathered (See Figure 4). Some stone units have been repaired. These repairs are either failing or are not aesthetically compatible with the original material (See Figure 5). Some stones are covered with glue from miscellaneous surfaces that were laid on top of the floors. In some areas, there are scratches and straight grooves in the stone (See Figure 6).

Footnote 1: Dell Corporation, Arts and Industries Building, Stone Floor Investigation, SI OFEO Project No. 973316 December 07, 2001.
A few sections of the marble pattern have been replaced with metal plates or concrete (See Figure 7) or were removed when changes to the mechanical system were undertaken.

The floor has settled in the vicinity of the southeast corner of the North Hall. In other areas, such as near the northwest corner of the West Hall, the floor has heaved (See Figure 8). Apparently, the damage to the floor in this area of the West Hall was caused by the explosion of a steam pipe that runs in an adjacent trench.

Rust, acid, and other chemicals have stained the marble, slate, and concrete floors (See Figures 9 and 10).

Of the four halls, the South Hall and the West Hall appear to be in the worst condition. The 2001 Dell Corporation study estimates that if stone units in good condition from the four halls were to be reused and reset, the amount of original material would be sufficient for only one hall. At this time there is no information to contradict that opinion.

The dark slate at the perimeter of the halls is in fair condition, with cracking, chipping, and spalling (See Figure 11), as well as staining visible (See Figure 12). Many of the units were replaced with metal plates that allow easier access to the utility trenches. It is unknown if some of the stone slabs are stored or were replaced because of deterioration.

The concrete is in fair condition. There are cracks, especially along the edges of the sections (See Figure 13). Some original concrete sections were replaced with other materials, such as terrazzo with white aggregate and reddish binder.
The encaustic floor at the rotunda is a replacement from 1970s. The floor is laid out with very narrow joints and is in fair condition. Some of the tiles, especially the larger octagonal buff tiles, are chipped (See Figure 14). Other encaustic floors at the exterior of the entrance vestibules are in good condition.

The terrazzo floor at the galleries is in fair condition. The floors have numerous cracks and, over the years, there were several attempts to repair some of the cracks either by patching (See Figure 15) or by replacing small sections (See Figure 16). Although cracking is noticeable throughout the floor, the most significant cracks occur near the intersection between the balconies at the end of the halls and the side galleries. The floor at the balcony has a different structural system — it is constructed above the bearing wall — and there is no control joint between the two surfaces (See Figure 15).

Some sections of the floor were poured without any dividers ("cold" joints), while others have various materials as dividers. There is significant cracking and spalling along the joints (See Figure 16). Some of the repairs at the joints are not compatible. A darker binder was used and the repairs are failing (See Figures 17 and 18).

Most of the terrazzo floors in the ranges and courts are covered with carpet and not visible to assess their condition. The floors date to a similar period of construction and it is likely that some of the conditions encountered at the galleries would also occur in these spaces (See Figure 19). Depending on the method of installation of the current surface, the terrazzo may be stained from glue or other chemicals.
In the mechanical rooms, some of the historic concrete surfaces are chipped, spalled, and stained (See Figure 20).

In the pavilions and towers, some of the original wood floor exists under the current floor surfaces of carpet or vinyl composition tile, but the condition could not be evaluated. Additional research is needed to probe the existence and determine the condition of the wood floors (See Figure 21). In the North West Pavilion, the first floor mosaic floor is cracked (See Figure 22). The crack appears to be old.

**Original Walls**

Many of the interior plaster walls are in poor condition, exhibiting significant moisture-related problems: failing plaster, efflorescence, mold, and water staining. The problems have multiple causes. Most of the damage is caused by water infiltration at the building envelope due to the poor condition of the roofs, windows, and brick masonry. Plaster deterioration is caused by mechanical equipment and drainage systems failure, as well as condensation. (See diagrammatic plans for location and type of damage at walls and ceilings on the following pages.)

The plaster surfaces in the Rotunda are in fair to good condition. Most of the damage occurs directly below the windows (See Figure 23). The damage of finishes suggests the potential for moisture in the masonry.

In the halls, most of the deterioration occurs at the upper part of the walls (See Figure 24). Plaster damage is more apparent in the vicinity of the intersections of the transitional roof and the gable roof (See Figure 25). Water-related deterioration is also observed at many locations where the trusses and
26: Halls
Showing deterioration caused by water infiltration at intersection of purlins and masonry piers.

27: Halls
Efflorescence below windows

28: North Hall, East Gallery
Ceiling plaster is in very poor condition

29: Structural Piers
Showing damage to plaster and significant efflorescence

30: Plaster Deterioration at Courts
Significant deterioration in areas below roofs

31: Plaster Deterioration at Courts
Significant deterioration in areas below windows

32: Rust Stains
Indicate possible significant deterioration of metal beams or decks above

33: Plaster Deterioration at Ranges
There is significant deterioration in areas where roof drains are located.

Purlins rest on the masonry walls (See Figure 26). There is significant efflorescence directly below many of the windows, especially at the large windows at the gable end of the halls (See Figure 27).

The plaster ceilings above the gallery at the North Hall are in very poor condition, particularly on the east side (See Figure 28).

Plaster surfaces at the piers that separate the courts, ranges, and halls are in fair condition. However, several piers are in very poor condition, with significant efflorescence and damage (See Figure 29).

Deterioration from water infiltrated at the top of the wall is visible on all floors, including at the base of piers on the first floor. Plaster surfaces exhibit plaster deterioration at the top of the walls, directly below the roof (See Figure 30) and below the windows (See Figure 31). Some of the rust staining suggests that the metal beams or decks above also have significant deterioration (See Figure 32).

In the ranges, the exterior plaster walls are in fair condition. The most significant deterioration in these areas occurs at the corners of the ranges, adjacent to the areas where the roof drains are located (See Figure 33). Also, there is
Basement Diagrammatic Plan
First Floor Diagrammatic Plan

Historic Structure Report & Conditions Assessment
Smithsonian Institution Arts & Industries Building
08.31.2009

2.3.2 – 7
Second Floor
Diagrammatic Plan
Third Floor
Diagrammatic Plan

Historic Structure Report & Conditions Assessment
Smithsonian Institution Arts & Industries Building
08.31.2009
2.3.2 – 9
water-related deterioration below several of the windows. In some of the ranges, the original exterior plaster walls below windows were furred out, concealing the condition of these surfaces.

In the towers and the pavilions, the plaster surfaces are in fair condition. Exterior plaster walls exhibit moisture deterioration, typically below windows (See Figure 34). Many of the areas below windows are furred out, concealing the walls' condition. Some of the areas where plaster damage was noted in previous reports have since been furred out. The ceilings on the first and second floors have signs of water damage, including rust stains (See Figure 35). In some of these areas, it is likely that the damage is due to leaks in mechanical system components or condensation. Moisture travelling within the masonry is likely the cause of some of the deterioration at interior partitions. The plaster is in poor condition at some locations adjacent to the interior storm drains, but this condition is not as general as in the ranges. Deterioration occurring in the second floor rooms between the towers might be caused by failing flashing between the shed roof above and the tower masonry wall. The third floor surfaces in the pavilions, dating to the 1980s restoration, exhibit signs of moisture infiltration. Although there is plaster deterioration at the exterior walls, most of the deterioration occurs at ceilings (See Figure 36).

The basement walls are in fair to poor condition. There are many signs of moisture at both the stone foundation and the brick walls (See Figure 37). The plaster surfaces are in very poor condition; the worst conditions are at the South West Pavilion (See Figure 38). Deterioration due to moisture is also visible at ceilings.
Besides moisture-related damage, many of the plaster surfaces are chipped at the bases, corners, and capitals. Several of the pilaster capitals have large sections broken off in the mechanical rooms at some of the courts, (See Figure 39). Other capitals are above acoustic tile ceilings and their condition is not visible.

Various cracks occur throughout the building. Many occur at the intersection between different wall surfaces and at the joints between original walls and infill walls, including original windows and arches. A few cracks at arches in the halls may be caused by structural movement (See Figure 40). There are hairline cracks above windows and cracks at the window openings (See Figure 41). Deterioration due to impact and wear is visible at pilaster bases, especially at the gallery level (See Figure 42).

The original scoring lines simulating masonry construction are still visible along many of the walls. However, these walls have been painted several times, which has reduced the legibility of the pattern. (This condition is discussed in the Finishes section.)

The original concrete baseboards are in fair to good condition. In some of the rooms, the floor was raised and the baseboard is likely below the level of the current floor.

Doors
The interior historic wood doors are generally in good condition. The doors in the pavilions and towers are in fair to good condition. A few have open joints and exhibit signs of wear. Some of the original doors have several layers of paint. The finishes are in fair condition. Several of the historic doors have wire glass panels, which may have been installed early in the 20th century. Several of the transoms are painted shut and have inoperable mechanisms.

Some of the doors open over landings or steps and do not meet current codes because of this condition, which occurs frequently on the first floor of the towers.

With the exception of the first floor in the South East Pavilion, none of the pavilions or towers is accessible for persons with disabilities nor does the door hardware throughout the building meet ADA
guidelines. The historic doors at the pavilions and towers meet the minimum width ADA requirement.\(^2\) Several of the locations of the doors do not meet the ADA guidelines for distances on either the push or the pull sides.

Throughout the rest of the building, doors installed starting at the time the arches between the public spaces were infilled are not original and are not historically significant. Although most of these doors are in good condition, there are a few cases where wood panels are broken, split, or chipped (See Figure 43). Many of the beads at the door openings are chipped (See Figure 44).

### Galleries
The cast iron columns and the steel beams supporting the galleries are in good condition. Some open joints exist at several of the column bases (See Figure 45). The metal railings at the galleries are in fair to good condition. Not all the square posts are securely attached to the beam. Some are very loose and a few are displaced (See Figure 46). At the top of the stairs in the southeast corner of the Rotunda, ties were installed to temporarily secure the rail. Many of the post caps are loose and some of the screws are missing. A few caps have been replaced with wood while others are missing (See Figure 47). At a few locations, the geometric cast iron rail is broken. Several sections at the balconies over the North Hall are wood replicas of the cast iron railings.

The stained wood handrail is in fair to good condition. At the South Hall gallery, one section of the wood handrail is missing (See Figure 48). Many of the wood rail sections are loose, and, at several locations, the wood is chipped.

---

Footnote 2: Polshek Tobey + Davis Architects, AIB Master Plan Renovations, 65% Door Schedule OFEO Project No. 973316.
The metal railings at the galleries are approximately 40" high, lower than the required 42" for a guard. The geometric design at the railing also does not comply with current code requirements restricting the sizes of spaces between bars.

Stairs
Cast iron stairs at the towers are generally in good condition. However, a few of the risers, treads, and landings are broken (See Figure 49) and some of the vertical rods at the railing are missing. The head clearance at the spiral stair is very low and temporary protection has been installed for safety (See Figure 50).

At the South Hall, the straight flight of steps continuing with the spiral stairs and leading onto the third floor tower space was replaced with a wood stair and is not historic (See Figure 51). A section of the railing at the North Hall balcony is not historic (See Figure 52). At a few locations, the anchoring into the walls of the cast iron stair accessing the third floor of the towers is loose.

Cast iron stairs at the pavilions are generally in good condition. A few of the risers are broken at the basement stair in the South West Pavilion. Some of the steps and a landing between the second and third floors in the North West Pavilion are not historic. They have been reconstructed in wood and are now covered with carpet. The underside of some of the stairs has been finished with gypsum board, beaded wood boards, or plaster, modifying the original open configuration. Some of the joints between the cast iron string and the finish material are open (See Figure 53).

In the South West Pavilion, one of the intermediate landings between the first and the second floors is very narrow and does not meet current codes. The winding configuration of several of the stairs between
the second and third floors also does not comply with current codes. The vertical rods at all cast iron stairs are spaced approximately 10” apart. At the landings, the railings are 2’-10” high, less than the required height for a guardrail (See Figure 54). (Various life safety issues are discussed in a separate section.)

The cast iron stairs are painted black or green and the coatings are in fair condition.

The wood stairs/steps between the halls and the towers date from the 1970s restoration and are in good condition. Several of the doors open over these steps without a landing.

Elevators
The two elevators are non-historic additions. The conditions information provided below has been compiled from the November 2006 report undertaken by Facilities Engineering Associates, P.C.³

The hydraulic passenger elevator has not been modernized since its installation and all elevator controls and operating equipment are obsolete. The elevator is not ADA-compliant and does not comply with current safety requirements. The elevator room is located below the lowest landing; the access is not compliant with current elevator safety code. The elevator machine room is not air conditioned and the lighting is inadequate. The hoistway is not vented and does not have sprinklers or a drain/sump. The 2006 report found that the elevator was in below average condition.

Originally installed in 1955, the hydraulic freight elevator was modernized in 1988. The elevator machine room is located below the lowest landing; the access is not compliant with current elevator safety code. The elevator machine room is not air conditioned and the lighting is inadequate. The hoistway is not vented and does not have sprinklers. It has a drain/sump. The 2006 report found that the elevator was in “average” condition.

Finishes
The existing decorative finishes are not historic and, in general, are in fair condition at the Rotunda and in poor condition at the halls. At the Rotunda, there are water marks along all of the walls. Paint is peeling in many sections — the lower spandrel (See Figure 55), the lower frieze, and the niches (particularly on the north wall- See Figure 56)— affecting all the patterns.

At the halls, along the side walls, the paint is failing in many of the decorated spandrels (See Figure 57). On the walls between the halls and the Rotunda, paint failure is very extensive and affects most of the decorated areas. Decorative paint at the wall between the East Hall and the Rotunda is in better condition.

55: Rotunda
Peeling decorative paint
56: Rotunda, North Wall
Significant deterioration of decorative painting

Existing Conditions Assessment

57: Halls
Showing peeling of decorative painting

58: West Hall
Paint failure at central arch

59: West Hall
Paint failure at side arches

60: Decorative Painting
Sections of the decorative painting were removed to study and identify original patterns

61: Hall Walls
Damage to plaster at interior surfaces of exterior walls

62: Hall Walls
Damage to plaster at interior surfaces of exterior walls

63: Paint Failure
Large sheets of paint failure occur at the arch between halls and Rotunda

64: Rotunda
Biological growth at underside of archway to a hall

than the other walls between Rotunda and the halls. There is severe paint failure at the West Hall over the central arch, as well as the side arches, (See Figures 58 and 59). Paint is peeling from the squares at the piers between the side arches and the central arch at the Rotunda end of the halls. This problem is worse on the west side of the North Hall. Sections of paint were removed in 2001 in order to study and identify original patterns (See Figure 60).

Throughout the structure, the non-decorative, functional finishes of the plaster surfaces are in fair to poor condition, depending on the location. Most of the damage occurs at the exterior walls and at the upper parts of walls, primarily from roof leaks and condensation (See Figures 61 and 62). Significant damage also appears below windows. Paint failure includes crazing, bubbling, and peeling in small chips and in large sheets (See Figure 63). While most of the failure appears to be related to moisture in the masonry walls, some of the paint failure may be due to the original paints, which were calcimine (distemper) paints. These tend to detach from their plaster substrate when painted over with oil paints.4

The original scoring throughout the building is still somewhat visible in many areas. However, in many areas, it has faded beneath numerous layers of paint.

Biological growth is visible on both plaster and wood surfaces in several areas in the building. On plaster surfaces, biological growth occurs at arches between the Rotunda and the halls (See Figure 64), as well as at many exterior walls. On wood, the most extensive biological growth occurs on the wood windows at the ranges.

Most of the interior wood finishes are in fair condition, with normal signs of wear and tear. The finishes in the Rare Book Library are in good condition. The staining at the wood rails along the balustrade at the galleries is in poor condition (See Figure 65).

Most of the finishes on metal surfaces, including stairs, railings, columns, and beams, are in fair condition. The finish on the metal deck at the Rotunda is in fair condition, while at the halls, the finishes are in very poor condition (See Figure 66 and Structural Masonry and Roof Deck section for additional information about the metal decks). The condition of the finishes at the metal framing varies depending on the space. In the public spaces, the condition of the finishes is directly related to the deterioration of the metal substrate (see section 2.4.1 for additional information about the metal trusses). There is extensive paint failure at the steel trusses in the courts (See Figure 67).

**Interior Lighting**
None of the original light fixtures survives in the building. The replica fixtures are in good condition; however, the replication of the existing fixtures has no historic base. (See electrical section for condition of light fixtures.)

**Fountain**
The marble Foley fountain installed during the 1970s restoration project was removed since and is presumably stored off site. The base of the fountain exhibits salt deposits due to moisture migration and evaporation (See Figure 68). The stone wall of the fountain basin exhibits water stains but is generally in good condition.
Existing Conditions Assessment

Introduction and Scope of Structural Investigation

The structural work associated with the Historic Structure Report for the AIB includes the following scope items:

- Perform a site condition assessment of the structural framing noting areas of deterioration.
- Review existing documentation related to structural systems to verify field findings.
- Describe structural systems and develop a chronology of structural modifications.
- Identify engineering material properties for structural elements.
- Provide a discussion of key structural items that are relevant to the future use scenarios for the building.

History of Structural Construction/Structural Modifications

The following is a general chronology of major structural modifications to the AIB with approximate dates based on available construction documents:

1879 to 1881  Original building construction

1894  Top chord of main hall trusses were observed to buckle. Main hall trusses near transitional roof areas were retrofitted with angle reinforcement and top chord bracing.

1896-1901  Galleries were constructed along the long sides of main halls (except the North Hall). Gallery-level framing also was constructed along the perimeters of the four courts and along three sides of the following ranges: West North, East South, West South, and South West. Gallery-level framing was constructed along the north end of the North West Range. Gallery-level framing was constructed to completely infill the South East Range.

1951  Concrete pan joists and columns were added within the existing gallery framing at the second floor and over the entire third floor level in the South West Court. New construction included a stair, elevator, and mechanical shaft surrounded by brick bearing walls. In the same area, a new mezzanine level of concrete pan joists was added below the existing gallery framing.


<table>
<thead>
<tr>
<th>Year</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1953</td>
<td>Gallery framing was added along the north bay of the West North Range and the columns supporting the gallery along the south bay were relocated.</td>
</tr>
<tr>
<td>1955</td>
<td>Steel beams and columns and concrete slab were added to infill the East North Range second floor.</td>
</tr>
<tr>
<td>1956</td>
<td>Steel wide-flange beams and precast concrete planks were added to infill the second floor area within perimeter gallery framing at the South East Court. Steel channel framing hung from the court roof trusses above was added at the third floor level. This framing supports the ceiling to the second floor in that area.</td>
</tr>
<tr>
<td>1966</td>
<td>Steel columns were added to provide support for existing steel girders in the South East Court.</td>
</tr>
<tr>
<td>1967</td>
<td>Gallery framing was partially removed at the second floor of the North West court. Concrete-encased steel framing was added to support mechanical equipment at the second and third floors.</td>
</tr>
<tr>
<td>1968</td>
<td>Open web joist framing was added to infill the second floor of the North East Range.</td>
</tr>
<tr>
<td>1971</td>
<td>Open web joist framing was added to infill the second floor in the North West Range.</td>
</tr>
<tr>
<td>1972</td>
<td>Open web joist framing was added within the existing gallery framing at the second floor in the West North, East South, and West South Ranges.</td>
</tr>
<tr>
<td>1973</td>
<td>Additional gallery framing was removed at the second floor of the North West Court. Concrete-encased steel framing was added to support cooling tower loads in the North West Court and open web joist framing was added at the gallery level.</td>
</tr>
<tr>
<td>1973</td>
<td>Perimeter gallery framing was removed at the second floor of the North East Court. New construction included a stair, elevator, and mechanical shaft surrounded by brick bearing walls and open web joist floor infill at the second and third floors.</td>
</tr>
<tr>
<td>1973</td>
<td>Steel beams and grating were added to infill a portion of the new mezzanine level in the South West Court provided in the 1951 construction.</td>
</tr>
<tr>
<td>1982</td>
<td>Steel purlins replaced existing wood framing over newly reinforced truss girders in all range roof areas.</td>
</tr>
</tbody>
</table>

**Detailed Description of Structural Systems**

**Foundation System**

Limited information for the foundation system for the AIB is available. The “Report of the Architect,” dated January 1, 1880, by Cluss & Schulze describes the foundation system. This report states that the foundation system consists of a base course of granite over a below-grade stone foundation wall constructed of gneiss laid in cement mortar. The stone foundation wall is laid over a heavy bed of hydraulic cement concrete bearing on solid ground. The stone walls extend a minimum of three feet below-grade to minimize the

---

Footnote 3: SI AR 1879 130-140
effects of uplift caused by freeze-thaw cycles of the soil. The soil conditions consist of a topsoil layer over a thick stratum of hard clay over a gravel layer (assumed to be disintegrated rock). The report entitled *Roof and Façade Restoration*, dated October 1980, authored by McGaughy, Marshall, and McMillan states that the concrete base supporting the foundation is typically 13” thick with 24” thick sections below the Rotunda piers. The majority of the foundation system, including below-grade stone walls and the perimeter granite base, appears to be in good condition. The stone foundation walls are visible in the basement levels of the North East, North West, and South West Pavilions, below the North Tower, and below the West South Range. (Figure 2 shows the condition of the below-grade walls.) No cracking or settlement is evident within these walls. Water infiltration at the foundation walls is visible at the South West Pavilion (See Figure 3).

Visual inspection of the building perimeter reveals that the outer corner of the South West Pavilion may have experienced slight foundation settlement. Coincidentally, this is the same general area where water infiltration was noted at the basement walls. The diagonal cracking pattern of the masonry indicates that the corner of the structure has moved downward (See Figure 4). No other locations around the building perimeter show any signs of foundation settlement.

**Roof Framing- Main Hall**
The structural roof framing system of the main halls consists of eight trusses spanning 62’-6” to the side walls of each hall, spaced at 13’ on center. Figure 5 shows the geometry and framing for the hall trusses. The trusses were fabricated with wrought iron members produced by the Phoenix Iron Company, which was a significant producer of iron products during the 19th century. The top chord consists of rolled I-beams measuring 6” deep. The bottom chord is made of solid rod members, with a single 1-3/4” diameter member along the center span and two 1-5/16” diameter rods for the outer span. The truss web elements consist of tension rod members and back-to-back double-T compression members. The support of the truss is provided by bearing connections at masonry piers on each side of the hall.
5: Main Trusses
Double fink configuration constructed in 1879 (Phase II Renovation Drawings, 1978)

6: North Hall
Original roof framing, pre-1897

7: East Hall
Roof framing, 1918 (SI AIB File, Folder: AIB Interior)
8: Hall Roof Framing
Description of structural framing of typical hall roof

9: Detail
Existing typical standing seam roof detail used for hall roofs
The secondary structural framing for the hall roofs is a system of wrought iron purlins, rafters, and sub-purlins that distribute the loading from the roof system to the main trusses (see Figure 8). The roof panels are fastened directly to wood nailer strips that run along the sub-purlins, which are angle-shaped iron members spaced at 10” on center. The sub-purlins are supported by a series of 4” deep I-beam rafters, which, in turn, frame into 6” deep I-beam purlins. These purlins direct the roof loading into the main trusses at their panel points.

A detail showing the construction of the roof system used in the halls is given in Figure 9. The roof deck is a 3/4” thick tongue-and-groove plywood system nailed to 2x4 blocking at 2'-0” on center spacing.

The in-plane truss bracing, which was added to the structure in 1900, consists of angle steel bearing the stamp of the Carnegie Steel Company. The cross-bracing occurs in every third bay and is attached at the mid-depth of the truss top chord members. At the center of the “x”, angle steel runs longitudinally through the hall and provides bracing to top chord members of each truss between panel points. Figures 6 and 7 document the addition of this cross-bracing following the original roof construction.

In general, the current condition of the main trusses is good given the age of the structure and the amount of water infiltration evident throughout the building. This can be attributed, in part, to the separation between the truss chord members and the roof system. A good example of this is shown in Figure 11 where the rafter-to-ridge connection has obvious signs of surface corrosion, yet the truss is located a few
16: Detail
Interface of transitional roof and hall roof

17: Detail
Existing typical stressed skin roof panel detail, transition roof and Rotunda

18: North Hall
Queen-post truss in North Hall transition area

19: North East Court
Queen-post truss in northeast transition roof from court area
inches away and appears to be in excellent condition. Similarly, the connection elements on the trusses are in good condition with little appreciable corrosion.

The only truss connection element where corrosion is repeatedly seen occurs at the truss bearing connections at the masonry load bearing walls. At several locations where signs of water infiltration at the walls are visible, pockets were exposed in the masonry to facilitate closer inspection of the bearing connection. Figure 12 shows the extent of surface corrosion on the truss top chord members within the wall, typical for those locations near where water damage is visible along the face of the wall. Approximately 1/8” of pack rust is seen on the surface of the top chord member, which indicates a relatively minor amount of corrosion and any material section loss is not a serious concern. The brick below the bearing pad is fully intact.

The locations where corrosion is seen in the highest concentrations in the hall roofs are along the ridge areas. High humidity levels and visible moisture condensation are repeatedly evident along these areas in the peak of the roof. This typical condition is shown in Figure 13. The metal architectural roof panels adjacent to the roof peak show the highest levels of deterioration. The surface corrosion is the most severe along the length of the ridge member, as well as the locations where the rafters connect to the ridge. However, despite the apparent severity of this surface corrosion field measurements did not indicate any measurable section loss at these areas. (More detailed information on the observed conditions can be found in the latest Annual Roof Survey Report authored by Thornton Tomasetti in 2009.)

In the center portion of each hall, a lantern skylight protrudes upwards from the main roof level. The roof system for each lantern consists of two trusses that support a tee-shaped ridge beam. (See Figure 15 for an overview of the lantern system.) The trusses are comprised of tee-shaped top chord elements and rod-shaped bottom chord elements. Tee-shaped purlins span from the ridge beam to the eave in a hipped roof configuration. Angle sub-purlins span between purlins and support the roof system. Several rod-shaped tie elements prevent the roof system from spreading at the base.

The condition of lantern structural framing is comparable to that of the adjacent hall framing. Surface corrosion is concentrated along the ridge of the lantern and hip areas at either end. Minor corrosion of the top chord of the ridge members and of the upper end of the roof beams framing into the ridge is evident. Minor surface corrosion is evident on some of the beam-to-ridge connections, but the integrity of the connections at these locations do not appear to have been compromised. The roof trusses supporting the ridge show minimal signs of corrosion.

The highest amounts of lantern corrosion appear to be in the West Hall. There is moderate corrosion of the architectural metal panels in the north and south hip areas, and severe corrosion of the panels adjacent to the ridge member. Figure 14 shows the extent of the deterioration along the lantern ridge. It is estimated that along this ridge member corrosion has resulted in a reduction in top flange thickness of roughly 1/32”.
Roof Framing: Transitional Area
A transitional roof area at the end of each hall was formed to provide roof drainage between adjacent halls. This transitional area is supported by a series of queen-post trusses located above the main roof trusses that span between the main hall and the adjacent court area. The queen-post trusses vary in total length and have a uniform spacing of approximately 4'-8". The valley girt spans from purlin to purlin, but also is supported directly by the main roof trusses at bearing pads located away from the truss panel points. (See Figure 16 for a diagram of the typical framing at the transition roof area.)

The queen-post truss top chord member is a 4" deep I-shape and the bottom chord is a 2-3/4" wide by 13/32" thick flat plate. The struts are 4" deep I-shapes and with locations that vary due to the overall length of the truss.

A detail for the roof deck construction used in this area is given in Figure 17. The panels consist of a system of two outer layers of plywood panels sandwiching a layer of 3-1/2" thick fiberglass insulation.

The corrosion seen along these trusses has been documented extensively in recent years. The heaviest concentrations of corrosion are usually located along the top chord members. This can be attributed to the top chord being in direct continuous contact with the transitional roof panels where moisture infiltration occurs regularly.

The area where this corrosion appears to be the most severe is in the transition roofs in the North and West Halls. The corrosion along some of the top chord members appears to go beyond the typical surface corrosion and pack rust is visibly flaking off of the top flange, an example of which is shown in Figure 18. However, the amount of section loss sustained thus far has not significantly reduced the load carrying capacity of the trusses in this area.

The queen-post trusses show the same types of deterioration beyond the wall into the court areas (see Figure 19). The corrosion is concentrated along the top chord members, most noticeably along the top flange and the web. Access to these members was limited and measurements could not be taken to assess any potential section loss. However, visual inspection of the member conditions indicates that the extent of the corrosion is most likely comparable to the trusses measured in the hall areas.

Roof Framing- Courts
The structural roof framing system of the court areas consists of four intersecting wrought iron trusses supported on the perimeter court walls. Two of these trusses are oriented in the north-south direction and flank the east and west sides of the skylight. The other two trusses are oriented in the east-west direction and flank the north and south sides of the skylight. The overall span length of these main court trusses is similar to those in the hall area and span approximately 63’. The spacing between these trusses is also similar to those in the main hall with a distance of 13’ on center. The bottom chord elements of these trusses intersect. The top chord elements of these trusses provide support for the skylight. The roofing system used in the court areas is similar to that shown in the main hall.
20: Detail
Orientation of secondary to main king-post truss framing in court area

21: Detail
Layout of typical court roof framing system
A diagonal member braces the intersecting top chords creating a compression ring around the top of the court truss framing. A king-post truss extends from each corner of the skylight and spans to the intersection point of the perimeter court walls. Wrought iron I-beam rafters span from these trusses to the perimeter wall. Sub-purlins consisting of angle sections span between the purlins to directly support the deck.

A skylight is located in the center of each court. The skylight framing consists of diagonal tee-shaped sections extending from each corner to the center of the skylight. Rod elements extend from corner to corner to prevent spreading of the roof framing. Tee-shaped purlins extend perpendicular from the perimeter of the skylight to the diagonals. Angle sub-purlins span between the purlins and directly support the deck.

The queen-post trusses supporting the transitional roof areas are supported on a series of king-post trusses located between the Rotunda and the court skylight. These trusses are supported by the main trusses and the perimeter walls.

The king-post truss supporting the transitional roof areas shows signs of corrosion along the top chord member. This can be attributed to the fact that this king-post truss supports the transition roof and comes in direct contact with this surface, as shown in Figure 20.

Generally, the conditions of the structural framing of the court roofs match the observations from the adjacent hall areas. The main roof trusses typically are in good condition and show no signs of appreciable corrosion or deterioration along the members or the connections. The main king-post trusses at the four corners of the court are also in good condition.

The secondary framing system of the court roof, which consists of sub-purlins, rafters, and purlins, are typically in good condition. Figures 21 and 22 show that there is little appreciable corrosion on these members, especially when compared with the amount of deterioration on the top chord elements of the queen-post trusses supporting the transitional roof.

It should be noted that the overall condition of the North West Court is poor and large portions of the court area, including metal ceiling panels, structural members, and connections, exhibit significant corrosion (see Figure 23). The main roof trusses on the south and east sides of the court exhibit significant amounts of corrosion on both the members and on the connections. The king-post trusses located in the northwest, southwest, and northeast corners of the court do not show signs of significant deterioration. The king-post truss located in the southeast corner does exhibit significant amounts of corrosion at the
A diagonal member braces the intersecting top chords creating a compression ring around the top of the court truss framing. A king-post truss extends from each corner of the skylight and spans to the intersection point of the perimeter court walls. Wrought iron I-beam rafters span from these trusses to the perimeter wall. Sub-purlins consisting of angle sections span between the purlins to directly support the deck.

A skylight is located in the center of each court. The skylight framing consists of diagonal tee-shaped sections extending from each corner to the center of the skylight. Rod elements extend from corner to corner to prevent spreading of the roof framing. Tee-shaped purlins extend perpendicular from the perimeter of the skylight to the diagonals. Angle sub-purlins span between the purlins and directly support the deck.

The queen-post trusses supporting the transitional roof areas are supported on a series of king-post trusses located between the Rotunda and the court skylight. These trusses are supported by the main trusses and the perimeter walls.

The king-post truss supporting the transitional roof areas shows signs of corrosion along the top chord member. This can be attributed to the fact that this king-post truss supports the transition roof and comes in direct contact with this surface, as shown in Figure 20.

Generally, the conditions of the structural framing of the court roofs match the observations from the adjacent hall areas. The main roof trusses typically are in good condition and show no signs of appreciable corrosion or deterioration along the members or the connections. The main king-post trusses at the four corners of the court are also in good condition.

The secondary framing system of the court roof, which consists of sub-purlins, rafters, and purlins, are typically in good condition. Figures 21 and 22 show that there is little appreciable corrosion on these members, especially when compared with the amount of deterioration on the top chord elements of the queen-post trusses supporting the transitional roof.

It should be noted that the overall condition of the North West Court is poor and large portions of the court area, including metal ceiling panels, structural members, and connections, exhibit significant corrosion (see Figure 23). The main roof trusses on the south and east sides of the court exhibit significant amounts of corrosion on both the members and on the connections. The king-post trusses located in the northwest, southwest, and northeast corners of the court do not show signs of significant deterioration. The king-post truss located in the southeast corner does exhibit significant amounts of corrosion at the truss connection to the skylight. It is recommended
that the North West Court be the focus of a detailed future assessment due to its current condition. This assessment should include evaluation of connections at the most heavily corroded areas by shoring, dismantling, and inspection of the connections.

**Roof Framing - Rotunda**

The structural roof framing system of the Rotunda consists of a dome structure supporting a cupola encircled by clerestory windows. The diameter of the Rotunda at the base of the dome is approximately 66'. The compressive forces generated by the dome action are resisted at the top of the dome by a wrought iron compression ring located at the base of the clerestory windows. The compression ring is stiffened by the roof diaphragm. The tendency for the base of the dome to spread is resisted by a wrought iron tension ring encircling the dome at its base. Tie rods are not required to cross at the base of the dome because of this tension ring. Figure 24 shows the configuration of the Rotunda framing system. The roof system is supported by wrought iron I-beams. Some of these beams span from the compression ring at the top of the dome to the support walls at the base of the dome (at the location of the tension ring). Other beams are supported by an intermediate girder located midway between the compression ring and the tension ring.

The roof panel construction used in the Rotunda area of the roof is similar to that in the transitional roof zones.

It is assumed that posts supported on the compression ring are located in the cupola walls to support the cupola roof. The cupola roof also behaves as a dome. It consists of a compression ring at the top of the dome. The tendency for the base of the dome to spread is resisted by tie-rods traversing the bottom of the dome and connecting to a central tension ring located directly below the center of the cupola roof. Wrought iron I-beams spanning from the top of the compression ring to the base of the dome support wrought iron angles creating a saw-tooth roof profile. The roof deck is directly supported on these angles.

The overall conditions of the Rotunda and the cupola are excellent. An overall view of the condition of the Rotunda framing is shown in Figure 25. Small areas of corrosion on the architectural metal panels and the Rotunda framing are evident, but these areas appear to be minor and have not caused cross-sectional loss. The tension ring at the base of the dome is embedded within the masonry support walls. The condition of the tension ring is not known, but it is assumed to be fully intact because there does not appear to be water infiltration or corrosion of the framing members near the tension ring.
27: Detail
Purlin replacement details

28: North East Range
Truss-girder and new purlins

29: South East Pavilion
Exposed pavilion roof truss

30: North East Pavilion
Tension ties at pavilion roof

31: Gallery Level
Construction
circa 1898, SIA RU 95, Box 32, Folder 11, Neg. No. 11478

32: Load Testing of Gallery
circa 1898, SIA RU 95, Box 32, Folder 11, Neg. No. 11482

33: North East Pavilion
Typical brick arch framing system

34: North East Pavilion
Long span brick arch framing system
Roof Framing- Ranges
In the range areas, truss girders spaced at 13'-0" on center span between masonry bearing walls. These wrought iron truss girders have double angle top and bottom chords and compression diagonals. The tension diagonals are single flat bars with thickness equal to the space between the chord double angles. The original configuration of the range roof trusses is shown in Figure 26. In 1982, the roof system and the existing wood purlins were replaced. The new structural roof support between the truss girders was a system of 4” steel beam purlins supported by a 4” steel beam added above the top chord of each truss girder. This construction process included the retrofit of all existing truss girders including strengthening of a central diagonal member and field welding the three connections of the truss girder web members closest to the court wall to reinforce these connections. In the short span condition immediately adjacent to each pavilion, the existing truss beam was removed and replaced with a new 14” steel beam. Figure 27 shows the construction drawing detail for the replacement purlin framing. The existing truss girder (painted white) and new purlins (painted red) are visible in Figure 28.

The truss girders are fabricated from Phoenix Iron wrought iron. New steel framing provided in the 1982 construction process was specified to conform to ASTM A36. All members in the range roof framing system appear to be in very good condition.

Roof Framing- Pavilions
The pavilion roof structure has generally been concealed by room partitions and ceilings, but the presence of two main trusses and tension ties at the upper roof level (as seen in Figures 29 and 30) suggests that a three dimensional roof truss system is used similar to the court roof systems.

The pavilion roof trusses were part of the original building construction and, therefore, are made of wrought iron. All visible members appear to be in very good condition.

Floor Framing- Galleries and Mezzanines
The gallery-level framing at the ends of the halls and adjacent to the towers consists of the same wrought iron beam and brick arch system used in the pavilion and tower floors and was part of the original construction effort. In 1903, new galleries were added along the edges of the West, South and East Halls. Gallery-level framing was also constructed along the perimeters of the four courts and along three sides of the following...
ranges: West North, East South, West South, and South West. Gallery-level framing was constructed along the north end of the North West Range. Gallery-level framing was constructed to completely infill the South East Range. The Figure 31 shows the gallery-level construction. Many of these galleries are still present and serve as floor framing for the second floor.

Gallery framing has a finished floor at an elevation of approximately 15'-10" above the finished first floor slab and consists of a concrete slab and concrete-covered steel I-beams spaced at 4'-4" supported by steel girders on one end and masonry bearing walls on the other. The 5" one-way concrete slab spans between beams and is reinforced by 3/16” twisted square steel bars spaced at approximately 4” on center. Gallery girders are supported by 7” square cast iron columns and the top flanges of gallery girders are set flush with the top of the concrete slab. Based on the 2006 Mothball Study by Beyer Blinder Belle, the gallery uses 6” steel I-beams. This information concurs with the 1977 report by Smislova, Kehnemui & Associates (SKA), which contained material testing of a “mezzanine” member. Both of these reports indicate that the 6” beams are the limiting structural factor and result in an allowable floor live load of 60 pounds per square foot. The photo Figure 32 below indicates a load test on the constructed gallery level in either a court or range area. Gallery framing was observed to be in very good condition.

**Floor Framing - Pavilions and Towers**

The tower and pavilion floors are a brick arch and concrete fill system spanning between wrought iron I-beams. The brick arch system uses flat bricks bearing on the bottom chord of the I-shaped beams and creating an arch to span between beams. A masonry infill is added on top of the brick arch up to the level of the beam top flange. On top of that level surface 2” of lean concrete fill create the finished surface along with wood sleepers spaced at 24” on center. Typical framing as seen in Figure 33 spans a single 13’ bay and has a total structural depth of 10” with a minimum structural arch thickness of 7”. Typical beams are spaced at about 4’-4” on center and were observed to have a depth of 8”. In the case where the system spans two bays, or 26’, the beam depth was observed to be approximately 12”. This is shown in Figure 34. Pavilion and tower floor framing appears to be in very good condition.

**Floor Framing - North West Court**

The majority of the second floor gallery framing in the North West Court was removed and replaced in two phases. The first phase added concrete-encased steel beams and columns in 1967 to support a cooling tower floor 18’-4” above the existing first floor. Concrete slabs are 5” thick with #4 reinforcing bars spaced at 11” on center and are monolithic with the concrete encasement of the beams. The concrete
encasement serves to provide fire protection for the steel structure. The four center columns in the phase one construction extend beyond the cooling tower level to create an enclosed plenum floor. In 1973, the remainder of the cooling tower floor was built in a second phase. There are two construction types for this phase of construction. Phase two construction is generally similar to phase one. The area immediately adjacent to the North Hall uses bar joists supported by steel wide flange beams or the bearing wall. A concrete slab on steel form deck with total thickness of 3” spans between the joists. Figure 35 shows the construction types based on a detail in the construction drawings.

The structural drawings for the 1967 construction provide live load capacity and material information. The cooling tower floor was designed for a live load of 250 pounds per square foot. The stairs and landings were designed for a live load of 100 pounds per square foot. The third floor plenum platform was designed for a live load of 30 pounds per square foot. The concrete in this phase was specified to be 3000 psi. The yield stress of the reinforcing steel was specified to be 60,000 psi and structural steel was to conform to ASTM A36. The undisturbed soil under the new concrete spread footings was specified to have a minimum bearing pressure of 4000 pounds per square foot. North West Court framing appears to be in very good condition.

**Floor Framing- North East Court**

The North East Court previously had one bay of steel gallery framing around all four sides. In 1973, this gallery framing was entirely removed. The new
construction included brick bearing walls around new stairs, an elevator, and a mechanical shaft. The floor framing is steel joists supported by new steel wide flange beams, the new brick bearing wall, and the original masonry bearing wall. A concrete slab on steel form deck with total depth of 3” spans between the joists as shown in Figure 36. The same construction types are used for the third floor infill.

The structural drawings for the 1973 construction provide design loads and material information. The second floor was designed for a live load of 100 pounds per square foot and the third floor was designed for a live load of 150 pounds per square foot. The structural steel was specified to conform to ASTM A36. Reinforcing steel was specified to conform to ASTM specification A615 Grade 60. Structural concrete for foundation walls and spread footings was specified with a strength of 3000 pounds per square inch. The concrete slab over steel bar joists was specified with a strength of 2500 pounds per square inch. The undisturbed soil under the new concrete spread footings was specified to have a minimum bearing pressure of 4000 pounds per square foot. North East Court framing appears to be in very good condition.

**Floor Framing - South East Court**

In 1956, structural infill was constructed within the four-sided gallery framing at the second floor. This structural framing consists of 18” steel wide flange girders and 8” steel beams connecting directly to existing gallery framing. The slab system is 2 ¾” precast concrete plank. New W8 steel columns and corresponding concrete spread footings were added
at midspan to support each of the existing north-south gallery girders. A detail for this new column along with typical framing is shown in Figure 37. The ceiling of the second floor and catwalk framing are supported by a network of channel sections hung from the roof truss above. This framing is visible in the photo Figure 38. In 1966, columns and corresponding concrete spread footings were added to support each of the second floor wide flange girders to reduce the clear span of the 1956 girders by about one third.

The construction drawings for the 1956 infill specify a concrete strength of 2500 pounds per square inch. Construction drawings do not provide steel material information but structural steel in that era had yield strength between 33,000 and 36,000 pounds per square inch. South East Court framing appears to be in very good condition.

**Floor Framing- South West Court**

The South West Court has one bay of steel gallery framing around all four sides. In 1951, a concrete scheme was constructed to add a mezzanine floor level below the gallery framing. This scheme also included the infill of the third floor throughout the entire court. The new construction included brick bearing walls around new stairs, an elevator, and a mechanical shaft. The floor framing at the gallery level is typically a 2 ½ concrete slab with 8” deep by 5” wide pan joists at a spacing of about 25” along with concrete girders as seen in Figure 40. The construction type is shown in Figure 39. The existing gallery cast iron columns were encased in concrete. New concrete columns were added under the existing steel girders and spaced through the infill area along with corresponding concrete spread footings.

An intermediate mezzanine level was added with a walking surface 7'-6” above the existing first floor. This new level and the third floor use the same concrete joist construction type as the gallery level infill. In 1973, a portion of the intermediate mezzanine level was expanded with steel framing. The new steel members frame into the existing mezzanine level concrete beams, concrete columns, and the brick bearing walls. The walking surface is 1 ¼” floor grating.

The 1951 structural drawings present material and allowable load information. The new mezzanine floor, extension of the existing gallery floor, and the third floor were designed for a live load of 200 pounds per square foot. Concrete was specified with strength equal to 2500 pounds per square inch. The reinforcing bars were specified as deformed high bond strength bars that meet ASTM specifications A-305-49 and A-305-50T. Footings were designed for a maximum pressure of 5000 pounds per square foot. The 1973 structural drawings provide a design live load of 200 pounds per square foot for the steel mezzanine infill. South West Court framing appears to be in very good condition.
Floor Framing - North West Range

In the North West Range, a single bay of steel gallery framing is currently located along the north side. The remainder of the second floor was filled by a steel joist system in 1971. The joists span between new steel beams that are supported by new steel wide flange columns and corresponding concrete spread footings. New steel wide flange columns were added to replace existing cast iron gallery columns and used to support the existing gallery girder. The slab consists of concrete fill on a steel form deck. In 1972, steel joists were added in the spaces between existing joists.

The 1971 structural drawings provide notes on material and allowable load information. The structural steel was specified to conform to ASTM A36. The minimum strength for the concrete slab at the second floor was specified as 2500 pounds per square inch. The strength of the concrete spread footings was specified as 3000 pounds per square inch. The design uniform live load for the second floor joist system was 100 pounds per square foot. The assumed bearing pressure beneath the spread footings was 4000 pounds per square foot. The North West Range framing appears to be in very good condition.

Floor Framing - West North Range

The West North Range has one bay of original steel gallery framing along the west, south, and east sides. In 1953, a new gallery segment was constructed along the north exterior bay using steel wide flange beams and a tongue-and-groove precast concrete plank. New steel columns were added along with corresponding concrete footings. Also in this construction project there were modifications to the south, west, and east gallery framing including the addition of new columns to replace existing columns. In 1972, the infilled north gallery was modified. In this project, the existing concrete plank deck was removed. Steel joists were added between the existing infill framing and a 1 1/8" tongue-and-groove plywood deck spans between the beams and joists. The two columns located off grid in the 1953 project were moved back to align with the gridline. In the same construction effort, the remainder of the second floor was filled in with steel joists supported by steel beams along with new steel columns and corresponding concrete spread footings. Figure 41 shows the joist support at the wide flange beam as well as the 1 1/8" tongue-and-groove plywood deck. At locations where new joists frame into existing girders, a reinforcing wide
Existing Conditions Assessment

Flange steel beam was added directly below the bottom flange of the existing girder.

The 1953 structural drawings provide allowable load information. The gallery infill was designed for a live load of 100 pounds per square foot. The 1972 structural drawings provide material and allowable load information. The spread footing concrete has a specified strength of 2500 psi for footings with rebar and 3000 psi without rebar. The design allowable live load was 100 pounds per square foot. Assumed bearing value of soil was 4000 pounds per square foot. The West North Range framing appears to be in very good condition.

Floor Framing- East North Range
In 1955, the second floor of the East North Range was infilled with a new structural system. A 5 ½” thick one-way formed concrete slab with #4 reinforcing bars at 5” on center spans between 14” deep wide flange steel beams. The steel beams span between new 18” deep wide flange steel girders and the existing masonry bearing walls. The girders are supported by existing masonry bearing walls and new extra strong steel pipe columns. The columns were added along with corresponding concrete spread footings. An overall view of the concrete slab and steel beam layout is shown in Figure 42.

The 1955 structural drawings provide material and allowable load information. The concrete was specified with minimum design strength of 2500 psi. The new second floor was designed for a live load of 125 pounds per square foot. Footings for columns were designed for a soil bearing of 3000 pounds per square foot. The East North Range framing appears to be in very good condition.

Floor Framing- North East Range
In 1968, the second floor of the North East Range was infilled. Steel open-web bar joists are supported by wide flange steel beams and wide flange steel columns with corresponding concrete spread footings. This system is shown in Figure 43. A 3” thick concrete slab on steel form deck spans over the joists.

The 1968 structural drawings provided material and allowable load information. The steel was specified to conform to ASTM A36. All concrete was specified to have a minimum strength of 2500 pounds per square inch. Assumed undisturbed soil bearing strength was 2500 pounds per square foot. The North East Range framing appears to be in very good condition.

Floor Framing- South East Range
The steel gallery framing used in the South East Range differs from the typical hall galleries as described above. Beams in this area are spaced at 4’-0” typically and have a total depth of 9”. This information was measured at a member where the concrete had been chipped away as shown in Figure 44. Based on the depth and spacing of the gallery
framing in this area, it is possible that the allowable uniform live load of the infilled areas is larger than the 60 pounds per square foot for the single bay galleries. There are no available structural drawings for this area. The South East Range framing appear to be in very good condition.

**Floor Framing - East South and West South Ranges**
The East South and West South Ranges have identical construction history. These ranges have original gallery framing along the west, north, and east exterior bays. In 1972, the balance of the ranges were filled at the gallery level with steel joists spanning between steel wide flange beams and wide flange steel columns along with corresponding concrete spread footings. The slab consists of concrete fill on a steel form deck with a total thickness of 3". New steel columns were added to support the existing mezzanine steel girders and replace the existing cast iron columns. The existing girders were spliced with a full moment transfer where they were previously supported by columns.

The structural drawings for these ranges provide material and allowable load information. The spread footing concrete has a specified strength of 2500 psi for footings with rebar and 3000 psi without rebar. The assumed bearing value for the design of the spread footings was 4000 pounds per square foot. All structural steel members were specified to conform to ASTM A36. The concrete slab had a specified minimum strength of 2500 psi. The assumed allowable live load for the existing gallery framing was 100 pounds per square foot and the new framing had a design live load of 100 pounds per square foot. The East South and West South Ranges appear to be in very good condition.

**Floor Framing - South West Range**
The South West Range has existing mezzanine framing along the north, east, and south exterior bays. No second floor infill framing exists at this location. The South West Range gallery framing appears to be in very good condition.

**Load Bearing Walls**
Except for steel or cast-iron columns supporting the mezzanine levels and court or range infill framing, the vertical support for the structure is provided by load-bearing, masonry walls. Perimeter load bearing walls surround each of the building areas including the Rotunda, the main halls, the courts, the towers, and the pavilions. Load bearing walls are located along the exterior walls of the ranges. Piers of increased wall thickness are located adjacent to the arched openings within the load bearing walls. These pier elements correspond with the roof truss bearing locations. (See Figure 45.)

An investigation of the continuous masonry load bearing walls was performed by Dell Corporation as described in the report entitled, *Arts and Industries Building Exterior Wall Probes – SI OFEO Project Number 973316*, dated December 7, 2001. This report performed wall probes on the west wall of the South Hall and on the north wall of the West North Range. The study found that the continuous load bearing wall in the South Hall consists of three interior wythes of brick and one exterior wythe of brick with no air space. The continuous load-bearing wall at the
West North Range consists of two wythes of interior brick, an air space, and one wythe of exterior brick. In both cases, a header course is located every sixth lift. Mortar samples revealed that a lime-based mortar was used. The report entitled *Roof and Façade Restoration*, dated October 1980 and authored by McGaughy, Marshall, and McMillan, states that exterior walls consist of two wythes of common brick on the interior, an air space, and two wythes of hard pressed brick on the exterior.

The interior load-bearing, masonry walls appear to be in good condition. No cracking or deterioration is visible. Water infiltration is visible at several bearing wall locations in the main halls and in the court areas near the low point of the transitional roof areas. Probes reveal that the water infiltration did not affect the integrity of the masonry walls at these locations. Figure 46 shows water infiltration at the North East Court. The majority of the exterior load bearing masonry appears to structurally be in good condition. Pyramid-shaped cracking is consistently apparent above ground level window openings within the corner pavilions. These cracks are most likely caused by a subsidence of the arched header over the window opening. In many of these cases, the “keystone” bricks at the top of the header appear to have shifted slightly downward causing the brick above this area to also shift downward. This is not a structural concern and does not affect the load-carrying ability of the wall, but should be repaired during future exterior improvements.

**Lateral System**

**Description**

The lateral load resisting system for any building structure consists of vertical elements and horizontal elements. Vertical elements typically consist of walls. Horizontal elements typically consist of floor and roof diaphragms that brace the vertical walls and transfer lateral loads to the vertical members of the lateral force resisting system. Vertical walls can have multiple functions. They can directly support the lateral loads and can also function as shear walls. Shear walls are vertical elements that collect lateral loads from the horizontal diaphragms and, through bending and shear, transfer these loads safely to the foundation. In the case of wind loading, wind loads are applied directly to the face of the exterior walls. The walls act as beam elements to transfer the lateral loads to horizontal diaphragms. The horizontal diaphragms then transfer load into the vertical shear walls. Loads that act perpendicular to the plane of the walls are called out-of-plane loads. Loads that act in the plane of the wall, such as the loads in a shear wall, are called in-plane loads.

Seismic loading is different from wind loading. During a seismic event, ground shaking occurs. The motion of the ground is transferred into the building structure through the foundation. This motion can be both side-to-side and up-and-down. The walls and the horizontal diaphragms are subject to lateral loads as these heavy elements are moved. In technical terms, lateral forces are generated as the mass of the walls and floor diaphragms are subject to horizontal accelerations. Lateral loads generated within the floor and roof diaphragms are resisted directly by the
shear walls attached to those elements. Out-of-plane lateral loads generated within the walls are transferred to horizontal diaphragms. These loads are then transferred to vertical shear walls.

The vertical elements of the lateral force resisting system for the AIB consist of unreinforced masonry walls. Perimeter walls surrounding the Rotunda, hall areas, courts, ranges, and pavilions act as vertical shear walls that resist in-plane wind and seismic loading. All masonry walls, exterior and interior, are subject to seismic out-of-plane loads. All exterior masonry walls are subject to out-of-plane wind loads.

The horizontal elements within the AIB consist of the floor and roof diaphragms. The floor diaphragms at the second floor consist of historic mezzanine construction (one-way concrete slabs supported by beams) and other deck systems used to infill the range and court areas. These systems include concrete fill over form deck, tongue and groove plywood, and one-way slabs supported by steel beams. The roof diaphragms consist of tongue-and-groove board sheathing (range areas), plywood over board sheathing (at the halls, courts, and lanterns), and plywood stressed skin panels at the hall transitional roof areas. Diagonal cross-bracing is visible in the plane of the hall roofs. It is assumed that the cross-bracing does not function as diaphragm bracing. It is understood that these elements were added to brace the top chord of the hall roof trusses.

In order to create a complete load path for lateral loads, positive anchorages are necessary between the wall elements and the horizontal elements. The diaphragms must also be capable of transferring in-plane shear forces. The majority of the floor and roof diaphragms that currently exist in the AIB do not contain positive attachments to the walls. Minimal interconnection of roof panels limits the transfer of in-plane lateral forces. In addition, the infill slabs between the existing mezzanines are often not positively attached to the walls or the mezzanine slabs. The only direct attachments that exist between the floor/roof framing and the vertical wall elements are beams pocketed into the existing masonry walls. These connections are not adequate for in-plane transfer of lateral loads or for out-of-plane anchorage (beam can pull-out).

Condition of the Lateral System
No deterioration of the vertical wall elements of the lateral load resisting system of the AIB is visible. Diagonal tension cracks resulting from excessive in-plane shear stresses are often a sign of failure within shear walls. Cracking of this type was not seen. Flexural cracking resulting from excessive out-of-plane loads also was not seen.

Although the floor and roof diaphragms are not considered effective in resisting design seismic loads, it is likely that these elements do participate to brace the walls against wind loading. In this respect, the condition of these diaphragms is important. Deterioration of the roof diaphragm is visible in the transitional roof areas and at the ridges of the lantern roofs and at the ridges of the hall roofs. Water staining of the wood components of the diaphragms is visible and may be indicative of further deterioration that is not visible. These diaphragms most likely will be replaced during the proposed roof replacement. The remaining floor and roof diaphragms appear...
to be in good condition without signs of in-plane cracking or pullout from the walls.

Seismic Analysis
A seismic analysis of the AIB was performed. The results of this analysis are described in the report entitled *Arts & Industries Building, Washington D.C. - Seismic Analysis Narrative with Preliminary Recommendations*, prepared by McMullan & Associates, dated June 18, 2001. Many of the design assumptions used in the seismic analysis are consistent with the previous discussion. The author states that the horizontal elements within the roof do not act as diaphragms, with the exception of the roof over the range areas. The author also explains that the second floor horizontal elements do not act as diaphragms and that the mass associated with these levels acts to lean on the adjacent masonry walls as opposed to providing support for the masonry walls.

The report concludes that several of the wall sections are overstressed (the piers along the hall walls and the piers between the courts and range areas). The report also concludes that structural modifications to the lateral load resisting system are required to prevent overstressing of the existing wall elements. The modifications include bracing the top of the walls between the halls and courts to resist out-of-plane loads, strengthening the range roof diaphragm and connections, strengthening the second floor diaphragms and their attachment to the masonry walls, and the addition of new shear walls. The report states that the second floor diaphragms and addition of new shear walls are necessary to control the shear stresses within the masonry walls.

Non-Structural Seismic Hazards
ASCE 31-03 Seismic Evaluation of Existing Buildings provides a prescriptive approach to the evaluation of seismic hazards within an existing building. Although it is not mandatory that the structure comply with this standard, it does offer insight into the identification of seismic hazards within an existing building. One aspect of this evaluation involves non-structural items that can pose falling hazards to the occupants of the building. It is recommended that the following non-structural hazards be mitigated during any future renovations: non-structural unreinforced masonry wall infill located within the arched openings, unreinforced parapets and chimneys located on the roof, bracing of the statue located on the roof, and bracing of any emergency power or hazardous materials located with the mechanical rooms. Non-structural items that could affect exit or egress from the building should be given first priority.

Engineering Material Properties
The engineering properties of the materials found in the AIB will be useful in analyzing the impacts of future renovations. Previous reports provide testing results for various materials used in the building’s construction. (Please refer to the detailed system descriptions for materials used during the more recent floor infill modifications. The concrete strengths and steel types were available from existing structural drawings.)

The most comprehensive set of test results is available from Law Engineering Testing Company, dated December 2, 1974, associated with the Smislova and Associates report entitled *Report on Roofing and Related Components*, dated January 22, 1975. Physical testing
of specimens from the gallery floor and roof truss bracing members was performed.

A sample from a round bar taken from the roof truss bracing system revealed wrought iron material with a yield stress of 27,100 psi and a tensile stress of 47,700 psi. This material exhibited significant ductility (elongation of 38%), which is as good as the ductile behavior of structural steel. This material is consistent with the time period of the truss construction (1880).

A sample from an angle of the roof truss bracing system revealed steel material with a yield stress of 46,900 psi and a tensile stress of 63,600 psi. Because this material is classified as steel, it is assumed that the sample was taken from the supplemental bracing members added to stabilize the truss top chord in the early 1900s and not from the original roof truss members. The original roof truss was constructed in 1880 when steel was not available.

A sample from gallery floor beam revealed steel material with a yield stress of 42,800 psi and a tensile stress of 49,200 psi. The gallery framing was labeled as “Carnegie”. It is important to note that wrought iron had been phased out as of this time period and steel was the predominant material used in beam construction. In addition, testing was performed on the gallery slab reinforcement and on the gallery concrete. The gallery slab reinforcement was classified as steel and consisted of 3/16” square, twisted bars with a yield stress of 73,200 psi and an ultimate of 109,600 psi. The concrete cores revealed compressive strengths between 2920 psi and 3510 psi.

A bolt sample revealed an ultimate shear stress of 44,230 psi. It is not clear where this sample was taken. It is recommended that additional testing of truss member connecting bolts be performed for use in future roof capacity studies.

Another sample was removed and tested in 2000 by CTI as a part of the James Madison Cutts investigation. This analysis was performed in order to study both the tensile properties of the metal and the weldability of the wrought iron members. CTI concluded that the wrought iron was chemically most similar to metal with an ASTM designation of A570, Grade 30 steel. This indicates that the wrought iron is suitable for welding purposes. The yield strength of the sample was calculated as being 32,121 psi with an ultimate tensile strength of 51,040 psi.

Compressive testing of the load-bearing, masonry wall construction was not performed. Structural Analysis of Historic Buildings, authored by J. Stanley Rabun, 2000, references design values for masonry construction. For hard-burned brick in lime mortar, a safe compressive load may approach 125 psi. Allowable shear stresses may approach 25% of the compressive load, or 30 psi. Recommended allowable tensile stresses range from 0 psi to 40 psi for masonry construction built during the time period of the AIB.

Structural Discussion Items: Seismic Upgrades
Seismic upgrades to the existing structure can have a significant impact on the historic fabric of the AIB. Recognizing this fact, an analysis of the seismic upgrade requirements of the building codes was performed in 2001 prior to the proposed underground
addition. The full discussion is contained in the letter, dated July 14, 2001, to Marc Tartaro entitled *Smithsonian – Arts & Industries Structural Design Review*. This analysis is based on the 1999 BOCA and IBC 2000 and is paraphrased below:

- The provisions of the code are not mandatory for existing buildings classified as historic buildings where such buildings are judged by the code official to be safe and in the interest of public health, safety, and welfare.

- For additions not structurally independent from the existing structure, the existing structure does not have to be upgraded to meet the seismic requirements of the code provided that the addition is designed to comply with the seismic provisions of the code for new construction, the addition does not increase seismic forces in any structural element of the existing building by more than 5%, and the addition does not reduce the seismic resistance of any structural element of the existing building below that required for new buildings.

- As of the date of this report, the building code adopted by the District of Columbia is the IBC 2006. The IBC 2006 contains very similar requirements compared to BOCA for the seismic upgrade of existing buildings with slight differences as paraphrased below:

  - The provisions of the code are not mandatory for historic buildings where such buildings are judged by the building official to not constitute a distinct life safety hazard.

  - For additions not structurally independent from the existing structure, the existing structure does not have to be upgraded to meet the seismic requirements of the code provided that the addition is designed to comply with the seismic provisions of the code for new construction, the addition does not increase seismic forces in any structural element of the existing building by more than 10% since the original construction, and the addition does not reduce the seismic resistance of any structural element of the existing building by more than 10% since the original construction.

It is recommended that additional seismic analyses be performed considering the future use scenarios and the compatibility of seismic upgrades with the proposed configuration of the building spaces. Results of this analysis should provide guidance as to how much of the code is achievable. Decisions to implement these seismic upgrades should account for the following factors: code requirements, safety of occupants, respect for historic building fabric, and renovation budget.

**Structural Discussion Items: Roof Capacities**

Several reports have been issued in order to establish the available roof capacity and the following structural analyses for the roof framing system have been reviewed:

- Smislova, Kehemui & Associates (1975, 1977)
- James Madison Cutts (1998)
- James Madison Cutts (2000)
The Smislova, Kehnemui & Associates (SK&A) reports and truss drawings indicate the main hall trusses have extra capacity and tabulate allowable hanging loads in various locations from the truss nodes. It appears that SK&A incorrectly assumed all of the truss I-shaped elements as being comprised of steel, rather than wrought iron, and overstated the actual capacity. Furthermore, the SK&A report labeled the top chord member size for the transitional trusses as being a 6” deep I-beam. Site measurements indicate that this is a 4” deep member.

The reports by James Madison Cutts concluded that the transitional trusses were adequate for 30 psf minimum D.C. Code minimum snow loading. The roof panels are adequate to support the 30 psf snow loading, but are unable to support drift loads adjacent to the Rotunda (per Boca 96, the current code at the time of the report).

A current analysis of the typical main hall trusses was performed and reveals that there is a slight overstress in some of the truss top chord members due to IBC snow loading (approximately 16 psf) due to the unbraced length of these compression members. This could easily be addressed by providing additional bracing in the roof plan at the top chord. However, based on the D.C. code minimum snow loading (30 psf), there are overstresses in both the truss compression and tension elements.

It should be noted that the prior analyses of the main hall trusses focused only on gravity loads. Any future replacement or modifications to the roof system should also consider wind uplift, particularly if the roof system is lighter than the existing. When using code-stipulated load combinations, the roof is subject to net uplift pressures, which could result in a load reversal in the truss members. Currently, the roof dead load is accurately known and approximately offsets this wind uplift pressure.

The scope of the James Madison Cutts (JMC) reports was limited to reviewing the effects of corrosion of the top-chord truss elements on the capacities of the queen-post trusses in the transitional roof areas. They conclude that the transitional trusses are able to support the 30 psf minimum District of Columbia-stipulated snow loading. One discrepancy was found. The JMC analysis was based on member sizes listed in the SK&A report, which labeled the top chord member for the transitional trusses as being a 6” deep I-beam. Site measurements indicate this to be a 4” deep member.

An analysis of a critical transitional truss was performed as part of this Historic Structures Report using the field measured member cross-sections to confirm the results of the JMC study. This analysis confirms that the typical transitional trusses are capable of supporting the minimum District of Columbia-stipulated snow loading of 30 psf.

As discussed above, the previous roof studies were focused only on specific areas, and did not cover the roof system in its entirety. It is, therefore,
recommended that a comprehensive roof analysis be performed prior to future renovations of the building. This analysis should include all primary elements of the roof system, secondary framing members, connections, and a full snow load analysis modeling drift for all areas of the roof especially drifts adjacent to the Rotunda. It is recommended that additional coupon testing be performed on the wrought iron and steel materials comprising the roof to be used in the comprehensive roof study. The decision to implement the requirements of the IBC code level snow loads or D.C. minimum snow load should consider the following factors: code requirements, impacts to historic building fabric, extent of proposed roof renovation, and safety of occupants.

**Structural Discussion Items: Structural Impacts of Future Use Scenarios**

The main hall trusses were analyzed to determine the impact of future changes in the roofing membrane, such as increasing the weight of the roof system, and the potential effect of increasing the insulation on snow accumulation. It has been determined that the proposed new roofing system would introduce a negligible increase in dead load. Furthermore, the impact of using R-30 insulation in the hall roofs was examined in calculating future code stipulated snow loadings, and there is no additional accumulation of snow due to the proposed thermal modifications.

The proposed systems scenarios include the construction of an underground vault to the west of the AIB. If this below-grade construction is located within the area of influence of existing foundations for the AIB or any other area buildings, those foundations would require underpinning. This procedure can be designed, or the vault can be strategically located, to avoid interference with existing foundations. Similar measures would be required in the proposed case of vaults constructed under the floor slabs in the ranges or courts.

A number of the proposed systems scenarios included the requirement for new ductwork to penetrate second floor slabs. Many of the second floor infill structural systems are open web steel joists spaced at 24” on center. This system would limit the allowable size and orientation of slab penetrations.

A possible solution would be to replace these infill structures with a new concrete slab and composite steel beam system that would have beams at a wider spacing, which could be coordinated around proposed duct penetrations.

One future use scenario described the inclusion of HVAC equipment and library uses in the range areas. Mechanical equipment and library design loads are often between 125 and 250 psf, so the application of these loads on existing structural systems would typically require structural retrofit. The East North Range is the one area designed for larger than 100 psf, with a design live load capacity of 125 psf. Depending on the layout of the future use spaces, this area would provide a larger capacity that might meet the load demands.
Summary of Recommendations for Further Study
The following is a summary of recommendations provided in the building structure report:

- A detailed future assessment of the North West Court including evaluation of connections at the most heavily corroded areas
- Mitigation of non-structural hazards, especially those items that could affect exit or egress from the building
- A comprehensive roof analysis including all primary elements of the roof system, secondary framing members, connections, and a full snow load analysis modeling drift for all areas of the roof especially drifts adjacent to the Rotunda
- Additional coupon testing on the wrought iron and steel materials comprising the roof
- Additional seismic analyses considering the future use scenarios and the compatibility of seismic upgrades with the proposed configuration of the building spaces
Existing Conditions Assessment

1: Aerial Photo
Note approximately square building footprint. (Photo source: Smithsonian RFQ 2007/2008)

2: View From Southeast
Note the square pavilions at the corners and the towers adjacent to the south entrances.

3: West North Range
Note the decorative bands of blue-glazed brick, buff brick, and black brick.

Background
This conditions assessment of the AIB’s exterior masonry focuses on areas of deterioration and previous remedial work as indicated in reports provided by SI. The assessment includes the external perimeter wall, gables, dormers, towers, turrets, chimneys, clerestory walls, and the Rotunda. It also includes an initial review of the condition and attachment of the interior corrugated metal panels.

General Building Description
The AIB is approximately square in plan, with the main halls arranged symmetrically on a cross design, aligned to the principal compass points, with the Rotunda at the center. A round cupola adorns the pinnacle of the Rotunda. The halls terminate in decorative gable ends between pairs of squat, square towers (See Figures 1 and 2). Each tower has four floors that are designated for discussion in this report from lowest to highest: first, second, third, and attic. A square covered court occupies the space between the halls and the Rotunda (See Figures 1 and 2). Square pavilions anchor each major building corner and are linked to the halls by cross aisles referred to as “ranges” (See Figure 3). Each pavilion has four floors that are designated for discussion in this report from lowest to highest: basement, first, second, and third.

The range roofs are covered with batten-seam, lead-coated copper roofing. The range roofs drain into hung gutters suspended along the edges. The hall roofs are covered with standing-seam, lead-coated copper roofing. Transitional roofs cover the area between the hall roofs, the court roofs, and the masonry drum of the Rotunda. The transitional roofs are covered with standing-seam, lead-coated copper roofing. The Rotunda roof is covered with standing-seam, copper roofing. The cupola roof is covered with flat-seam, copper roofing. The towers are crowned with eight-sided spires clad with slate shingles; metal-clad gable dormers project from each side of the towers. The hip-roofs of the pavilions are covered with slate shingles. The hip roofs of the courts are covered with standing-seam, lead-coated copper roofing. Four-sided lanterns crown the roofs of the courts pavilions and halls. The lanterns over the courts and pavilions include windows or louvers on four sides and are topped with ornamental metal spires. The


roofs of the pavilion lanterns are covered with slate shingles. The court roofs include skylights. The hip roof of the hall lantern is covered with standing-seam, lead-coated copper roofing.

The exterior walls consist of red brick masonry with decorative patterned bands of glazed blue brick, buff brick, and black brick around the perimeter of the building. Each exterior range wall includes seven large, wood-framed window bays spanning two stories in height below Roman arches. The spandrels between the Roman arches are comprised of buff brick and decorative limestone medallions. The fenestration in the towers and pavilions includes lower basement windows, a first-story window below a segmental arch, and a second-story window below a Roman arch, and three small windows below individual Roman arches. The Rotunda includes a large, wooden-framed window bay on all 16 sides.

Document Review
Existing documentation on the AIB includes reports by others and construction drawings for the building. This section reviews portions of this documentation that are relevant to the assessment.

Report Review
The following reports were reviewed:

Exterior Wall Probes prepared by Dell Corporation (December 7, 2001)
SI retained Dell Corporation (Dell) to make two exploratory openings in the exterior walls to document their condition and configuration. Dell also removed samples of the mortar and interior plaster finishes for analysis. The report includes, in part, the following information:

- Dell removed masonry at two locations in the building’s exterior walls to review the configuration of the exterior walls and take samples of the mortar and plaster used in the construction. Exploratory Opening 1 is located on the west elevation of the South Hall and Exploratory Opening 2 is located on the exterior wall of the west “range” (the west wing of the AIB) on the north elevation. Dell identified two types of wall configurations:
  - Exploratory Opening 1: Load-bearing, brick masonry walls consisting of three interior wythes and one exterior wythe. The wall is mortared solid with no air space.
  - Exploratory Opening 2: Exterior walls consist of, from the interior to the exterior, two wythes of brick, a cavity, and an outer brick wythe. The lateral support of the exterior wythe of brick masonry, such as wall ties, brick headers, or their equivalent, is not identified in the report.

- The dimensions of the individual brick masonry units are 210 to 215 mm (≈ 8 ¼” to 8 ½”) long x 100 to 103 mm (≈ 4”) wide and 55 to 59 mm (≈ 2 ¼”) tall. The width of the exterior mortar joints is approximately 8 to 13 mm (≈ 0.30” to 0.50”).

- Dell removed samples of mortar and plaster from the exploratory openings for analysis. The plaster consists of an 18 to 19 mm (≈ 0.75”) base coat and a 4 mm (≈ 0.15”) thick veneer coat of self-colored finishing plaster.

- Dell removed a small number of mortar specimens taken from the two probe openings.

- Dell recommends repairing mortars in the binder-to-aggregate ratio range (by volume) from 1:3 to
The leaks reported in the previous report (2003) have continued. Building maintenance staff reported the areas of greatest leakage occur below the valleys, between the transitional, court, and hall roofs.

Hoffman observed holes in the roofing panels at locations where snow guards and lightning arrestors have pulled off of the roofing.

The cupola roof is low-sloped and covered with a lead-coated, flat-seam copper roof. The pans are flat lapped, riveted, and soldered to the finial base. Hoffman noted that many of the flat lapped seams are broken.

Hoffman observed deteriorated and open mortar joints in the brick masonry at the exterior of the masonry drum above the Rotunda and on the range elevations.

The slate roofs have broken or missing slate at many locations. Hoffman noted the most significant slate damage on the North West Pavilion. Hoffman recommended repair to the damaged slates as a long-term solution. Recommended repairs include replacing the broken and missing slates and replacing mastic at the corners with sealant. They did not recommend short-term repairs for the slate roofs.

Hoffman observed open seams in a few locations in the metal panel roofs of the range. Hoffman recommended soldering the open seams in the metal roofing as a long-term solution.

Hoffman noted that defects in the valley flashings between roof planes on the halls, courts, transitions, and Rotunda roofs contribute the greatest amount of leakage. Hoffman recommended three repairs, including:

- Removing the defective valleys and replacing them with new metal valleys that provide sufficient laps into the adjacent roofing.
- Repairing the defective valleys with traditional techniques (soldering and patching).
- Applying an elastomeric coating over the valley transitions.

Hoffman removed 12 samples from different locations throughout the roofing. They reported the following observations at the sample locations:

- Wet roofing felt and rosin paper at the valley flashing between the transition roof at the East Hall roof on the north side, valley flashing between transition roof, the North East Range, the South East Court on the north side and the skylight roof at the North West Court.
- Dry rotted plywood deck below the roofing felt and rosin paper at the North Hall lantern roof.
at the north end, southwest transition roof near the valley to the West Hall on the south side.

- There is no rosin paper between the metal roof panels and the roofing felt.
- Hoffman observed a rubberized asphalt membrane under the metal roofing panels below the skylight roof at the North West Court. The surface of the membrane sheet was wet.
- Hoffman noted that the skylight was repaired many times with various applications of sealant. The corner closure pieces of most skylights are covered with sealant. Hoffman also noted that sealant was used to wet-glaze existing skylights and set new skylights.

Mothballing Study by Beyer Blinder Belle Architects & Planners (August 30, 2006)

Beyer Blinder Belle Architects & Planners LLP (BBB) was retained to prepare a Mothballing Study for the AIB in preparation for a temporary closure of the building. The report includes, in part, the following information:

Foundation
- BBB noted deterioration of the granite plinths at grade. The surface of the granite is delaminating in areas along the west portion of the south elevation. BBB recommended three options to address the causes of the damage including:
  - Regrade the slope at depressed locations along the east portion of the south elevation.
  - Regrade the slope along the east portion of the south elevation and provide a concrete base slab adjacent to the building.

- Excavate the grade to expose and waterproof the foundation wall and provide drainage to divert water away from the building. Re-slope the adjacent grade to direct water away from the building along the south elevation and/or provide a concrete base slab adjacent to the building.

Brick Masonry
- BBB observed that the mortar in the brick masonry joints is generally in fair condition with areas of narrow mortar joints and open joints. Open joints are typically found at upper portions of the elevations and the base of the wall on the east elevation. BBB recommended repointing the joints with an appropriate mortar to match the physical and aesthetic characteristics of the adjacent mortar and building materials. BBB estimated that approximately 15% of each elevation will have to be repointed.
- BBB noted fractures or fissures in the mortar joints (i.e. step cracking) on the north elevation of the North East Pavilion.
- BBB observed cracks through several bricks throughout the building elevations. BBB recommended replacement of approximately 100 bricks as part of a long-term repair solution and patching approximately 100 bricks as a short-term repair solution.
- BBB observed several bricks that are displaced or out of plumb with respect to the adjacent brick masonry. They included resetting approximately 40 bricks in their recommendations for short-term repairs.
- BBB observed efflorescence on the exterior walls of the building, particularly at the base of the wall on the west elevation. They recommended
cleaning the efflorescence off the walls using a clay poultice mixed with water.

- Masonry walls above the range roofs exhibit deteriorated mortar joints, open joints, cracks in the masonry sills, and unsealed wall penetrations.

**Sandstone**

- BBB observed cracked and spalled sandstone window sills in several locations throughout the building elevations. Several sandstone masonry sills have been replaced with new stone. BBB recommended routing the cracks and installing repair materials or a “Dutchman.”

- BBB observed open joints between individual sandstone sills, and between sandstone sills and the adjacent brick masonry. BBB observed silicone sealant in the joints and staining around the joints between sandstone sills. They noted that the silicone could cause some of the staining on the sandstone. They recommended removing the sealant and grouting all joints between pieces of individual sandstone and half of the joints between the sandstone and the brick masonry.

- BBB observed biological growth on some sandstone sills. A sample application of biocide treatment was applied to one sill exhibiting biological growth. The treatment was effective in killing the biological growth.

**Limestone**

- BBB observed a dark thin black crust on the surface of the exterior limestone and marble surfaces. BBB recommended removing the black crust off of all 72 stone relief panels. BBB observed regular cracking in the stone arch panels above the second floor arches (between towers) on the north elevation. BBB did not observe cracking or movement in the arches below these panels.

- BBB noted step cracking brick masonry on the north elevation of the North East Pavilion.

**Brick Masonry**

- The repair mortar is harder than the original mortar.

- The SmithGroup report cited the mortar analysis in the Mothballing Study (prepared by John Milner for BBB). SmithGroup contracted the services of another consultant to extract mortar samples to validate the findings and recommendations of BBB’s Mothballing Study; that analysis is not yet completed. For this reason, SmithGroup did not provide recommendations for the mortar specification in their report.

- The step cracking is attributed to the cyclical expansion and contraction due to seasonal changes in temperature. The SmithGroup recommended removal and reconstruction of displaced brick masonry.
• SmithGroup recommended painting the glaze spalls on the blue-glazed, brick masonry as a part of long-term repairs.

• SmithGroup recommended the replacement of damaged bricks with matching bricks or attic stock, if a source is available, as a part of long-term repairs.

• SmithGroup recommended the removal of displaced and loose bricks.

Limestone
• SmithGroup observed “gypsum crusts” on the unprotected underside of the carved features. Before making restoration recommendations, the report recommended testing to determine the composition of the stains and ascertain whether a sealer was installed. For interim repairs, SmithGroup recommended routing and sealing the cracks in the limestone.

Sandstone
• SmithGroup observed damage to sandstone at the entrances, including surface scaling and erosion. Biological growth was also visible as were open, stone-to-stone joints between window sill units.

• SmithGroup stated that the lack of soft joints between the stone and the brick masonry caused cracks in the stone as a result of compressive forces in the brick masonry.

• SmithGroup recommended replacement of the stone sills as a long-term repair, and a program consisting of the application of biocide, repointing of perimeter joints, patch repairs, and the application of a water repellent as intermediate-term repairs.

• The report recommended that spalled sandstone sills be repaired in the short term.

Foundation/Granite
• SmithGroup reviewed exposed portions of the granite rubble walls and observed deeply eroded mortar joints, shifting stones, scaled stones, and settlement cracks. The flaking surfaces of the granite were attributed to water penetration. The report recommended further investigation to determine the condition of the foundation wall.

• SmithGroup recommended excavating approximately one foot below grade and repointing the exposed portion of the foundation.

• SmithGroup recommended a structural assessment of the settlement in the southwest corner of the South West Pavilion.

Field Investigation
This portion of the AIB condition assessment included an overall exterior and interior building survey from the ground and from lower roofs. Close-up observations of the corrugated metal deck and the interior of the Rotunda were made from a hydraulic-lift. No exploratory openings were made. Existing interior exploratory openings prepared by Thornton Thomasetti during a previous investigation were reviewed.

Exterior Observations
The exterior walls were examined from grade using binoculars and a zoom lens camera and from lower roofs to observe the general condition of the granite masonry plinths, brick masonry, sandstone sills, entranceways,
**Existing Conditions Assessment**

4: South West Pavilion
Note that the foundation consists of rubble masonry and a granite plinth. Note the exfoliation on the granite plinth and the efflorescence on the brick masonry.

5: Foundation
Open joints between the granite plinth stones on the north elevation of the building.

6: East South Range
Exfoliation of the granite plinth on the eastern portion of the south range elevation.

7: Detail
Small hairline cracks and surface voids in the brick masonry in the plane of the wall. Note the black substance is wearing off the edge of the brick in upper portion of photo.

8: Detail
Crazing (thin spider cracking) and spalls in the blue-glazed brick masonry.

9: South East Pavilion
West elevation of the South East Pavilion. Note the raking cornice over the decorative bands of blue-glazed brick and buff brick masonry.

and ornamental limestone pieces. The lower batten-seam roofs, which are accessible from window openings in the towers and pavilions, and the upper standing-seams roofs, which are accessible from ladders on the lower roofs, were walked as part of the assessment.

**Foundation**
The AIB foundation consists of rubble masonry topped by a granite plinth that forms the transition between the brick masonry and foundation wall at grade (See Figure 4). The granite plinth is located at grade on most of the south elevation and adjacent to a sidewalk. The surface of the granite masonry is exfoliating (i.e., shedding a thin exterior layer) over large areas of the granite (See Figure 6). Exfoliation in the granite plinth is especially noticeable on the south and east elevations of the building. Open head joints also are visible at several locations (See Figure 5), particularly on the south and east elevations of the building.

**Exterior walls**
The majority of the AIB exterior walls consist of red brick masonry. Glazed blue brick, buff brick, and black brick form decorative patterns and bands around the perimeter of the building.

**Brick Masonry**
The exterior brick masonry walls were examined from grade and from accessible roofs, using binoculars and zoom lens cameras for up-close observations in some areas.

Hairline cracks and surface voids are visible in the red and buff brick masonry at various locations on all four building elevations (See Figure 7). The location of the bricks with hairline cracks is not localized to one area.
Crazing, which refers to hairline cracks on the surface of ceramic glazing, is seen on the surface of the glazed brick (See Figure 8). Crazed brick is randomly distributed over all the building elevations. Neither a pattern nor a significant amount of crazed units in the glazed blue brick is visible. Spalling of the glaze on blue glazed bricks located under the raking cornice at one of the pavilions is visible (See Figure 9).

Damage caused by previous repointing efforts (See Figure 10) to the red brick masonry is seen. In the west entrance, extensive damage to the masonry surface, caused by previous work, such as tooling of the surface to create a roughened substrate suitable for the application of stucco is visible (See Figures 11 and 12).

The head joints of the buff bricks on the narrow spandrels above the arched windows around the pavilions and courts are very tight and in some instances lack mortar (See Figure 13). In similar locations, faces of buff bricks have cracked (See Figure 14) or spalled (See Figure 15). These buff bricks fill the space between arched windows below the range roofs.

A small number of bricks with saw-cut marks along the brick edges on either side of bed joints are seen.
17: Detail
Loose brick adjacent to a first story window. Note scaling and hairline cracks in adjacent brick.

18: Detail
This image shows black coloring applied to red brick to produce the decorative bands of black. The black coloring is wearing off along the brick edges.

19: Detail
Step cracking above a first floor segmental arch on the South East Pavilion.

20: Detail
Step cracks above the first story pavilion window head start at each both brick arch springlines and converge near the center of the second story sill.

21: Detail
Spalled brick masonry at an exterior corner of the building—note black coloring can be rubbed off by hand.

22: Detail
Staining on the exterior brick masonry west range elevation—note roof run off has collected on the ground adjacent to the exterior wall.

23: Detail
White stains on brick masonry in areas that are subject to concentrated runoff from the decorative parapet coping

24: Detail
Stained brickwork around drain leader at the range roof

In other locations, the “run-on” of disc cutters on either side of brick head joints is visible. This damage is typically caused by overcutting into the brick when removing mortar with a rotary disc cutter in preparation for repointing work (See Figures 10 and 16).

A small amount of displaced voussoirs — the soldier bricks that form the arches — are visible above window heads. Displaced bricks adjacent to first floor windows sills (See Figure 17) can be seen as can two displaced “keys” in the segmental arches above first floor windows at the North and West Tower elevations.

The building walls are accented with bands of black brick masonry. The black coloring consists of a black substance that leaves a dark residue when rubbed by hand. In some instances, the black color stops short of the brick edges (See Figures 7 and 18) and these bricks have a red body, similar to adjacent red brick in the field of the wall. The black substance is not identified.

Step cracking at approximately 75% of the first floor segmental arched openings is visible and, correspondingly, below the sills of the same windows (See Figures 19 and 20). The step cracking runs
from the center of the second-story window sill and typically steps downwards and outward in both directions (left and right – See Figure 20). The width of the cracks varies between hairline (1/16” or less) and approximately ¼”. The displaced voussoirs are seen in the same locations as the step cracking.

Only a few spalled bricks are visible throughout the building elevations. Spalled masonry is generally noted at exposed edges such as building corners. A spall occurs when a brick loses its fire skin and the interior clay body of the brick is exposed (See Figure 21).

Various kinds of staining on the brickwork is seen, including: efflorescence (salts deposited on the masonry surface, See Figure 4); mineral deposits on the exterior brick masonry on the west and south elevations, where splash-back deposits from the ground occur beneath gutters (See Figure 22); white stains on brick masonry in areas subject to concentrated runoff from the decorative metal copings (See Figure 23); and stained brickwork behind and below roof downleaders (See Figure 24).

Algae growth is visible on the brick masonry in several locations on the building elevations. It occurs on brick masonry, limestone, sandstone, and the granite plinths. An increased amount of algae growth is evident on the inner return elevations above the tower main entrances, where these areas are generally shaded (See Figure 25).

The mortar joint profile varies but typically consists of a tooled concave joint. Portions of the mortar joints were removed at various locations to verify whether or not the locations were repointed. At most locations, a different mortar can be seen behind the mortar on the top surface. Mortar is easily removed with a screwdriver at all locations sampled.

Open head and bed joints are visible on the masonry drum around the Rotunda (See Figure 26). The open joints are most prevalent at masonry areas behind the drain leaders at each outside corner (See Figure 27) on the masonry drum around the Rotunda. The mortar joints at the base of the east elevation wall are deeply eroded. A screwdriver is easily inserted into the mortar joints (See Figure 28). Approximately 10% to
2.4.2 – 11

Smithsonian Institution Arts & Industries Building

Existing Conditions Assessment

29: Detail
Open head joints on the lower portion of the east elevation

30: East Entrance
Repair mortar patches are visible on the sandstone pilasters on the east tower elevation. This condition is representative of building entrances.

31: North Entrance
Main entrance on the North Tower elevation of the building—note staining on the upper portion of the entrance portal.

32: Detail
Hairline crack between the repair mortar patch and the sandstone base material at the North Tower

33: Detail
Close up view of the staining on the decorative cornices at the top portion of the main entrance

34: Detail
Horizontal cracks are visible in a sandstone window sill at the first story on the north elevation of the building. This crack is representative of most sandstone sills.

35: Detail
Horizontal crack, staining, and relative vertical displacement at a vertical joint between sandstone window sill pieces at the first story of the North West Range

36: Detail
Open joint between a sandstone window sill and the adjacent brick masonry on the south elevation of the South East Pavilion

15% of head joints are open (See Figure 29) over the entire building. Some of the head joints are too thin for commonly used mechanical mortar removal techniques.

Sandstone
The decorative pilasters at the main entrances to the AIB and the window sills are sandstone. Patches on portions of the sandstone columns that were previously repaired are lighter in color than the main portion of sandstone on the column (See Figures 30 and 31). The patches sound hollow when tapped with a hammer. Some of the patches are cracked along the bond line with the sandstone base material (See Figure 32).

Algae and black staining is visible on the exterior of the sandstone columns above the main entrance (See Figures 31 and 33), but the staining has not been identified. Spalls, cracks, and delaminations in the sandstone window sills can be seen. The cracks typically run horizontally along the length of the sandstone window sill (See Figure 34). Also visible are open joints between adjacent sandstone window sills (See Figure 35) and between the sandstone window sills and adjacent brick masonry (See Figure 36) at approximately half of the window sill pieces on the building in the pavilions, towers, and ranges). Sealant
had been installed at a majority of the other sandstone window sill joints (See Figure 37). This sealant has also cracked and debonded from the sandstone sill in some locations (See Figure 38). The sandstone at the base of the masonry drum is covered with a white coating (See Figure 39). The joints between sandstone pieces are filled with sealant.

Limestone
The recent reports reviewed indicate that the decorative, triangular-shaped panels above windows in the towers and the round medallions within the range walls are limestone. A spall in two of the round medallions on the south elevation eastern range wall is visible (See Figure 40).

Roofs
The roofs of the AIB are covered with a variety of roofing systems including batten-seam, standing-seam, and flat-seam, lead-coated copper roofs. A review of the roofing systems is not included in the scope of work, but general comments are provided as they pertain to the exterior masonry observations and discussion.

Cursory observations of the range roofs, hall roofs,
transitional roofs, tower, and pavilion roofs were made but the Rotunda roof was not reviewed. The range roofs are low-sloped — less than a 3:1 slope — (See Figure 41) and are covered with batten-seam, lead-coated copper roofing. The hall and court roofs are steep-sloped — greater than 3:1 — (See Figure 42) and are covered with standing-seam, lead-coated copper roofing. The valleys of the upper roofs are lined with fully soldered copper valley sheets. The valleys and other perimeter details, such as base flashings at rising walls of the standing-seam upper roofs, are covered with a fluid-applied membrane (See Figure 42). The fluid-applied membrane also covers other localized areas in the plane of the upper roof (See Figure 43), such as a roof pan between standing seams. Sealant was applied in the transverse seams between standing-seam, metal roof panels of the transitional roofs over approximately 50 square feet (See Figure 44). The day after a rainstorm, stepping on several transverse seams in the batten-seam, metal roof caused water to seep out from the interior (See Figure 45).

The metal roofs terminate under reglet-set, metal counter flashing set into the rising brick masonry walls. Lap joints in the counter flashing joints are reinforced with pop rivets. At one location, pulling back the counter flashing exposes the upturned legs of the metal roof panel (See Figure 46). The flashing height in this location is approximately 3”.

During a rainstorm, water was seen leaking through joints in the hung gutters along the roof eave of the South West Range on the west elevation. The water dripped down the exterior masonry walls (See Figure 47). White staining and open brick masonry mortar joints is visible below the gutter joint.

The Rotunda roof drains through 16 external downspouts onto metal splash blocks on the standing-seam roof above the center hall. Some of the splash blocks are missing or have blown to other portions of the roof. The slate tower roofs and pavilion roofs drain to built-in gutters with interior drains. The upper hall and transitional roofs drain to the interior of the building or onto the range roofs. The range roofs have internal drains connected to interior downleaders. Signs of water damage — efflorescence and finish damage, such as
peeling paint — are visible on the interior of the building near many of these internal drain leaders.

The gutters for both the standing-seam hall and transitional roofs and the batten-seam range roofs consist of relatively thin — approximately 16 or 20 ounce gauge — lead-coated copper. The gutters have longitudinal stiffeners soldered to the bottom of the trough. The hung gutters along the ranges are approximately 80’ long; only one expansion joint is visible along the length of the gutter on the range roofs (See Figure 48). After a rainstorm, standing water was visible in a few of the gutters at the perimeter of the building. The drains of these gutters are clogged with leaves and debris (See Figure 49).

**Foundation**

The interior foundation walls consist of unfinished rubble natural stone masonry. Accessible basement spaces were viewed to assess the condition of the foundation walls. A thick accumulation of efflorescence — up to approximately 2” thick — is visible on the plaster-finished walls of the basement stair well at the southeast corner of the building (See Figure 50). Less severe efflorescence is seen on the west wall of the South East Pavilion foundation.

During a rainstorm, water was visible on the floor of the basement. Water enters through open joints in the attic doors on the south elevation of the building. Water also ponds on the basement floor. Staining and efflorescence is visible on the masonry around the interior drain leader at the basement floor in the South East Pavilion. Rust is seen on the clean-out threaded cap fitting covering the clean-out for the drain leader. The drain leader can be easily removed by gently pushing on the clean-out cap, without applying any torque.

**Interior Observations**

The first and second floor exterior walls, third floor mechanical spaces, towers, and the interior of the Rotunda and halls were viewed from the ground with binoculars. The interior corrugated deck of the halls and Rotunda were examined from a hydraulic lift. No exploratory openings were made in the walls, but openings previously prepared by Thornton Tomasetti were examined.
2.4.2 – Existing Conditions Assessment

Interior Masonry Walls
The interior of the exterior masonry walls at the halls and the Rotunda were reviewed from the first floor with binoculars and from a hydraulic lift. Spalling plaster and peeling paint are visible at many locations, including below roof eaves, in the middle of the wall, and directly below windows at the perimeter of the first and second floors. Peeling paint also is visible on the interior walls of the halls and Rotunda (See Figure 51).

The upper portions of the halls and Rotunda are exterior walls and lower portions are interior walls. The peeling paint occurs in all wall areas of the hall and Rotunda, but, generally, is more prevalent below windows. Efflorescence is visible on the ceiling below the intersection of the transitional roofing and rising brick masonry walls of the North, East, South, and West Halls. Efflorescence also is visible on the ceiling of the second floor corridors on the east and west sides of the North Hall, below the transitional roofs.

Underside of the Corrugated Metal Panels
The underside of the corrugated metal panels of the range roofs, hall roofs, and transitional and the Rotunda roofs were examined with binoculars from the first floor, from a ladder, and from a hydraulic lift. The corrugated metal panels of the hall, transitional, and Rotunda roofs are exposed (See Figure 52). The corrugated panels of the range roofs are hidden by a drop ceiling that consists of ceiling tiles.

Water stains are visible on the ceiling tiles above the second floor, below the range roofs. Removing the ceiling tiles exposes the corrugated metal panels at the underside of the range roofs. No surface corrosion or other obvious signs of deterioration at the underside of the corrugated metal panels below the range roofs is visible. Signs of water penetration — efflorescence, paint delamination — are visible on portions of the masonry walls above the ceiling tiles.

There also are signs of water damage at the masonry walls located adjacent to the interior down leaders. The interior down leaders are routed through a mechanical space between the drop ceiling and the corrugated metal panels.

Plywood sheets are suspended below the corrugated metal panels below portions of the transitional roofs. The space between the suspended plywood and the underside of the corrugated metal deck were examined from a boom-lift. Pieces of debris that appeared to be fragments of the corroded deck are visible on the plywood. The edges of the corrugated metal deck show more significant corrosion than the field of the panel (See Figure 53). Pieces of the metal panel deck are easily pulled off by hand.

Signs of water damage — paint peeling, corrosion, and efflorescence — are visible on the underside of the roof deck and masonry material conditions.
the hall roofs, especially along the roof ridge. The underside of the corrugated metal panels was viewed from the first floor. Approximately 10% to 15% of the metal panel area is covered with surface corrosion. However, a close-up review of the corrugated metal panels from a boom-lift shows that additional corrosion is hidden under paint coatings. Several pieces of the delaminating paint were removed by hand, exposing corrosion of the corrugated deck at a fastener penetration.

A portion of the damaged corrugated deck at the transitional roofs was removed, exposing the condition of the plywood. The plywood is directly inboard of the corrugated roof panels. The corrugated roof deck is installed flush against the plywood. White staining is visible on the underside of the plywood (See Figure 54). The plywood deck could not be punctured with a screwdriver. A portion of the corrugated deck in a mechanical space had been removed earlier, exposing a section through the roofing below the lantern roof. The roofing system consists of (from interior to exterior – See Figures 55 and 56) the following:

- Metal angles (run perpendicular to the roof rafters)
- Wood purlins (run perpendicular to the roof rafters)
- Roof rafters
- Corrugated metal deck
- An aluminum, foil-faced sheet membrane vapor barrier
- Black cellular foam glass insulation, with a paper facer on both sides of the insulation
- 2\" × 4\" wood blocking, oriented parallel to the roof slope
- Plywood

The condition beyond the exterior of the plywood was not verified.

The roof framing is spaced 52\" on center and the metal panels span between roofs. The 1\" × 1\" piece of wood blocking is installed nearly flush with corrugations in the metal panels. In some locations, a thin metal putty knife can be inserted between the corrugations in the metal panels and the wood blocking.
A 3¼" x 1¾" x ¼" metal angle is attached to the wood blocking with clips. Two shapes of clips are visible: a C-shaped clip and an L-shaped clip (with a lip). The C-shaped clip wraps around the wood blocking and the horizontal leg of the angle and the L-shaped clip (with a lip) wraps around the wood blocking, the vertical leg of the angle, and free end of the vertical leg. The clips are spaced at 10" on center and alternate between C-shapes and L-shapes. The metal angles have cut slots that engage the top chord of the roof truss. Deteriorated portions of the roofing system described above were removed at accessible locations. In the North Hall, staining on the exterior paper facer of the insulation is visible.

Underside of the Tower Roofs
The attic of the tower roofs is accessible by hatches in the ceilings of the third floors of the towers. The attics of the tower roofs in the West and East Towers were accessed on the south elevation and in the North Tower on the east elevation. No obvious signs of leakage are visible at these locations (See Figure 57).

Miscellaneous Item
Relative humidity and temperature readings were taken in several building areas at approximately 2:00 PM on March 19, 2009. The following table summarizes the readings:

<table>
<thead>
<tr>
<th>Location</th>
<th>Temperature (°F)</th>
<th>Relative Humidity (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>North Hall</td>
<td>70.5</td>
<td>40.8 – 41.3</td>
</tr>
<tr>
<td>East Hall</td>
<td>72.5</td>
<td>37.0</td>
</tr>
<tr>
<td>South Hall</td>
<td>73.3</td>
<td>36.4</td>
</tr>
<tr>
<td>West Hall</td>
<td>73.9</td>
<td>35.9</td>
</tr>
<tr>
<td>South Tower</td>
<td>75.0</td>
<td>35.0</td>
</tr>
</tbody>
</table>

Recommendations
Foundation
- Perform an investigation to determine the condition and configuration of the foundation walls and assess the causes of foundation wall leakage. Effective and durable waterproofing repairs will likely require installation of a foundation wall waterproofing membrane.
- Review grounds keeping operations. Modify, if appropriate, to avoid exposing the masonry to deicing salts.
- Review roof drainage and surface drainage. Modify drainage provisions to avoid run off over masonry and ponding water along the foundation wall.
- Remove damaged and exfoliated portions of the granite masonry plinth. Repoint granite mortar joints.
- Replace basement doors and the entrance to the basement on the south elevation.

Brick Masonry
- Perform an investigation and analysis to determine the causes of step cracking, displaced soldier courses above the segmental arches, and similar masonry distress and displacement. Develop and implement a program of structural repairs that addresses the causes of this distress.
- Document the exterior masonry to determine the extent of pointing required. Perform mortar analysis on representative existing mortar to determine its material properties. Develop a replacement mortar specification based on
material properties, configuration, and appearance of the existing mortar joints. Perform a materials analysis to identify the black coating on brick masonry. Perform a review and analysis to locate appropriate replacements for red brick, blue glazed brick, and black coating.

- Develop a procedure to remove existing mortar without damaging the brick. Repoint portions of the buildings where missing or deeply eroded mortar joints exist. Repoint masonry at the perimeter of the Rotunda. Alternatively, consider repointing all brick masonry to achieve a uniform appearance and mortar durability.
- Perform a survey to document the extent of damaged brick masonry. Damaged masonry includes spalled, saw-cut, and cracked bricks.
- Reconstruct badly damaged masonry with replacement bricks. Replacement bricks should match existing brick masonry in size, shape, color, and texture. Replace individual crazed and spalled blue-glazed brick masonry. Replace individual spalled and cracked buff brick masonry. Replace damaged masonry at the west entrance to the AIB.
- Replace damaged black bricks in the decorative bands at the perimeter of masonry.
- Reconstruct roofs — including roof gutters and downleaders — that contribute to the deterioration of the masonry. (See recommendations below.)
- Clean masonry of algae, dirt, and miscellaneous stains at the conclusion of the work.

Sandstone
- Document the sandstone sills. Note the location and size of spalls, cracks, and delaminations in the sandstone window sills.
- Replace or repair the sandstone sill based on the size and type of damage as noted below:
  - Full Stone Replacement (6” length): Replace the sandstone sill. This approach is appropriate for severely deteriorated individual stone, with damage to 1/3 or 1/2 of the sill.
  - Dutchman Repairs: Replace the deteriorated portion of the stone with a carved partial replacement fabricated from matching stone and fastened to the remaining stone. This approach is appropriate to address larger spalls and cracks.
  - Mortar Patch Repairs: Remove and replace the deteriorated portion of the stone with restoration mortar that matches the stone in shape, color, texture, and the permeability of the existing stone. This approach is appropriate for small spalls.
- Sound and document sandstone patches at the entrances to the AIB and other miscellaneous locations. Remove and replace delaminated patches.
- Remove sealant at the perimeter of the sandstone sills and at the head joint between sandstone stills. Replace sealant with mortar.
- Remove the coating on the sandstone at the perimeter of the Rotunda.
Limestone Medallions
- Perform a survey to document the location and configuration of spalled medallions. Develop a repair approach.
- Repair spalled medallions.

Flashing
- Develop a repair strategy that addresses window deterioration and water leakage at window perimeters. Implement window repairs and window perimeter waterproofing repairs, including installation of window perimeter flashing.

Metal Roofing
- Develop a roof replacement strategy that addresses the deteriorated deck and ceiling assembly, roof leakage, defective perimeter conditions, and roof drainage. Consider other demands on the roof assembly, such as interior humidity that may be introduced by a future AIB program. Select a roof assembly that is appropriate for the roof slope and configuration.
- Remove metal roof assemblies including the roof deck. Reconstruct roofs. The roof replacement must address the deteriorated deck and ceiling assembly, roof leakage, defective perimeter conditions, and roof drainage.
2.4.2 Existing Conditions Assessment

Structural – Roof Deck and Masonry Material Conditions

Historic Structure Report & Conditions Assessment
Smithsonian Institution Arts & Industries Building

25 August 2009
Arts & Industries Building
Historic Structures Report

Cupola
Masonry drum
South East tower (east elevation)
South East tower (south elevation)
Transitional roof, typ.
South East pavilion
Court roof lantern, typ.

Note: See partial elevations for additional detail

2.4.2 – 23
25 August 2009
Arts & Industries Building
Historic Structures Report

SK-5 West Elevation
Note: See partial elevations for additional details.

N.T.S.
Existing Conditions Assessment

2.4.2 Existing Conditions Assessment

25 August 2009
Arts & Industries Building
Historic Structures Report

North Elevation
North West Pavilion

LEGEND:
- Efflorescence
- Biological Growth
- Open joints
- Window damage
- Loose masonry
- Staining
- Masonry spall
- Masonry crack
- Step crack

Pavilion roof, typ.

Roman arch, typ.

Segmental arch, typ.

Masonry sill

Open joints in masonry sills, typ. on all elevations.

SCALE: 1/16" = 1'-0"
25 August 2009
Arts & Industries Building
Historic Structures Report

SK-10

North Elevation
East Range

SCALE: 1/16" = 1'-0"
Existing Conditions Assessment  Structural – Roof Deck and Masonry Material Conditions 2.4.2

Legend:
- Efflorescence
- Biological Growth
- Open joints
- Major window damage
- Loose masonry
- Staining
- Masonry spall
- Masonry crack
- Step crack

East Elevation
North East Pavilion

25 August 2009
Arts & Industries Building
Historic Structures Report

SCALE: 1/16" = 1'–0"
Legend:
- Efflorescence
- Biological Growth
- Open joints
- Major window damage
- Loose masonry
- Staining
- SP Masonry spall
- CR Masonry crack
- SC Step crack

East Elevation
North Range

25 August 2009
Arts & Industries Building
Historic Structures Report

SCALE: 1/16" = 1'-0"
Historic Structure Report & Conditions Assessment
Smithsonian Institution Arts & Industries Building

25 August 2009
Arts & Industries Building
Historic Structures Report

Legend:
- Efflorescence
- Biological Growth
- Open joints
- Major window damage
- Loose masonry
- Staining
- SP Masonry spall
- CR Masonry crack
- SC Step crack

East Tower Elevation

Scale: 1/16" = 1'-0"
2.4.2 – 37 Smithsonian Institution Arts & Industries Building

Structural – Roof Deck and Masonry Material Conditions

Existing Conditions Assessment

Historic Structure Report & Conditions Assessment
Smithsonian Institution Arts & Industries Building

25 August 2009
Arts & Industries Building
Historic Structures Report

South Elevation
South East Pavilion

Legend:
- Efflorescence
- Biological Growth
- Open joints
- Major window damage
- Loose masonry
- Staining
- Masonry spall
- Masonry crack
- Step crack

Staining on underside of masonry sill
Patch in sill is spalling

SCALE: 1/16" = 1'-0"

08.31.2009
South Elevation
East Range

25 August 2009
Arts & Industries Building
Historic Structures Report

LEGEND:

- Efflorescence
- Biological Growth
- Open joints
- Major window damage
- Loose masonry
- Staining
- SP Masonry spall
- CR Masonry crack
- SC Step crack

SCALE: 1/16" = 1'-0"
Legend:
- Efflorescence
- Biological Growth
- Open joints
- Major window damage
- Loose masonry
- Staining
- $\text{SP}$ Masonry spall
- $\text{CR}$ Masonry crack
- $\text{SC}$ Step crack

Crazing of brick stain

Soft joints in masonry sill

Painting peeling on ornamental metal sheathing

Cacks on sides of masonry pillars, typical

South Tower Elevation

25 August 2009
Arts & Industries Building
Historic Structures Report

SCALE: 1/16" = 1'-0"
25 August 2009
Arts & Industries Building
Historic Structures Report

South Tower Side Elevations

SCALE: 1/16" = 1'-0"

Legend:

- Efflorescence
- Biological Growth
- Open joints
- Major window damage
- Loose masonry
- Staining
- SP: Masonry spall
- CR: Masonry crack
- SC: Step crack

Open joints in masonry sills, typ. at all elevations

3rd Floor

2nd Floor

1st Floor

Damaged window frame
Existing Conditions Assessment

Structural – Roof Deck and Masonry Material Conditions 2.4.2

25 August 2009
Arts & Industries Building
Historic Structures Report

South Elevation
West Range

SCALE: 1/16" = 1'-0"

Legend:
- Efflorescence
- Biological Growth
- Open joints
- Major window damage
- Loose masonry
- Staining
- SP Masonry spall
- CR Masonry crack
- SC Step crack

SK-22

Historic Structure Report &
Conditions Assessment
Smithsonian Institution Arts & Industries Building
08.31.2009
2.4.2 – 41
Legend:
- Efflorescence
- Biological Growth
- Open joints
- Major window damage
- Loose masonry
- Staining
- ▼ SP Masonry spall
- ‡ CR Masonry crack
- SC Step crack

Staining at spalls in masonry sill

Loose keystone

25 August 2009
Arts & Industries Building
Historic Structures Report

West Tower Side Elevations

SCALE: 1/16" = 1'-0"
2.4.2 – 47 Smithsonian Institution Arts & Industries Building

Structural – Roof Deck and Masonry Material Conditions 2.4.2

Legend:
- Efflorescence
- Biological Growth
- Open joints
- Major window damage
- Loose masonry
- Staining
- SP Masonry spall
- CR Masonry crack
- SC Step crack

West Elevation
North Range

Open joints in masonry sills, typ. at all elevations

3rd Floor

2nd Floor

Loose brick at cornice

1st Floor

25 August 2009
Arts & Industries Building
Historic Structures Report

SCALE: 1/16" = 1'-0"
2.4.2 Existing Conditions Assessment

Structural – Roof Deck and Masonry Material Conditions

Legend:
- Efflorescence
- Biological Growth
- Open joints
- Major window damage
- Loose masonry
- Staining
- ▼ SP Masonry spall
- ◀ CR Masonry crack
- ↓ SC Step crack

Spall and crack in masonry sill
Lower masonry sills are painted, paint is peeling
Staining below lower masonry sills, typical
Open joints below masonry sills
Efflorescence
Damaged wood frame

Rotunda Elevation
Eastern Exposure

25 August 2009
Arts & Industries Building
Historic Structures Report

SCALE: 1/16" = 1'-0"
2.4.2 – 50 Smithsonian Institution Arts & Industries Building

Historic Structure Report & Conditions Assessment

08.31.2009

Smithsonian Institution Arts & Industries Building
Existing Conditions Assessment

1: North West Pavilion
   Basement
   Pressure reducing station and condensate pump

2: North West Court
   Heat exchangers at second floor mechanical room

3: North West Court
   Heating water pump at second floor mechanical room

Condition of Mechanical System
All components of the existing HVAC system are in poor condition and are well past their expected useful life span. A 1993 study of the building’s mechanical and electrical systems by RTKL found that the air handling units were “in deteriorating condition, approaching the end of their useful lives”.¹ In 2006, Beyer Blinder Belle reported that “The general condition of the existing Heating, Ventilation, and Air Conditioning (HVAC) equipment, including heat exchangers and pressure vessels, fan coil units, air handling units, ductwork and piping systems, abandoned cooling towers and chillers, existing controls, ventilation and exhaust systems, etc., is unsuitable for reuse”.² Today, there are no HVAC systems or components worth saving and all piping, ductwork, controls, and equipment should be removed.

The underground chilled water system currently serving the AIB was tied to the General Services Administration (GSA) chilled water system in 2004. The building’s steam system was connected to the GSA steam loop in the 1980s. Both systems should have adequate capacity for any future uses in the building.

Central Plant Configuration
The building currently uses central chilled water from the GSA system. The chilled water plant consists of a chilled water heat exchanger and secondary chilled water pumps located in the North West Court. The building’s existing chillers and cooling towers were abandoned in place when the AIB was connected to the GSA chilled water system in 2004.

The building uses 80 psig steam from the Smithsonian Institution Building (SIB). High pressure steam (250 psig) from the GSA system enters the National Museum of Natural History (NMNH), which feeds into SIB, where it is reduced to medium pressure steam (MPS psig). The steam is then distributed to the AIB through an underground steam main. A pressure reducing station in the basement of the North West Pavilion lowers the pressure to 15 psig. This low pressure steam then travels through the existing tunnel system to steam-to-water heat exchangers located on the second floor of the mechanical room in the North West Court. The existing pressure reducing station and condensate pump are installed in a very cramped location that is inadequate for servicing these devices (See Figure 1). Although they still function, the


Historic Structure Report & Conditions Assessment
Smithsonian Institution Arts & Industries Building

08.31.2009 2.5 – 1
existing heat transfer packages (exchangers and pumps) are in poor condition (See Figures 2 and 3).

**Incoming Utilities**
The 8” chilled water supply and return piping enters the building along the North West Range where it rises up to the first floor ceiling and runs to the chilled water heat exchanger. The piping from the GSA tie-in to the heat exchanger was installed between 1963 and 1975. The remainder of the chilled water piping was installed in 1975. Since all of this piping is over 30 years old, it should be replaced. Sections of the underground piping have already failed and been replaced with new piping run above the floor (See Figure 4).

The 6” high pressure steam and the 4” condensate return enter the building in the basement of the North West Pavilion. The steam and condensate piping between The SIB and AIB was replaced in 1979. Since it is 30 years old, this piping should be replaced.

**Natural Ventilation**
While most of the windows in the pavilions and towers are still operable, natural ventilation is no longer used. During the 1980s, air handling units were installed in the basement to mechanically ventilate the spaces served by fan coil units.

**Heating Systems**
The building perimeter is heated and cooled by four pipe fan coils. These fan coils were installed in 1975 and are well beyond their expected service life (See Figures 5 and 6). New walls were built in front of the existing exterior walls to conceal the fan coil units and their piping (See Figures 7 and 8).

The steam distribution piping that fed the perimeter radiators was abandoned in place when the fan coil systems were installed.

**Ventilation Systems**
The ranges, halls, and courts are provided with fresh air through the air handling unit serving that area. For the most part, the fresh air for the air handling units is ducted through the clerestory windows in the court in which the air handler is installed. In some cases, the windows one level down are also used.

The towers and pavilions are provided with fresh air
Existing Conditions Assessment

Mechanical Systems 2.5

6: Four Pipe Fan Coils
Typically in poor condition and beyond expected service life

7: Towers
Fan coil piping in towers is typically concealed behind partitions.

8: Ranges
Fan coil units and piping are typically concealed behind interior furring.

9: Heating and Ventilating Unit
Previously provided fresh air to tower; no longer function

ducted from heating and ventilating units located in the attics or basements. These units are in disrepair and, in many cases, no longer function (See Figure 9).

There are a variety of small exhaust systems located throughout the building. Per the 1993 RTKL Mechanical and Electrical Study, an exhaust fan located in the mechanical room housing AHU#18 serves the first floor toilets in the South East Range and toilet rooms in the South West Range are served by an exhaust fan above the ceiling in the same area. Again, due to age and configuration, all these systems should be removed.

Air Handling Systems
The air handling units are generally installed in areas with limited accessibility, are inadequately zoned, and are beyond their useful service life. As noted in the 2006 Beyer Blinder Belle study: “The existing HVAC air handling equipment is not in a condition suitable for reuse ... except for the Liebert units.”

The majority of the building is served by 19 constant volume air handling units. The air handling unit areas of service are shown on Sketches H-1 through H-3 from the Mothballing Study (See Figures 12, 13, and 14). Only three of these units, AHU-9, 10, and 11, are provided with airside economizers. Units AHU-1, 2, 3, 6, 7, and 17 are the only units with individual zone reheat control. The rest are configured as single zone air handling units.

Two split systems serve rooms in the North West Range and several computer room units serving various areas in the building.

Controls
As stated in the 1993 RTKL Mechanical and Electrical Study: “Control of the AHUs varies slightly from system to system. In general, the control valves serving the chilled and hot water coils are modulated by room thermostats or ductmounted temperature transmitters to maintain their setpoints. AHU 1, 2, 3, 6, 7, and 17 have zone reheat and the capability of zone humidification controlled by room sensors. AHU 4, 5, 8, 12, 13, 14, 15, and 16 are controlled by a temperature transmitter located in the return air duct and have the capability of central

Footnote 3: Ibid.
Footnote 4: Ibid.
humidification in the supply air ductwork leaving the unit. AHU 9, 10, and 11 are controlled by space thermostats and humidistats and are provided with an economizer cycle.”

Utility Rooms
Expanding the public space into the courts is impossible with the current HVAC system configuration. The entire North West Court is full of HVAC equipment, which includes the heating plant, the cooling plant, and the abandoned chillers and cooling towers. The air handling units are generally located within the courts on different levels (Refer to Sketch H-4 thru H-6) and, in all cases, the court skylights are blocked by HVAC units, ductwork, and piping (See Figures 10 and 11).

Comparison of Existing Conditions with Current ASHRAE, IMC, IECC Requirements and Best Practices

Heating Systems
The heating water system should use variable flow pumping with Variable Frequency Drives (VFD) to maximize system efficiency. Although past its useful service life, with the change to variable flow as described above, this type of system should be considered for the new building heating system.

Cooling Systems
The chilled water system should use variable flow pumping with VFDs to maximize system efficiency. Although all its components should be replaced and relocated, the existing system configuration, with the addition of variable flow pumping, is the most suitable for the building cooling system.

Ventilation Systems
The codes have changed several times since the existing ventilation systems were installed and now require about twice as much outside air as they did in the 1970s and 1980s. Although not a code violation, it is recommended that ventilation air inlets be located well above street level where close to heavily traveled roadways. Several options should be considered for outside air systems including demand controlled ventilation and energy recovery to improve building’s energy efficiency.

Air Handling Systems
The existing constant volume reheat type of air handling systems does not meet the current energy code requirements for eliminating simultaneous heating and cooling. Either single zone variable air systems, multiple zone variable air systems, or single zone constant volume systems with cooling coil face and bypass should be used. Additionally, all air units should be provided with airside economizer capability for substantial energy savings.
12: Sketch H1
Basement air conditioning zoning plan

13: Sketch H2
First floor air conditioning zoning plan
14: Sketch H3
Second floor air conditioning zoning plan

15: Sketch H4
Basement air conditioning unit location plan
16: Sketch H5
First floor air conditioning unit location plan

17: Sketch H6
Second floor air conditioning unit location plan
### Existing Conditions Assessment

**1: North West Court**

Service transformers at main electric room

---

**Incoming Site Power**

The AIB is served by three underground 13.2kV primary feeders that originate from the NMNH and are a part of a "Museum Campus" distribution system that is owned and maintained by SI. This information was provided by SI during the March 25, 2009 walk-through.

The NMNH is supplied by four 13.2kV PEPCO (utility company) primary feeders (Nos. 14600, 14601, 14602, and 14603) that feed four medium voltage switchgear line-ups located in the basement of NMNH. Primary power is distributed to the NMNH, the AIB, the SIB and the Freer Gallery of Art from 13.2kV radial feeders from the switchgear via a network of underground ductbanks and manholes.

SI reported that all three primary feeders serving the AIB are routed through a common ductbank and the same manholes. Elbow type modular connectors are utilized for splices within the manholes.

The NMNH medium voltage switchgear and site underground distribution system were not surveyed as part of this study and the age and condition of the equipment and cabling are unknown. Based upon existing drawings, the equipment and wiring is assumed to be approximately 20 to 30 years old. SI personnel report that the system, in general, is in good condition and is tested/inspected on a regular basis as part of a preventative maintenance program. The three sets of 15kV cables entering the electric room appear to be size #4/0 or larger, in good condition, and are adequately sized for the capacity of the service.

### Main Electric Service

The 13.2kV primary feeders enter the west side of the AIB below grade into the main electric room, which is located on the first floor of the North West Court. The primary feeders serve six service transformers that provide the building with two electric services (See Figure 1). One operates at 480/277V, 3 phase and the other at 208/120V, 3 phase. All of the transformers are vault network type, silicone insulated, 65 deg C, Class OA, manufactured by Westinghouse Company, and installed in 1989. They replaced older, PCB oil transformers.

Three transformers are rated 750kVA, 13.2kV – 480/277V, paralleled for a total rating of 2250kVA. Each primary includes a closely coupled 15kV oil switch. The secondary side of each feeds a network protector that feeds into a common 480/277V busduct. The busduct is routed overhead and serves two 480/277V switchgear line-ups (labeled C and D), located directly behind the transformers. The metal-clad switchgear for both line-ups consist of fused draw-out air circuit breakers. Switchgear ‘C’ is manufactured by General Electric Company. Switchgear ‘D’ is manufactured by Federal Pacific Electric (FPE) Company. The switchgear serves 480/277V chillers, motor control centers, and distribution panels.
Three transformers are rated 750kVA, 13.2kV–208/120V, paralleled for a total rating of 2250kVA. Each primary includes a closely coupled 15kV oil switch. The secondary side of each feeds a network protector that feeds into a common 208/120V busduct. The busduct is routed overhead and serves two 208/120V switchgear line-ups (labeled A and B), located directly behind the transformers (See Figure 2). The metal-clad switchgear for both line-ups consist of fused draw-out air circuit breakers manufactured by General Electric Company. The switchgear serve 208/120V distributions panels throughout the building.

Newer digital power meters, Power Logic series, manufactured by Square D, are installed on the secondary side of all six service transformers.

All four switchgear sections are approximately 25 to 30 years old and appear to be in good operating condition. Switchgear section “D,” however, was manufactured by FPE, which stopped manufacturing switchgear in the 1980s. Parts would have to be procured from the secondary market.

Draw-out type circuit breakers can be “racked out” to permit servicing and repair, and usually have replaceable parts, which can extend service life. SI personnel reported during the March 25, 2009 walk-through that routine maintenance and testing is performed every three years. The estimated remaining service life of the switchgear is 10 years.

The working space clearance between the front of the switchgear sections and the network protectors does not meet the minimum distances per the NEC, table 110.26. A minimum of 4’ clearance is required.

**Normal Power Distribution**

The existing power distribution system throughout the building consists of distribution panels, power panels, lighting/appliance panels, and motor control centers operating at 480/277V and 208/120V. In general, receptacles, small equipment, and a percentage of the lighting operate on the 208/120V system. Large motor loads and the majority of the fluorescent lighting operate on the 480/277V system. Power distribution equipment is located in various mechanical and electrical rooms as well as flush-mounted in offices and corridors.
All of the overcurrent devices within the panelboards are circuit breakers. The equipment manufacturers vary, but the majority of equipment was manufactured by either Square D, Federal Pacific Electric, or General Electric Company. (See Figure 3).

HVAC equipment is served by either motor control centers or combination starters/disconnects located in the mechanical rooms.

Power feeders consist of conduit and wire and are typically routed overhead within each of the four quadrant areas. Power feeders traversing the hall and Rotunda areas use the underfloor trench system.

Branch wiring typically consists of conduit and wire and metal clad (MC) wiring. All cables appear to be copper conductors. Insulation types are either thermoplastic or rubber insulated. No cloth sheathed cables are apparent.

The age and condition of the power distribution equipment varies throughout the building due to the numerous building renovations completed over the years. A limited quantity of older panels (pre-1970s) — manufactured by Federal Pacific Electric — are still in operation and are in poor condition. Most of the panels, however, appear to have been installed during the 1970s and 1980s and are in average condition.

It is recommended that all existing power distribution equipment, devices, and associated conduit and wiring throughout the building be removed and replaced under any major building upgrade or renovation scenario.

All electrical equipment upgrades including reuse of existing equipment will require the completion of the following analyses as part of the new work documentation:

- **Short Circuit Analysis** — Determine the maximum short circuit values at the terminals of electrical and mechanical equipment. All equipment and devices shall be rated for the maximum calculated short circuit current.

- **OCPD Coordination Analysis** — An overcurrent protective device coordination analysis (OCPD) shall be performed utilizing industry standard computer program to determine the appropriate type, trip, and sensor settings for OCPDs in order to achieve selective coordination with all supply side OCPDs.

- **Arch Flash Analysis** — Per the National Electrical Code (NEC), equipment likely to require examination, adjustment, servicing, or maintenance while energized shall be field marked to warn qualified persons of the potential electric arc flash hazards. An Arc-Flash analysis shall be performed in accordance with NFPA 70E-2004 to determine the potential electric flash hazards and appropriate personal protection equipment (PPE) to be utilized at each piece of electrical equipment that may require examination, adjustment, servicing or maintenance. The equipment installed will be labeled in accordance with NFPA 70E.

**Emergency Power Distribution**

A diesel-driven, indoor emergency generator is located in a dedicated room within the basement of the South West Pavilion. The unit is rated 150kW,
480/277V, 3 phase, manufactured by Kohler, and was installed in 1993 (See Figure 4). An above-grade diesel steel tank is located in the room. The radiator is water cooled.

A permanent load bank rated 125kW, 480V, 3 phase is electrically connected to the generator and is remotely located in an adjacent room within the basement. The unit is water cooled, manufactured by Simplx Company, and appears to have been installed with the generator.

The generator feeds one 400A, 480/277V transfer switch that feeds a 600A (M.L.O.) distribution panel. Loads on the panel include: fire pump, jockey pump, freight and passenger elevator, sump pump, egress lighting panels, and miscellaneous, non-life safety loads.

SI reported that the Automatic Transfer Switch (ATS) and panel were installed in 2001.

The generator and associated power distribution equipment appear to be in good condition. The record log stored with the generator indicates that periodic testing of the unit is performed on a routine basis.

The generator is located in a very confined space that limits accessibility for maintenance and replacement, if required. Mechanical piping is routed through the room in violation of the National Electrical Code (NEC).

The configuration of the emergency distribution system is in violation of the NEC. Life safety loads such as egress lighting are required to be served by a separate ATS. The existing circuit breaker serving the fire pump is sized for locked rotor amps and should be sized for 125% of FLA. The fire pump also should be provided with a separate circuit breaker, directly connected to the generator bus with the ATS integral to the fire pump controller and a normal feed from the 480V service.

The capacity of the generator may not meet the emergency needs of future building renovations. At a minimum, it could only be used for emergency egress lighting of the entire building and the fire pump (50HP).

Lightning Protection System

A lightning protection system report, dated May 2008, was prepared by Ehrenkrantz Eckstrut & Kuhn Architects (EEKA). The report describes in detail the extent and condition of the existing roof top lightning protection system and associated ground conductors and ground rods.

Air terminals are installed on top of the cupola, the top of each tower, and on top of the intermediate tower roof walls. A system of bare copper conductors connect the air terminals and drape over the gutters.
and travel down the building walls to the ground rods. The conductors are routed in PVC conduit, up to 10 feet above grade.

The report includes a "Lightning Risk Analysis" based upon the 1997 edition of NFPA 780, and concludes a "Severe" risk index for the AIB. This rating implies that a complete and operational lightning protection system should be in place to effectively ground the facility.

The EEKA report notes numerous deficiencies with the existing lightning protection system related to the quantity and location of air terminals, conductors, and ground rods; grounding of exposed metallic building elements; and detached fasteners/straps.

To properly protect from lightning strike, the building’s lightning protection system should be upgraded to meet the latest edition of NFPA 780. The recommendations described in the EEKA report should be implemented as soon as possible, and coordinated with any roof, flashing, and façade work in order to maximize protection of life and property.

**Lighting Systems**

Illumination throughout the existing two-story halls and Rotunda is provided by decorative chandeliers mounted at multiple elevations, with the exception of the North Hall. The chandeliers located throughout the main hall areas incorporate decorative diffusers and use mirror inlays to allow the multiple incandescent T-4 lamps to reflect light in all directions from the luminaire (See Figure 5). Lighting within the Rotunda is provided primarily by multiple glass globe luminaires strategically aligned with the four stair towers and the centers of each hall. Incandescent lamps, similar to those found in the hall fixtures, illuminate these globes.

The North Hall appears to have been converted to allow for live performances and “movable” displays; illumination throughout this area consists of multiple lengths of track and track heads. The lamp source within these heads appears to be incandescent. These luminaires were controlled by a lighting control system located behind decorative doors at the southwest end of the hall. Most of the track heads have been removed during recent demolition activities.

Lighting within the enclosed stair towers that provide access to the pavilions and towers use decorative iron and brass luminaires mounted at the main stair landings. The iron chandeliers exist in both four and six lamp types with decorative glass globes enclosing the incandescent A-lamp sources. The brass chandeliers also use decorative glass globes to enclose the incandescent lamps. These brass luminaires are located in many of the pavilion office areas and the stair towers.

Theatrical luminaires were used throughout the main theater, located in the South West Range, and were controlled by a custom control system. Recent demolition activities removed most of these luminaires.

With the exception of the main spaces noted above, the remainder of the building illumination is provided by either recessed or surface mounted fluorescent luminaires. These are found throughout the administrative and support spaces. A combination
of traditional acrylic lenses and parabolic diffusers are incorporated in the fluorescent luminaires in all of the administrative areas. Lamp sources for these fixtures are both T-8 and T-12 types and it can be inferred that the matching ballasts are both magnetic and electronic types dependent upon the approximate age of the luminaire.

Some of the administrative areas located in the pavilions on the second and third floors incorporate pendant mounted linear fluorescent luminaires with parabolic louvers and wall wash lighting characteristics. These luminaires are typically mounted along the perimeter walls of the office and conference spaces and have a traditional white finish.

Conference rooms have decorative recessed downlights for both table illumination and wall washing. Incandescent lamps sources, both A-lamp and PAR lamp types, are visible in these luminaires. Wall washer type downlights located in a former conference room in the West North Range use wheat colored reflectors rather than the standard mirrored reflector found elsewhere in the building.

Utility spaces such as electrical rooms, mechanical rooms, telecommunication closets, and the utility tunnels use standard industrial fluorescent luminaires with multiple lamps and standard painted metal reflector. Similar type luminaires are used throughout the high-density storage area located on the second floor of the East North Range.

Emergency and egress illumination throughout the administrative and utility areas is provided by incandescent emergency light fixtures with integral batteries, charging unit, and multiple heads. Exit signs in these areas also incorporate incandescent lamps, integral batteries, and charger unit. A recent emergency power distribution system upgrade, including a diesel driven generator, provides emergency power to strategically located lighting panels located throughout the first floor of the building. It appears that many of the branch circuits serving the emergency and egress luminaires originate from these panels.

Exit luminaires located throughout the main corridors, multi-story halls, and Rotunda are decorative luminaires with brass artistic enclosures and glass lenses. The lamp source appears to be incandescent. Many of these luminaires are pendant mounted using decorative brass rods.

Lighting control throughout the building is by local switch, especially within the administrative and utility areas. With the exception of the theater and North Hall, the remainder of the lighting throughout the main halls and Rotunda appear to have been controlled by local circuit breaker.

Exterior illumination appears to consist of grade-mounted directional luminaires with incandescent lamp sources. No exterior building mounted luminaires are apparent. These luminaires appear to be controlled by contactor and mechanical timeclocks. Remote light sensing photocells also provide additional control.

Many of the decorative chandeliers located throughout the “public” areas of the building use incandescent lamp sources; these luminaires are in
poor condition with multiple lamp failures, broken/damaged mirrors, bent supports, and damaged reflectors. SI notes that the decorative luminaires located throughout the main halls are not original to the building. They are in the style of early 20th century Tiffany chandeliers and were added to the building in the late 20th century to provide general ambient lighting in the multi-story halls. The decorative iron and brass chandeliers located throughout pavilions and towers use similar incandescent lamp sources and also are not original to the building.

The excessive use of incandescent lamp sources throughout the building increases the overall building electrical load and introduces a large heat gain into these spaces. They also require more maintenance since they do not last as long as fluorescent sources. Many of these luminaires are located above the second floor in the halls, further adding to the difficulty of maintenance.

General illumination throughout the administrative areas is provided by traditional fluorescent sources. However, many of these luminaires use obsolete T-12 type lamps that do not meet today’s energy codes and are no longer available. Also, these luminaires likely use magnetic type ballasts that do not conform to current energy codes and are no longer recommended for use. Other luminaires in these spaces use T-8 fluorescent lamps but many of these do not operate and appear to be beyond their useful life. Any future demolition that removes the fluorescent lamps and their associated ballasts will have to dispose of them in accordance with hazardous materials regulations.

Local lighting controls throughout the interior spaces of the building do not meet current energy codes and their use makes energy conservation difficult, placing an added burden on maintenance staff.
1: Domestic Water Service
A 6” domestic water line enters the building in the basement of the southwest quadrant of building.

2: Domestic Water Service
Showing reduced pressure backflow preventers

3: Domestic Water Service
The water meter is located in a vault directly outside the building.

4: South West Pavilion
Abandoned natural gas service to building

General Plumbing Information
The plumbing systems in the AIB are generally original to the building with the exception of the restrooms and incoming domestic water service. Renovations were done to the pavilion restrooms in the 1970s.

Services to the building include domestic water, sanitary sewer, storm water piping, and natural gas.

Generally, all components of the plumbing systems are in poor condition and are well past their expected useful service life with the exception of the domestic water incoming service, backflow preventers, booster pump, and sump pump, all of which were installed in 2001.

The domestic water booster pump is a Hydronic Modules Corp. model HBP 200, 12.6. LPS at 160 KPa boost. The sump pump is a Weil duplex model 1603 submersible, 37.9 LPS at 59.7 KPa total head.

Incoming Utilities
A 6” domestic water service enters the building in the southwest area basement. The 6” service has two reduced pressure backflow preventers installed in parallel. The water meter is located in a vault directly outside the building (See Figures 1, 2 and 3).

The sanitary sewer exits the building in three locations. A 6” exits at the East Tower and flows into a 10” main on Independence Avenue, a 6” exits at the South East Pavilion and flows into a 10” main on Independence Avenue, and a 6” at the South West Pavilion and flows into a 10” main on Independence Avenue.

The storm water piping exits the AIB in several locations on the south side of the building and flows into a 12” storm water main located at Independence Avenue.

A 3” natural gas service enters the building in the South West Pavilion in room B416. The gas service is presently not serving anything in the building and is abandoned. The gas service is connected to the gas main on Independence Avenue. The main shut-off valve is located in a valve box toward Independence Avenue (See Figure 4).
Mechanical Rooms
Plumbing in mechanical rooms generally consists of floor drains, emergency fixtures, and make-up water. Cooling towers are supplied with domestic water with reduced pressure backflow preventers.

Roof Drainage
The roof is drained by gutters and downspouts. The downspouts are routed on the outside and inside of the building. The downspouts are routed down through the building and are connected to underground storm water piping (See Figures 5, 6, and 7).

Domestic Water System
The domestic water system uses a booster pump system to increase water pressure. The pump is duplex, 200 gpm with 50% capacity per pump. The pump system uses a hydropneumatic tank.

Domestic hot water for restroom fixtures, sinks, and a washing machine is provided from electric storage-type water heaters. A 119-gallon electric water heater is located in the southwest basement level in room B415. A 40-gallon electric water heater is located in the northwest basement level in room B424. A 50-gallon electric water heater is located in the northeast basement level in room B108. A 50-gallon electric water heater is located on the ground floor in the southeast janitor closet. A 50-gallon electric water heater is located on the ground floor in mechanical room 1435B (See Figures 8, 9, 10, 11, 12, 13, and 14).

Sanitary Sewer System
The sanitary sewer system collects waste from water closets, urinals, lavatories, mop sinks, electric water coolers, stainless steel sinks, clothes washer, shower, and floor drains. Most sanitary piping is a gravity system with the exception of two areas where a sewage ejector is utilized. A sewage ejector is located in the northwest basement level in room B424 and one is located on the ground floor in mechanical room 1435B. Sanitary waste and vent piping is cast iron (See Figures 15 and 16).
Storm Water System
The storm water system is primarily a gravity system serving roof drains and area drains. A sump pump is located in the southwest area next to the incoming domestic water service. Storm water piping is cast iron (See Figure 17).

Plumbing Fixtures
Plumbing fixtures in the building consist of restroom fixtures, sinks, and emergency fixtures.

Water closets are primarily manual flush valve. Some are wall-mounted and some are floor-mounted. Water closets serving the nursery are floor-mounted flush tank. Urinals are wall-mounted, manual flush valve. Lavatory sinks are either vitreous china countertop or wall-mounted with manual faucets. Mop sinks are wall-mounted. There are four floor-mounted and two wall-mounted electric water coolers and none are ADA compliant. Stainless steel sinks are countertop. The single shower in the building is a non-ADA compliant fiberglass stall. Emergency eyewash and emergency showers are located in mechanical rooms (See Figures 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, and 30).
Comparison of Existing Conditions with Current IPC Requirements and Best Practices

Domestic water systems appear to be compliant with IPC and best practices. Backflow preventers are installed where they would be required by code.

The sanitary systems appear to be compliant with current IPC. Existing cast iron hub piping is used above ground. Typically, cast iron no-hub piping would be installed above ground.

Some storm water system rain leader sizes are not code compliant due to the amount of square feet of roof surface they serve. Existing storm water rain leaders are cast iron with threaded fittings. Typically, cast iron no-hub piping would be installed above ground. The horizontal storm water piping is not insulated and does not meet code requirements.

Water closets are typically code compliant, meeting the maximum 1.6 gallon per flush for water closets. Lavatories for handicapped use do not have insulated piping as required by ADA. The shower stall is not ADA compliant.
25: Plumbing Fixtures
Floor-mounted electric water cooler

26: Plumbing Fixtures
Wall-mounted electric water cooler

27: Plumbing Fixtures
Mechanical room emergency shower

28: Plumbing Fixtures
Mechanical room emergency eye wash

29: Plumbing Fixtures
Mechanical room emergency eye wash

30: Plumbing Fixtures
Fiberglass shower stall

31: Plumbing Fixtures
Mechanical room floor drain

32: Plumbing Fixtures
Mechanical room floor drain

33: Plumbing Fixtures
Mechanical room floor drain

34: Plumbing Fixtures
Mechanical room floor drain

Support or Related Utilities for Plumbing Systems
Fire protection uses floor drains for drainage of wet pipe systems. The floor drains are in poor condition and some are clogged.

Mechanical uses floor drains for drainage of condensate and for general drainage of equipment room areas. The floor drains are in poor condition and some are clogged (See Figures 31, 32, 33, and 34).

Make-up water for HVAC equipment is provided with backflow preventers.
General Life Safety and Fire Protection Information
The AIB’s walls are masonry and its floors are concrete. Roofs and mezzanines are supported by unprotected steel/iron. A building construction type is based on the least protected elements. Because of the AIB’s unprotected columns and roof, the building’s construction type is Type IIB per the International Building Code (IBC) and Type II(000) per NFPA 101, The Life Safety Code (LSC).

Although currently vacant, the AIB’s category, per the IBC, is an existing mixed-use/non-separated Group A-3, Assembly and Group B, Business with accessory storage. A similar categorization according to the LSC is mixed-use Existing Assembly and Existing Business occupancy.

The AIB’s exiting scheme is, essentially, unprotected exit access to the four main tower grade-level exterior exit doors. An enclosed exit stair is located in two of the courts and each of the pavilions.

The building is fully sprinklered with numerous wet-pipe automatic sprinkler systems. The approximate installation date for the system is 1975, but has several more recent modifications. Fire hose valves are provided in the courts, ranges, and pavilions.

The building is provided with a manual and automatic fire detection and alarm system. Alarms are initiated by waterflow switches, manual pull stations, and complete area detection. A Fire Command Center is located in the North Tower.

Currently, the halls vertically connect two floors.

Incoming Utilities
An 8” incoming city water line enters the AIB in the southwest corner at the basement level to supply the fire suppression systems. An AMES 200SS double check backflow preventer is located on this line at this service entrance to prevent cross contamination. No post indicator valve or wall post indicator valve is visible. This service could be used for future systems. It suggested that, during renovation, a redundant fire service be brought into the facility.

Construction Type and Materials
The AIB general construction consists of load–bearing, brick masonry walls and arched-topped interior piers separating halls, courts, and ranges. Exposed steel trusses and roof purlins support the roofs. Pavilions and towers are three-story masonry structures having framed floors of shallow brick vaults spanning between steel beams with a concrete topping slab.

The AIB was not constructed to any model building code that exists today. Rather, it was constructed as a “fireproof” building as can be seen in the following quote: “To fulfill the Smithsonian’s requirements of the building to provide large open exhibitions and be claimed as a ‘fireproof’ facility, the architects retained the services of well-known civil engineer General Montgomery C. Meigs. Meigs devised a structural system similar to those utilized for other clear span applications of the period... Meigs’ design incorporates iron roof trusses pocketed into four-wythe unreinforced masonry walls to create clear spans for open exhibition areas beneath. Throughout each of the AIB’s four symmetrical quadrants (northwest, northeast, southeast, and southwest)
there are four distinct areas of roof framing: the main hall, transitional area, court, and range.” (See Mothball report, page 3)

The term “fireproof” has been replaced by “fire resistive”. It is recognized that no building is totally fireproof as building contents can produce a significant fire without involving the structure.

The AIB's construction type per current IBC is considered Type IIB and Type II(000) per NFPA 220. The building’s area (~95,000 square feet for the first floor area) exceeds the height and area limits found within the IBC based on a future A-3 use and IIB construction type. Although the International Existing Building Code (IEBC) only requires construction type upgrades for nonseparated additions exceeding height area limits and changes of occupancy, SI practice is to meet current code as nearly as practicable. An IBC area calculation is shown below.

\[ Aa = \{ At + [ At \times If ] + [ At \times Is ] \} \]

\[ Aa = \text{allowable area per floor (ft}^2\text{)} \]
\[ At = \text{IBC tabular area per story (ft}^2\text{)} \]
\[ If = \text{Area increase factor due to open frontage} \]
\[ Is = \text{Area increase factor due to sprinkler protection} \]

<table>
<thead>
<tr>
<th>Building Construction Type</th>
<th>Base Area, ft²</th>
<th>Sprinkler Increase, ft²</th>
<th>100% Frontage Increase, ft²</th>
<th>TOTAL ALLOWABLE AREA, ft²</th>
</tr>
</thead>
<tbody>
<tr>
<td>IIB</td>
<td>9,500</td>
<td>19,000</td>
<td>7,125</td>
<td>35,625</td>
</tr>
</tbody>
</table>

Current Applicable Codes
Per SI’s Fire Protection and Life Safety Design Manual, the most current code editions should be used for any project upgrade. The most restrictive requirement of the design standard and any referenced code should be used:

- International Building Code (IBC) 2009 edition
- International Existing Building Code (IEBC) 2009 edition
- International Fire Code (IFC) 2009 edition
- NFPA 70, National Electrical Code, 2008 edition

- Society of Fire Protection Engineers Guide to Performance-Based Fire Protection Analysis and Design of Buildings

Egress
Building egress elements must comply with the LSC or a performance-based analysis must be performed to prove equivalence. Egress must be adequate in number, arrangement, and capacity. The analysis below is based upon former and future planned use.

---

Footnote 1: Performance-based approaches employed to meet the goals and objectives outlined in NFPA 909 shall be permitted subject to the approval of OSHEM.
as exhibition space (Assembly Occupancy) with some Business use areas.

Not all spaces are provided with the required exit number. IBC and LSC require four exits for areas of this building with occupant loads greater than 1,000. Access to two remote exits is also required for almost all spaces. (See Egress Deficiencies below.)

Not all spaces in the AIB have access to an exit within the required travel distance and within maximum common path limits. Exit arrangement requirements for a fully sprinklered building are summarized in the following chart:

<table>
<thead>
<tr>
<th>OCCUPANCY TYPE</th>
<th>Max. Common Path (ft)</th>
<th>Max. Dead End (ft)</th>
<th>Max. Travel Distance (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business</td>
<td>100</td>
<td>50</td>
<td>300</td>
</tr>
<tr>
<td>Assembly</td>
<td>75</td>
<td>20</td>
<td>250</td>
</tr>
</tbody>
</table>

Each basement area is served by a single exit stairway up to the first floor.

There are four main exits on the first floor. Each is a pair of 33" doors with a single 31" wide door on each side.

The occupied second floor pavilions’ exit paths include balconies open to the halls below and access to each tower’s exit stair. Balconies discharge via open stairs to the first floor halls below. There is an additional stair in the North West and South East Courts. An exit stair also is provided at each pavilion and in the North East and South West Courts. All stairs discharge onto the first floor.

Each third floor tower space is served by a single exit stair. There are also third floor offices at the end of each hall accessed via spiral stairs. The South West Pavilion houses a computer room on the third floor of approximately 4,225 square feet. This area is served by a single stair. The North East Pavilion contains a third floor mechanical room of approximately 4,225 square feet. This space is served by a single stair from the second floor mechanical room.

Refer to the electrical portion of this report for discussion of the diesel generator and exit marking and exit illumination.

**Occupant Load**

Occupant load is based on the use of each space and is contingent upon the AIB’s final layout. Although partition layout in many spaces within the building is set for Business use, these spaces are now vacant. A more likely future use is Assembly. Occupant load factors from the LSC are used to estimate occupants: 100 square feet per occupant for Business, 300 square feet per occupant for Mechanical/Storage, 7 square feet per occupant for Assembly (concentrated), and 15 square feet per occupant for Assembly (less concentrated).
### AIB First Floor - OCCUPANT LOAD

<table>
<thead>
<tr>
<th>ROOM / AREA NAME</th>
<th>AREA (ft²)</th>
<th>OCCUPANT LOAD FACTOR (ft²/ OCC)</th>
<th>OCCUPANTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>North Hall</td>
<td>6760</td>
<td>15</td>
<td>451</td>
</tr>
<tr>
<td>South Hall</td>
<td>6760</td>
<td>15</td>
<td>451</td>
</tr>
<tr>
<td>East Hall</td>
<td>6760</td>
<td>15</td>
<td>451</td>
</tr>
<tr>
<td>West Hall</td>
<td>6760</td>
<td>15</td>
<td>451</td>
</tr>
<tr>
<td>Center Hall</td>
<td>3050</td>
<td>7</td>
<td>436</td>
</tr>
<tr>
<td>NW Pavilion / Tower</td>
<td>13875</td>
<td>15</td>
<td>925</td>
</tr>
<tr>
<td>NE Pavilion / Tower</td>
<td>13875</td>
<td>15</td>
<td>925</td>
</tr>
<tr>
<td>SW Pavilion / Tower</td>
<td>13875</td>
<td>15</td>
<td>925</td>
</tr>
<tr>
<td>SE Pavilion / Tower</td>
<td>13875</td>
<td>15</td>
<td>925</td>
</tr>
<tr>
<td>OCCUPANT LOAD:</td>
<td></td>
<td></td>
<td>5940</td>
</tr>
</tbody>
</table>

Each third floor tower has approximately 1,296 square feet resulting in an occupant load of 13. The 4,225 square feet former computer room in the South West Pavilion has a load of 42 and the 4,225 square feet mechanical room in the North East Pavilion has a load of 15.

### Exit Capacity

First Floor: Each tower has a 66” pair of doors and two 31” doors. There are four towers.

First Floor N Tower:

\[
31” + 66” + 31” = 128” \text{ width} \\
128” / 0.2”/person = 640 \text{ persons} \\
640 \times 4 \text{ towers} = 2,560 \text{ total exit capacity}
\]

Total First Floor capacity = 2,560 persons

Second Floor: Each of four balconies has a 66” stair. Each of the four pavilions

Court Stairs:
\[44” \times 2 \text{ stairs} = 88” \]
\[88” / 0.3”/person = 293 \text{ persons}\]

Pavilion Stairs:
\[30” \times 4 \text{ stairs} = 120” \]
\[120” / 0.3”/person = 400 \text{ persons}\]

Balcony Stairs:
\[66” \times 4 \text{ stairs} = 264” \]
\[264” / 0.3”/person = 880 \text{ persons}\]

Total second floor capacity = 1,573 persons

Third Floor: As calculated above, each pavilion stair has a capacity of 100 and each third level court area has a stair with a capacity for 146.

In summary, exits are inadequate in capacity on the first floor. Exit arrangement and number is beyond the prescriptive code limits on the second and third floors.

### Fire Suppression Systems

A noted above, the AIB is a fully sprinklered building with numerous wet-pipe type sprinkler systems and a standpipe system located throughout the facility.

---

Footnote 2: Final mechanical, incidental storage, or business spaces provided on this floor will decrease this load.

Footnote 3: Future use could include elimination of the pavilions leaving only the towers and balconies loaded.
The original sprinkler system was installed around 1975 and there have been numerous modifications since. (See General Life Safety and Fire Suppression heading above for a description of the incoming service.) A 500 gpm electric fire pump located in the utility room on the basement level boosts the pressure for the sprinkler and standpipe systems. The most recent test report (August 2007) indicates the pump is providing 86 psi of net head at 100% flow and 64 psi net head at 150% of the 500 gpm rated flow. The pump is powered by normal power with emergency generator backup.

An adjacent jockey pump maintains the sprinkler and standpipe system pressure. The sprinkler system is a wet pipe system with standpipes in the stairs. Separate pump controllers are provided for the fire pump and the jockey pump. According to the fire pump log on site, the fire pump was rebuilt in August 2005. The jockey pump and the fire pump controllers were recently installed. Piping consists of Victaulic and black steel. Sprinkler heads are upright in areas without ceilings and pendant type heads are used in areas with ceilings. Fire department (2 ½") and occupant use (1 ½") fire hose valves are also provided in the facility.

The sprinkler system was designed per NFPA 13 with a design density for Ordinary Hazard Group II, which is in accordance with SI standards.

The Halon gaseous systems located in the third floor computer room and the rare book room have been disconnected. The computer room cylinders have been removed while the book room cylinder remains, but is not connected.

Fire Detection and Alarm System
The AIB is currently provided with an automatic and manual fire detection and alarm system. The existing fire alarm system is the Siemens System 3 model with an MXL-IQ subpanel for the beam detectors. The fire alarm panels are located in the security room near the north entrance on the ground floor. The same security room also houses the SIB fire alarm remote panel and the SIB fire pump status panel. An additional panel is located in the third floor computer room.

The system is monitored via a site proprietary supervising station over an Ethernet connection. Full area smoke detection is provided including spot type detection in rooms and enclosed spaces. Projected beam detectors are located in the halls. Fire alarm signals are also initiated by manual pull stations located at exits and a multitude of sprinkler waterflow switches.

The fire alarm system also provides supervision of sprinkler control valves, fire pump and jockey pump controllers, fire alarm sub-panels, and duct detectors.

Audible occupant notification is provided via fire alarm bells.

Notes and Comments on System Analyses and Performance Based from Other Reports:

Polshek, Tobey Davis – Gage Babcock Report
This report describes the Performance Based Life Safety Analysis used to assess and resolve life safety and egress needs. The analysis addresses life safety and egress given the programmed occupancy, the potential limited capacities of exits, and the
historic preservation requirements of the building. A preliminary analysis using the prescriptive criteria of the LSC indicates the exit capacities are insufficient to meet the programmed occupant loads of the AIB. However, there are architectural features in the AIB that enhance life safety and are not considered when using a prescriptive code approach.

This analysis demonstrates that an acceptable level of life safety, consistent with SI criteria, is provided in the AIB.

A very similar analysis will be required during the design process of any reconfiguration of the AIB. Modifying the contents and spatial arrangement of the facility will obviate the fire and egress models used in this analysis.

Comparison or Existing Conditions with Current Applicable Code Requirements & Best Practices with the Following:

Egress / Code
Based upon its intended use, the AIB exceeds the height/area limits of current prescriptive building codes. The International Existing Building Code would not require this existing noncompliance to be remedied unless the building’s occupancy type was changed or an addition was constructed. However, SI OSHEM Design guidance requires this issue be mitigated in some way. Typically, this condition is addressed by increasing the existing construction type (applying spray-applied fireproofing, mastic coatings, or gypsum enclosures to building structural steel) or building firewalls to create independent buildings. A third option is to include this risk into a performance based life safety assessment. Such an assessment could include those life safety features that are above and beyond prescriptive code requirements.

There are numerous areas with exit arrangements that do not meet prescriptive code requirements found in the LSC. Such deficiencies include:

- The southwest basement has a single exit stair resulting in an excessive common path of travel. Northwest and northeast basements have a single exit stair. Such spaces should be designed for a low occupant load and with a use acceptable to OSHEM (LSC Table A7.6).
- The first floor occupant load exceeds the exit capacity. This condition should be addressed in a future performance-based analysis (LSC Table A7.6).
- All second floor exits discharge to the first floor. The LSC and IBC each require that at least 50% of exits discharge to the exterior or through rated exit passageways (LSC 7.7.2).
- If the building is used for exhibitions, the second floor occupant load will exceed egress capacity.
- The pavilion stairs are too narrow. The 30” width does not meet the LSC requirement of 36” minimum width for existing stairs. (LSC Table 7.2.2.1.1(b))
- Pavilion stairs have winders that do not meet minimum tread depth requirements for existing stairs (LSC 7.2.2.1).
- The third floor computer room and pavilion areas require a second means of egress or a modified single exit (LSC 38.2.4).
The halls communicate to the first and second levels. Per SI Design Guidelines, such vertical communication must meet the Life Safety Code requirements. In many spaces, there is inadequate separation of the first and second floor. Either:

- Remove the second level;
- Modify the second level so it meets the requirements and definition of a mezzanine. Such a modification would include a reduction in area to 1/3 of the room onto which it opens (LSC 8.6.9);
- Modify the space to meet the eight requirements for a “Communicating Space” (LSC 8.6.6). This would entail providing self-closers or automatic hold-open devices activated by the fire alarm system on all doors that open onto the second floor balconies and securing closed the operable windows at the end of the halls; or
- Modify the space to be an Atrium (LSC 8.6.7). This would allow the stories to be open to each other but will require a smoke control system. Such a system may be minimal based on the large volume of space above the halls.

Combustible construction (plywood without FR treatment) is visible in the northeast mechanical room. Combustible construction should be removed when the building is renovated. Construction materials must be noncombustible or those specific combustible items permitted in Section 603 of the International Building Code.

Fire Protection Suppression Systems
Any major construction activity will require extensive sprinkler system modification. The existing service will suffice for reuse, however a redundant water supply is suggested. A redundant supply, including a 100% backup booster pump may be warranted once the nature of any modification is known.

Many existing sprinkler heads are 35 years into their maximum 50-year lifespan and should be replaced as part of any major improvement. Existing piping may be investigated for corrosion during a future design process for the possibility of remaining in place.

While not a code deficiency, the building is divided by numerous sprinkler zones. At least 25 control valves are visible on the first floor. Numerous valves make the system difficult to maintain.

There are numerous locations where ceiling tiles have been removed. These ceiling tiles are necessary for proper sprinkler activation and should be replaced.

Fire Detection and Alarm Systems
The fire detection and alarm system is at the end of its useful life. The system offers little or no flexibility for modifications. There is little or no capacity to add the numerous visible notification appliances required for a major construction improvement. The system should be replaced. It may be possible to salvage the hall beam detectors and beam detector panel.

There are numerous locations where ceiling tiles have been removed. These ceiling tiles are necessary for proper smoke detection actuation and should be replaced.
The following summary of the AIB security system refers to conditions extant when the building was in operation. It is based on field observations and discussions with the Office of Protective Services (OPS) Project Manager.

A number of architectural and security related factors contribute to the security system of the AIB. Physically, the perimeter of the building is relatively sound. The ground floor windows are equipped with cast iron bars. The building’s walls and structure are robust. A guard is stationed at the loading dock gate, and a guard station is located in the SIB basement, adjacent to the entry to the tunnel to the AIB. Guards were previously stationed at public entrances while the building was operational. Substantial doors contribute to after-hours security. Employee after-hours access and parcel control were accommodated through the tunnel from the SIB.

A Unit Control Room with a rack room is located within the building. Although it is secure, it is not current to OPS design criteria for UL Level 3. The amount of space provided for OPS administrative purposes appears to be adequate.

Security and IT shared closets for electronic systems throughout the building when it was in use. OPS currently requires separate closets for security equipment and system components.

The building uses a Software House C-Cure system for alarm and access control. The system was previously monitored both on-site and at a main central station. The limited card access in the building is tied into the institution-wide system. Other components include: volumetric motion detectors, door contacts at all perimeter doors and secure interior doors, glass break detection in the tunnel and other unsecured windows at grade, and a panic button in the unit control. When the building was in use, the level of motion detection in the collection-bearing areas was approximately equivalent to UL Extent of Protection Level 4, and control panels were tamper-protected.

At present, the building is marginally secured using the existing C-Cure system. The system is monitored off-site and connected to field panels by means of a fiber network. The network is suitable to remain in use, but any future building intervention would require a server on site.

Software House C-Cure is the current security system standard for the Smithsonian Institution. However, the current system would have to be more expansive to meet current OPS design standards and criteria. In addition, the existing volumetric detectors, glass break detectors, and other devices are obsolete and likely aesthetically unacceptable for an historic rehabilitation project. Similarly, surface mounted conduit is used in a number of locations for security wiring, and most likely should be removed due to the historic nature of the building.

The existing analog closed circuit television (CCTV) system is limited and obsolete and would not be salvageable for future reuse. No exterior perimeter CCTV surveillance currently exists.

Wireless object protection system (Inovonics) devices have been removed from the building with exhibition furniture. The system was up to OPS standards when in use.
Some security features, such as a guard watch patrol system, are obsolete. These may be replaced with a card access control system to conform to current OPS standards and criteria.

Vulnerabilities exist due to the proximity of the building perimeter wall to the Independence Avenue parking spaces at the south side. The existing glass at the Independence Avenue and other perimeter windows is neither laminated nor blast-resistant.
1: North West Pavilion
Utility Demarc/MDF closet at the basement level

2: North West Pavilion
MUX units at the basement level

3 & 4: IDF Closets
In various locations throughout the building

The incoming utility services that support telephony and data communications for the building are provided by Verizon and enter the tunnel located between the SIB and the AIB. These services use both high-pair count copper trunk cables and multi-strand fiber optic cables and terminate into the utility demarcation equipment located within the Main Distribution Frame (MDF) closet (See Figure 1). Terminations of the fiber optic cables utilize multiple multiplexer (MUX) units provided by the utility company for distribution of the data system services throughout the building (See Figure 2). The multi-pair count copper trunk lines terminate onto lightning/surge protectors and then onto multiple type 66 terminal blocks.

Distribution of the analog/voice communications services from the MDF is accomplished in a “hierarchical star” topology via multi-pair count copper trunk cables rated for Category 3 communications. These trunk cables radiate out from the MDF and are routed through the existing underground tunnel system and strategically located conduits terminating into the Intermediate Distribution Frame (IDF) closets located throughout the building (See Figures 3 and 4). The main IDF closets are located in the following areas:

First Floor
- West North Range conference room
- North West Range private office
- West South Range closet adjacent to South Tower
- East South Range closet adjacent to former day care center
- East North Range closet adjacent to former conference center

Second Floor
- West South Range closet adjacent to main corridor and restrooms
- West North Range closet within administrative area
- North East Range closet adjacent to file storage area
- South East Range closet adjacent to East Hall
Third Floor

- West North Range closet located between second and third floor stairs to North West Pavilion
- South West Court former main data center (See Figure 5)
- South West Pavilion equipment located in private office

In addition to these locations, other lower-pair count copper trunk lines are extended from these closets to type 66 terminal blocks located within administrative areas, conference spaces, and similar support spaces on an "ad-hoc" basis to support telephony requirements. Many of these locations are exposed within the spaces and are typically located behind walls, under countertops, and within semi-recessed enclosures.

Similar to the origin of the analog/voice system, the network data infrastructure originates from the utility demarcation equipment located in the basement floor MDF closet. A dedicated multi-strand 62.5/125 micron multimode fiber optic backbone cable extends from the demarcation equipment to the former data center located on the third floor of the South West Court. This data center used to be the central computer center for the SI campus and served all of the buildings located on the Mall. The data center has been relocated from this building to the Herndon, Virginia site. However, the existing cabling infrastructure still remains.

The network infrastructure primarily consists of multi-strand, 62.5/125 micron multimode fiber optic cabling suitable for 100Mb Ethernet communications. Numerous fiber optic backbone cables radiate from the former third floor data center to the main IDF closets noted above. Most of these backbone cables contain 6-strands of multimode fiber and are terminated into wall mounted termination cabinets. Depending upon the amount of administrative space served by the IDF, more than one 6-strand cable is terminated into the terminations cabinets. Activation of the network switches that were located in the IDF closets was accomplished by fiber optic patch cords terminated at the wall mount termination cabinet and onto the active network fiber termination ports on the switch.

In some instances, additional network switches were located beyond the IDF closets. For example, a 6-strand multimode fiber optic cable was extended from the IDF closet to the second floor West Tower administration area in order to provide network connectivity for the local office areas. This condition occurs in numerous locations throughout the building. The rationale for this approach may have been due to the 295-foot (90-meter) distance limitations of the horizontal workstation copper cables from the IDF closet to the workstation outlet.

Horizontal workstation cabling consists of unshielded twisted pair (UTP) cables originating at the IDF closet.
and terminating into the workstation outlets. The UTP cabling supporting analog and voice communications is rated for Category 3 communications. Horizontal UTP cabling supporting network (data) communications is rated for Category 5 and 5e, which was dependant on the time of the specific telecommunications fit out of the area.

Terminations of the horizontal cabling throughout the administration areas occur mainly within the existing partitions via recessed work area outlets. In locations where the existing partitions were masonry or plaster, the cabling was routed via surface mounted raceway (conduit or plugmold) to the work area and terminated into surface mounted devices.

A typical IDF closet consists of plywood backboards extending from the floor to approximately 8'-0" above the finished floor. Wall mounted cabinets are used for termination of the fiber optic backbone originating from the data center. Workstation cabling supporting network/data functions are terminated onto wall-mounted patch panels rated for Category 5 and 5e communications. Activation of workstation network outlet was accomplished via patch cords connected from the network switch to the corresponding outlet position on the patch panel. Terminations of the copper trunk cables from the MDF are accomplished via multiple type 66 terminal blocks with integral feet. Horizontal workstation cabling terminations supporting analog/voice communication use similar type 66 terminal blocks with cross-connect cabling to the trunk riser blocks for circuit activation.

Grounding of the MDF, IDF closets, and remote telecommunications equipment located throughout the building does not appear to exist.

The existing utility demarcation equipment appears to be in serviceable condition. However, it is not known what services are presently available and if there is capacity for future expansion.

The existing MDF does not appear to have sufficient space for future expansion and does not meet the sizing criteria as recommended by EIA/TIA/ANSI industry standards. Presently, additional utility equipment is located adjacent to the MDF closet in a separate enclosure due to the lack of space within the closet. The closet doors do not lock properly, allowing access by unauthorized personnel. In addition, many of the existing terminal blocks are in poor condition and many of the trunk riser terminations appear to be damaged. Also, the present cabling configuration will not support “Voice over Internet Protocol (VoIP)” communications should SI elect to incorporate this system in the future. Finally, the capacity of the existing copper trunk backbones may not be adequate to support proposed building reuse functions.

The fiber optic backbone appears to consist of 62.5/125 micron multimode fiber optic cables that are rated for 100 Mb Ethernet communications rates. In addition, many of the backbone cables are damaged at their point of origin in the data center due to removal of the former active components. Many of the existing wall-mounted termination cabinets are also damaged. Current industry trends have many new facilities incorporating fiber optic backbone cabling suitable for 10 Gigabit (Gb) Ethernet communication rates and are employing both single and multimode fiber optic cables to achieve these network speeds. The industry governing bodies, IEEE and EIA/TIA/ANSI, the active component manufacturers, and the
Cabling manufacturers have recently adopted the 10 Gb communication networks as the current standard for Ethernet communications. Once reuse of the existing building is identified, a decision can be made regarding what type of cabling backbone will be required to support the proposed building activities.

Workstation cabling consists of both analog/voice and network data cabling originating from the IDF (or ad-hoc IDF) and are rated for Category 3 (analog/voice) and Category 5/5e (data) communication rates. Most of these cables are in poor condition and have been abandoned in place. In many cases, the existing workstations have been removed and the work area outlets have been left on the floor. In addition, the Category 3 rated cables will not support VoIP communications and the Category 5/5e rated cables will not support network speeds beyond 100 Mb rates.

Similar to the MDF closet, each of the IDF closets do not meet the industry recommended best practices for sizing and locations. Most of the IDF closets are located within private offices and conference spaces, prohibiting access and limiting future expansion capabilities. Many of these rooms are also located within the administration areas that may be demolished for building reuse.

A dedicated telecommunications ground system does not exist as recommended by the industry standards. The lack of this system can allow for a ground voltage imbalance between the MDF and IDF closets to transmit over the communications cabling potentially causing cabling and equipment failure.
This section contains a series of exterior and interior photographs taken during field surveys. Please note that all pertinent images have been included in previous sections, and that the images contained herein are supplemental.
1: Exterior North Tower
2: Exterior North Tower
3: Exterior North Tower
4: Exterior North Tower
5: Exterior North Tower
6: Exterior North Tower
7: Exterior North Tower
8: Exterior North Tower
9: Exterior North Tower
10: Exterior North Tower
11: Exterior North Tower
12: Exterior North Tower
Existing Conditions Assessment

13: Exterior
North Tower

14: Exterior
North Tower

15: Exterior
North Tower

16: Exterior
North Tower

17: Exterior
North Tower

18: Exterior
North Tower

19: Exterior
North Tower

20: Exterior
North Tower

21: Exterior
East North Range

22: Exterior
East North Range

23: Exterior
East North Range

24: Exterior
East North Range

Additional Photographs and Drawings 2.11

08.31.2009
Historic Structure Report & Conditions Assessment

Smithsonian Institution Arts & Industries Building

25: Exterior
North East Pavilion

26: Exterior
North East Pavilion

27: Exterior
North East Pavilion

28: Exterior
North East Pavilion

29: Exterior
North East Pavilion

30: Exterior
North East Pavilion

31: Exterior
North East Range

32: Exterior
North East Range

33: Exterior
North East Range

34: Exterior
North East Range

35: Exterior
East Tower

36: Exterior
East Tower
Existing Conditions Assessment

37: Exterior
East Tower

38: Exterior
East Tower

39: Exterior
East Tower

40: Exterior
East Tower

41: Exterior
East Tower

42: Exterior
East Tower

43: Exterior
East Tower

44: Exterior
East Tower

45: Exterior
East Tower

46: Exterior
East Tower

47: Exterior
South East Range

48: Exterior
South East Range

Additional Photographs and Drawings 2.11

37

38

39

40

41

42

43

44

45

46

47

48
Existing Conditions Assessment

61: Exterior
East South Range

62: Exterior
East South Range

63: Exterior
South Tower

64: Exterior
South Tower

65: Exterior
South Tower

66: Exterior
South Tower

67: Exterior
South Tower

68: Exterior
South Tower

69: Exterior
South Tower

70: Exterior
South Tower

71: Exterior
South Tower

72: Exterior
South Tower

Additional Photographs and Drawings 2.11
Existing Conditions Assessment

85: Exterior
South West Pavilion

86: Exterior
South West Pavilion

87: Exterior
South West Pavilion

88: Exterior
South West Pavilion

89: Exterior
South West Pavilion

90: Exterior
South West Pavilion

91: Exterior
South West Range

92: Exterior
South West Range

93: Exterior
South West Range

94: Exterior
South West Range

95: Exterior
West Tower

96: Exterior
West Tower

Additional Photographs and Drawings 2.11

08.31.2009
Existing Conditions Assessment

109: Exterior
North West Range

110: Exterior
North West Range

111: Exterior
North West Pavilion

112: Exterior
North West Pavilion

113: Exterior
North West Pavilion

114: Exterior
North West Pavilion

115: Exterior
North West Pavilion

116: Exterior
North West Pavilion

117: Exterior
North West Pavilion

118: Exterior
North West Pavilion

119: Exterior
West North Range

120: Exterior
West North Range

Additional Photographs and Drawings 2.11

Historic Structure Report & Conditions Assessment
Smithsonian Institution Arts & Industries Building

08.31.2009
Existing Conditions Assessment

133: Exterior
East Hall

134: Exterior
East Hall

135: Exterior
South East Court

136: Exterior
South East Court

137: Exterior
South East Court

138: Exterior
South East Court

139: Exterior
South East Court

140: Exterior
South East Court

141: Exterior
South Hall

142: Exterior
South Hall

143: Exterior
South Hall

144: Exterior
South Hall

Additional Photographs and Drawings 2.11

08.31.2009
Existing Conditions Assessment

157: Exterior Rotunda
158: Exterior Rotunda
159: Exterior Rotunda
160: Exterior Rotunda
161: Exterior Rotunda
162: Exterior Rotunda
163: Exterior Rotunda
164: Exterior Rotunda
165: Exterior Rotunda
166: Exterior Rotunda
167: Exterior Rotunda
168: Exterior Rotunda
Existing Conditions Assessment

181: Interior  
North Tower- Third Floor

182: Interior  
North Tower- Third Floor

183: Interior  
North Tower- Third Floor

184: Interior  
North Tower- Third Floor

185: Interior  
North Tower- Third Floor

186: Interior  
North Tower- Third Floor

187: Interior  
East North Range- First Floor

188: Interior  
East North Range- First Floor

189: Interior  
East North Range- First Floor

190: Interior  
East North Range- First Floor

191: Interior  
East North Range- First Floor

192: Interior  
East North Range- First Floor
Existing Conditions Assessment

205: Interior
North East Pavilion- First Floor

206: Interior
North East Pavilion- First Floor

207: Interior
North East Pavilion- First Floor

208: Interior
North East Pavilion- First Floor

209: Interior
North East Pavilion- First Floor

210: Interior
North East Pavilion- First Floor

211: Interior
North East Pavilion- Second Floor

212: Interior
North East Pavilion- Second Floor

213: Interior
North East Pavilion- Second Floor

214: Interior
North East Pavilion- Third Floor

215: Interior
North East Pavilion- Third Floor

216: Interior
North East Pavilion- Third Floor
217: Interior
North East Pavilion- Third Floor
218: Interior
North East Pavilion- Third Floor
219: Interior
North East Pavilion- Third Floor
220: Interior
North East Pavilion- Third Floor
221: Interior
North East Pavilion- Third Floor
222: Interior
North East Pavilion- Third Floor
223: Interior
North East Annex- First Floor
224: Interior
North East Annex- First Floor
225: Interior
North East Annex- First Floor
226: Interior
North East Annex- Second Floor
227: Interior
North East Annex- Second Floor
228: Interior
North East Annex- Second Floor
Existing Conditions Assessment

229: Interior
North East Annex- Second Floor

230: Interior
North East Annex- Second Floor

231: Interior
North East Annex- Second Floor

232: Interior
North East Range- First Floor

233: Interior
North East Range- First Floor

234: Interior
North East Range- First Floor

235: Interior
North East Range- Second Floor

236: Interior
North East Range- Second Floor

237: Interior
North East Range- Second Floor

238: Interior
East Tower- First Floor

239: Interior
East Tower- First Floor

240: Interior
East Tower- First Floor

Additional Photographs and Drawings 2.11

229
230
231
232
233
234
235
236
237
238
239
240
Existing Conditions Assessment

253: Interior  
South East Range- Second  
Floor

254: Interior  
South East Range- Second  
Floor

255: Interior  
South East Range- Second  
Floor

256: Interior  
South East Pavilion- First Floor

257: Interior  
South East Pavilion- First Floor

258: Interior  
South East Pavilion- First Floor

259: Interior  
South East Pavilion- Second  
Floor

260: Interior  
South East Pavilion- Second  
Floor

261: Interior  
South East Pavilion- Second  
Floor

262: Interior  
South East Pavilion- Second  
Floor

263: Interior  
South East Pavilion- Second  
Floor

264: Interior  
South East Pavilion- Second  
Floor

Additional Photographs and Drawings 2.11
265: Interior
South East Pavilion- Third Floor

266: Interior
South East Pavilion- Third Floor

267: Interior
South East Pavilion- Third Floor

268: Interior
South East Pavilion- Third Floor

269: Interior
South East Pavilion- Third Floor

270: Interior
South East Pavilion- Third Floor

271: Interior
South East Pavilion- Third Floor

272: Interior
South East Pavilion- Third Floor

273: Interior
South East Annex- Second Floor

274: Interior
South East Annex- Second Floor

275: Interior
South East Annex- Second Floor

276: Interior
South East Annex- Second Floor
Existing Conditions Assessment

277: Interior
East South Range- First Floor

278: Interior
East South Range- First Floor

279: Interior
East South Range- First Floor

280: Interior
East South Range- Second Floor

281: Interior
East South Range- Second Floor

282: Interior
East South Range- Second Floor

283: Interior
South Tower- First Floor

284: Interior
South Tower- First Floor

285: Interior
South Tower- First Floor

286: Interior
South Tower- Second Floor

287: Interior
South Tower- Second Floor

288: Interior
South Tower- Second Floor

Additional Photographs and Drawings 2.11
Existing Conditions Assessment

301: Interior
South West Pavilion- Basement

302: Interior
South West Pavilion- Basement

303: Interior
South West Pavilion- Basement

304: Interior
South West Pavilion- Basement

305: Interior
South West Pavilion- Basement

306: Interior
South West Pavilion- Basement

307: Interior
South West Pavilion- Basement

308: Interior
South West Pavilion- Basement

309: Interior
South West Pavilion- Basement

310: Interior
South West Pavilion- First Floor

311: Interior
South West Pavilion- First Floor

312: Interior
South West Pavilion- First Floor

Additional Photographs and Drawings 2.11
Existing Conditions Assessment

325: Interior
South West Range- First Floor

326: Interior
South West Range- First Floor

327: Interior
South West Range- First Floor

328: Interior
South West Range- Second Floor

329: Interior
South West Range- Second Floor

330: Interior
South West Range- Second Floor

331: Interior
West Tower- First Floor

332: Interior
West Tower- First Floor

333: Interior
West Tower- First Floor

334: Interior
West Tower- First Floor

335: Interior
West Tower- First Floor

336: Interior
West Tower- First Floor

Additional Photographs and Drawings 2.11

325
326
327
328
329
330
331
332
333
334
335
336
Existing Conditions Assessment

349: Interior
North West Pavilion- Basement

350: Interior
North West Pavilion- Basement

351: Interior
North West Pavilion- Basement

352: Interior
North West Pavilion- Basement

353: Interior
North West Pavilion- Basement

354: Interior
North West Pavilion- Basement

355: Interior
North West Pavilion- First Floor

356: Interior
North West Pavilion- First Floor

357: Interior
North West Pavilion- First Floor

358: Interior
North West Pavilion- First Floor

359: Interior
North West Pavilion- First Floor

360: Interior
North West Pavilion- First Floor

Additional Photographs and Drawings 2.11

Historic Structure Report & Conditions Assessment
Smithsonian Institution Arts & Industries Building

08.31.2009
Existing Conditions Assessment

373: Interior
North West Annex - First Floor

374: Interior
North West Annex - First Floor

375: Interior
North West Annex - First Floor

376: Interior
North West Annex - Second Floor

377: Interior
West North Range - First Floor

378: Interior
West North Range - First Floor

379: Interior
West North Range - First Floor

380: Interior
West North Range - First Floor

381: Interior
West North Range - Second Floor

382: Interior
West North Range - Second Floor

383: Interior
West North Range - Second Floor

384: Interior
North Hall

Additional Photographs and Drawings 2.11
385: Interior
North Hall
386: Interior
North Hall
387: Interior
North Hall
388: Interior
North Hall
389: Interior
North Hall
390: Interior
North Hall
391: Interior
North Hall
392: Interior
North East Court- First Floor
393: Interior
North East Court- First Floor
394: Interior
North East Court- First Floor
395: Interior
North East Court- Second Floor
396: Interior
North East Court- Second Floor
Existing Conditions Assessment

397: Interior
North East Court- Second Floor

398: Interior
North East Court- Second Floor

399: Interior
East Hall

400: Interior
East Hall

401: Interior
East Hall

402: Interior
East Hall

403: Interior
East Hall

404: Interior
East Hall

405: Interior
East Hall

406: Interior
East Hall

407: Interior
East Hall

408: Interior
South East Court- First Floor
2.11 – 36

08.31.2009

Smithsonian Institution Arts & Industries Building

Historic Structure Report &
Conditions Assessment
Existing Conditions Assessment

421: Interior
South East Court- Third Floor

422: Interior
South East Court- Third Floor

423: Interior
South Hall

424: Interior
South Hall

425: Interior
South Hall

426: Interior
South Hall

427: Interior
South Hall

428: Interior
South Hall

429: Interior
South Hall

430: Interior
South Hall

431: Interior
South Hall

432: Interior
South West Court- First Floor
Existing Conditions Assessment

445: Interior
West Hall

446: Interior
West Hall

447: Interior
West Hall

448: Interior
West Hall

449: Interior
West Hall

450: Interior
West Hall

451: Interior
West Hall

452: Interior
West Hall

453: Interior
North West Court

454: Interior
North West Court

455: Interior
North West Court

456: Interior
North West Court

Additional Photographs and Drawings 2.11
Recommendations for Treatment
The future use of the Arts & Industries Building (AIB) should minimize changes to the building's historic character, as well as to the significant materials and features previously identified in this report. Treatment of the building is to be guided by the Smithsonian Directive 418 including Appendices A, B and C, the Secretary of Interior's Standards for Historic Properties, the Americans with Disability Act (ADA), and the International Building Code. Non-compliance with current codes should be addressed; however, because this is an historic building, alternatives to full code compliance are recommended where compliance would compromise the integrity of the historic building.

The recommended treatment for the AIB is a rehabilitation project. “Rehabilitation” is defined as “the act or process of making possible a compatible use for a property through repair, alterations, and additions while preserving those portions or features which convey its historical, cultural, or architectural values.” Of the four treatments listed under the Secretary of the Interior’s Standards — Preservation, Rehabilitation, Restoration, and Reconstruction — rehabilitation provides an opportunity to introduce an efficient, contemporary use through alterations and additions, including upgrades of systems, to comply with modern building, life safety, and accessibility codes and to meet future programmatic needs.

The guidelines for Rehabilitation recommend that historic building materials and character-defining features are protected and maintained as they are in the treatment Preservation. Repairs of materials should consider minimizing the degree of intervention; when limited replacement is necessary, in-kind or compatible substitutes that convey the visual appearance of the original material are recommended.

When the historic features are missing, the Rehabilitation guidelines recommend their replacement as the first course of action if they can be accurately recovered in form and detailing from historic documents and their reconstruction contributes to the understanding of the historic structure during the Period of Significance. If character-defining features are missing and they cannot be restored based on historic documentation, the design should be clearly differentiated so that a false appearance is not created.

All work needed to accommodate the new use, including accessibility and safety, should not radically change, obscure, or destroy character-defining spaces, features, materials, or finishes.

Although the entire project will be a Rehabilitation, for clarity, the recommended work is categorized in the following treatments:

1. Preservation — maintaining and repairing the building’s existing architecturally significant features and material from the Period of Significance;

2. Rehabilitation — work required to meet future programmatic needs, including building’s mechanical, electrical, plumbing, and communication systems and alterations to comply with modern building, life safety, and accessibility codes;
3. Restoration — re-establishing significant features that have lost their character or have been removed and are necessary for the understanding of the character of the building during the Period of Significance.

Work items in these categories are summarized below; a more detailed discussion for exterior and interior character-defining features follows.

**Preservation**

The first component of treatment, preservation would seek to retain all the existing significant features and materials dating to the Period of Significance, and to repair all those features that are necessary to secure the building and its contents against further deterioration:

- Preserve the massing and visual appearance of the exterior of the building; above-grade additions could only be considered only if designed and constructed to allow the understanding of the entire envelope and volume of the original building;
- Repair and repoint brick masonry; repointing mortar should match the original mortar composition and color;
- Repair sandstone at entrances and window sills;
- Repair cast stone medallions;
- Clean the stone and cast-stone ornaments;
- Repair the fountain or reconstruct if sufficient documentation becomes available for a more accurate replica;
- Repair cast iron stairs, including reconstruction of missing sections;
- Repair the existing gallery and balcony rails;
- Repair existing terrazzo and wood floors that date to the Period of Significance;
- Repair existing original exterior and interior load-bearing plaster walls, including the cementitious baseboard and horizontal bead at interior walls;
- Repair original plaster pilasters, including capitals;
- Repair exterior and interior doors dating from the Period of Significance, including upgrades of the hardware, and details at openings;
- Repair metal trusses and other structural elements including cast iron columns;
- Repair skylights at courts; use laminated glass, with a frosted appearance;
- Repair decorative metal features at the roof level;
- Repair and replaced corrugated sheet metal ceilings at locations where the deterioration of the material is beyond repair;
- Repair slate roofs at pavilions and towers, and replace slate roof at the sections over the four entrances with in-kind materials; and
- Repair Buberl statue.
Rehabilitation
The second component of treatment, rehabilitation, would seek to make improvements and/or alterations for the new use while minimizing loss of character-defining features. These would include building code upgrades, improvements in accessibility for the disabled, and replacement of building systems and equipment. Also, it would include replacement with appropriate contemporary technology of various features that are not historic and reconstruction of original features with historic materials or detailing is not technically or economically feasible:

- Remove the existing roof covering at the Rotunda, halls, courts, and ranges, inspect the condition of corrugated sheet metal ceilings, make repairs, and install appropriate new roof decking and covering; construct a flat-seam roof at ranges; construct new roofs at the Rotunda, halls, and courts visually compatible — texture and color — with the appearance of the roof during the Period of Significance;

- Replace all flashing at roofs; flashing material is to be compatible with the new roofing system;

- Replace built-in roof gutters and interior leaders at halls, courts, and ranges; match the original profile; improve the original design by introducing expansion joints;

- Remove all interior leaders and install new interior leaders at all public spaces but the Rotunda;

- Construct a new exterior drainage system at the Rotunda;

- Remove all windows and replace them with new insulated, energy-efficient windows; rot-resistant wood should be the first choice of material, but if not feasible, an appropriate material should be selected that would allow for replicating the sizes and profiles of the original window trim and sash; windows should include frosted/filtering glass at public spaces and clear glass at pavilions and towers; the colored glass at the large windows at the end of the halls should be preserved and installed in new sashes;

- Minimize water infiltration potential at window sills by constructing perimeter flashing; do not use sealant or adhesive for joints or repairs;

- Minimize intrusion into the significant historic fabric of any new mechanical, plumbing, electrical, and security systems; the new systems should comply with sustainable design principles;

- Minimize intrusion into the significant historic fabric of any required structural lateral support, seismic, and roof upgrades; any structural upgrades should not obscure, damage, or destroy character-defining features;

- Retrofit the railings at the galleries and balconies, as well as railings at all the cast iron stairs, except cast iron spiral stairs at the towers, to meet life safety requirements; minimize visual intrusion of these alterations;

- Any new stairs and elevators required to meet future programmatic needs should not obscure historic features or alter character-defining spaces; and
Construct new partitions at original public spaces to meet life safety requirements and allow for visual connection between halls, courts, and ranges (depending on the future use, see discussion under Section 4.4 Codes)

**Restoration**
The final component of this program for treatment of the AIB is restoration, which seeks to return the building to its historic appearance during the Period of Significance. Work would include:

- Restore the original single-space configuration of courts and ranges by removing all infill walls, floors and ceilings that are not historic and/or non-compatible with the Period of Significance;
- Restore the original openings of brick arches;
- Restore the missing brick pier along the west side of the North Hall;
- Reconstruct the original interior vestibule configuration at the north entrance or modify existing layout to allow for understanding of original design that included side rooms as part of the towers;
- Remove and salvage all existing stone tiles at halls and reset salvaged white, black, and red stone tiles in one hall in the original pattern;
- Replace the stone floor at three halls with white, black, and red stone tile matching the texture and the pattern of the original hall floor materials;
- Replace the black-set terrazzo pavement at the corner of the southwest gallery with new terrazzo to match the original texture and color or the original floor at the gallery and the adjacent surfaces;
- At pavilions and towers, in areas where existing wood strip floors cannot be repaired, construct new wood strip floors to match original floors;
- Reconstruct doors and stairs between the North Hall and the North Towers to match the original design and materials;
- Reconstruct the light stanchions at the railings along the hall galleries and the balconies at the Rotunda;
- Restore original (1881) decorative finishes;
- Restore original scoring on plaster walls in primary spaces; and
- Reinstall the “Freedom” statue in the Rotunda, a replica of it, or another decorative element of similar scale that would provide for spatial orientation.

**Exterior Recommendations**
The exterior of the AIB is one of the most significant and character-defining features. The existing exterior elements are either original or replicas from the 1970s and 1980s projects. The existing brick masonry, stone and cast stone ornaments, slate roofs, skylights at courts, metal ornaments (including the statuary), the door at the North West Pavilion, and windows at
the end of the halls should be retained and repaired. Other elements should be restored or replaced with elements that match the original design, material, color and texture as discussed below.

Site
The site was not part of the scope of this project. However, a successful rehabilitation of the AIB depends on measures taken in the immediate vicinity of the structure. Perimeter and site drainage should be constructed to minimize water infiltration at the foundations. The concrete sidewalks along parts of the building should be removed and small corrections of the grade should be undertaken simultaneously with the site drainage improvement project.

Vegetation should be kept trimmed within a minimum five feet from the building to allow for better ventilation along the wall and to minimize moisture in exterior walls. Original light fixtures at the north entrance should be reconstructed to match fixtures shown in historic photographs.

A site landscape evaluation should be undertaken and the landscape during the Period of Significance should be restored.

Massing
The massing of the AIB is one of its character-defining features and should not be altered by any above grade additions. The altered café addition that by 1901 extended 77’ along the exterior wall of the South East Range was removed during the 1980s restoration project. Although the café addition addressed a missing program element of the original design, it should not be reconstructed as it is detrimental to the understanding of the clear volume of the building, the symmetry, and the original decoration of the east façade. An addition could be constructed above grade only if would allow full understanding of the entire envelope and volume of the original building.

Masonry
The exterior original masonry walls are one of the most significant features of the building. The original openings were carefully designed not only to allow in natural light but also to carefully balance the composition and create rhythm along the brick masonry walls. The few openings cut into the walls around the turn of the 20th century were strictly functional and are detrimental to the understanding of the original design. These openings were infilled during the 1980s restoration and should not be reconstructed. No new openings should be cut into the masonry walls.

The exterior brick walls should be repointed (See Figure 1). Brick randomly cracked should be replaced. Cracked brick under windows should be monitored to identify the cause of the cracks. The chipped brick at the west entrance vestibule should be retained as a witness to the previous alterations to the building. This area is protected from direct rain and the exterior envelope performance would not be compromised by the deteriorated brick. The spalling units of granite along the south elevation should be maintained; the grading and drainage should be addressed to minimize splashing and moisture adjacent to the foundation. The foundations should be repointed. (See section 2.4.2 for additional technical recommendations.)
The stone sills at the windows should be preserved and repaired. Flashing should be installed at all sills to prevent moisture penetration into the masonry wall below. All sealant should be removed and replaced with mortar appropriate for sandstone work. The sills identified in the survey as severely cracked should be replaced. The cracked stone at the entrances should be repaired; the improper patch repairs should be addressed (See Figure 2). Depending on the degree of damage, repairs may include dutchman or composite patching.

Areas of sandstone displaying biological growth should be cleaned as some of the by-products of this growth (acids) lead to deterioration of the stone. The cast stone medallions on the south elevation, at the East South Range, should be repaired by patching them with a compatible material.

Roof
Metal roofs at the Rotunda, halls, courts, and ranges, as well as the entire drainage system, should be replaced. The replacement of the roof should not introduce changes in the form of the roof and the volume of the building. The batten roofs at the ranges should be replaced with flat-seam roofs as they were originally (See Figure 3); this construction is more appropriate for low slopes. At the halls and courts, the current standing seam construction is not historic and should not be replicated (See Figure 4 showing slate being replaced with batten seam roof). Slate roofs at these spaces were one of the flaws of the original design and the reconstruction of slate roofs is not recommended. High-performance materials should be selected for the new roofs. The selection of material should consider matching the color and visual texture of the roof during the Period of Significance.

The re-engineered new roof system should include new drainage and expansion joints to maintain a secure envelope. The new roofing system should take into account the performance requirements of the new mechanical system. The selection of the new system should be made with a full understanding of maintenance requirements.

The slate roofs at the pavilions and towers should be repaired. The slate roofs over the four
Recommendations for Treatment

entrances should be replaced with new slate roofs. The new slate should match the size and color of the original material.

Drainage
The current hanging gutters should be removed and the original configuration of the roof with built-in gutters and internal drains should be restored at the halls and courts. At the Rotunda, it remains unknown how the internal drains were run and the reconstruction of the original drainage system is not recommended.

Decorative Metal Features
Decorative metal features, including vents, acroteria, cornices, and finials should be retained, repaired, and refinished to match the original color, based on original finishes analysis (See Figure 5). The metal grilles at the windows should be retained. The ferrous metal upper section of the chimney should be repaired and refinished to prevent rusting (See Figure 6).

Windows, Monitors, and Skylights
The frames and the sashes of all the windows should be replaced. The historic colored glass at the decorative windows at the end of the halls should be salvaged and reset in the new sashes. The windows at the monitors should also be replaced. Replacement windows — frames and sashes — should match the form and profiles of the original design; rot-resistant wood should be the first choice of material, but if not feasible, an appropriate material should be selected that would allow for replicating the sizes and profiles of the original window trim and sash as shown on historic drawings, documentation from the 1980s replacement project, as well as the historic sash at the two remaining interior windows.

During the Period of Significance most windows had operable steel sashes to improve the ventilation (See Figure 7); reconstruction of these steel sashes is recommended only if they will be functional and used as part of the ventilation system devised for the entire building. The glazing of the windows and monitors should replicate the original frosted appearance at the public spaces and the clear appearance at the pavilions and towers. The original window operating mechanisms should be preserved in place.

The skylights over the courts should be retained, repaired, and retrofit to allow for installation of new laminated glass. None of the other skylights that existed during the Period of Significance survives. Because of the lack of information regarding the size, type, and exact location, their reconstruction at the ranges would be conjectural and it is not recommended.

Removal of all non-historic partitions and infill will restore the historic way natural light penetrated most of the exhibit spaces. The windows at the
Pavilions and towers should remain operable. The operability of the windows at the original public spaces, including the monitors, needs to be evaluated in relation to the future programmatic needs and the new mechanical system.

Awnings
Awnings were an important feature added at many of the windows during the Period of Significance. Each year, beginning with 1882, some awnings were installed while others were removed, and at no period in time did all windows feature them (See Figure 8). Historic photographs show that the awnings covered a large surface of the windows, blocking the view from the offices but offering the desired protection from heat and bright light in the summer. Their reconstruction would be partly conjectural as there is insufficient information — the color remains unknown, as well as the hanging and operating systems. However, if awnings are desired for reducing the mechanical load, additional research is recommended to determine the color of the awnings.

Interior Windows and Openings
Many of the interior openings and windows between the ranges and halls; the towers and the ranges; and the pavilions, the ranges, and annexes began to be infilled during the Period of Significance and the process continued until all were infilled. These openings and windows were significant features of the original design and contributed to the continuity of the space and allowed for observation of exhibits directly from offices (See Figure 9). However, exact identification of when each of the openings and windows was infilled is not possible from the existing documents. The openings between the halls and the ranges should be restored. At all other spaces, the reconstruction of the openings is desirable. Between office and public spaces (i.e. between pavilions and ranges) the functionality of the original windows should be considered and if the original windows should be reconstructed.

Exterior Doors
The doors at the original four main entrances are replicas of the original doors, but they do not match exactly the original design or the original material.
The current condition of the doors does not require that they be replaced. However, when the doors do require replacement, more accurate replicas should be constructed.

Toward the end of the Period of Significance, two of the main entrances were infilled (west in 1898 and south in 1901), in an effort to provide additional space. Also, the north and east entrances displayed storm doors. These alterations are detrimental to the understanding of the original significant composition and organization of spaces and distract from the reading of the original entrances, which were meant to be welcoming and give the visitors a sense of openness.

The only original exterior door, located at the North West Pavilion, should be retained and repaired and refinished. The glazing should be replaced with safety glass (See Figure 10). New stairs and railing at this door should be constructed complying with current building codes.

Statuary
The statuary group should be retained and refinished. Paint analysis should be undertaken to determine the original color.

Signage
The stone decorative inscriptions should be preserved and cleaned. No other treatments are recommended for the decorative stone panels.

New wayfinding should be introduced based on the program and it should not detract from the historic character of the building.

Exterior Finishes
The color scheme during the Period of Significance should be replicated for all exterior surfaces to be painted. This should include gilding of the finials as identified during the 1980s roof replacement project. Additional paint analysis should be undertaken at existing original metal ornaments, including metal cornices. If any of the original acroteria, vents, or other metal ornaments replaced during the 1980s project survive, samples should be taken and analyzed.

Interior Recommendations
Spatial Organization
Some of the large open interior spaces were inappropriately subdivided by inserting a full second floor and, in some cases, a third floor. At five of the ranges and two of the courts, the original galleries should be retained, but the second floor infill should be removed (see recommendations for “Galleries” for treatment of the galleries to be retained). Infilling the large arched openings between the public spaces further changed the historic appearance, compromising their size and proportion. All these non-historic additions should be removed. This will restore the original
openness of the interior and will render visible many of the original character-defining features now hidden behind non-historic material (See Figure 11).

The original layout of the interior vestibule at the north entrance should be restored and the adjacent spaces now part of the vestibule should be returned to the towers. If for functional reasons this is not preferable, the existing vestibule should be modified to allow for understanding of the original design.

Circulation
The original circulation pattern should be restored by reopening circulation between halls, courts, and ranges. The vertical circulation at the towers and pavilions should be preserved. New circulation nodes should be introduced based on the selected use and care should be taken not to obscure, alter, or damage character-defining features.

Floors
The marble floors in the halls should be disassembled and reset to match the original pattern. Many of the red, white, and black stone tiles are broken or stained and should be replaced. The slate tiles covering the utility trenches that are in poor condition should be replaced; new slate tiles should be reinstalled in areas where they have been replaced with metal panels. New stone tiles should match the color and texture of the original ones.

The ceramic and encaustic floor at the Rotunda and the exterior vestibules at the south and west entrances are 1970s replicas and should be repaired. If additional information will be uncovered that would provide a better source for the original floor design, including color and pattern, the current floor should be replaced with a more accurate replica.

A ceramic encaustic tile floor should be reconstructed at the north vestibule, replacing the existing marble floor (See Diagrams of floor materials between 1896 and 1902 in Section 1.2). It appears that the 1970s floors used a simulated Minton tile; an accurate encaustic tile in composition and color should be used for the reconstruction (See Figures 12 and 13, note different color contrast and pattern).

The terrazzo floors at the galleries should be repaired. At the balconies along the end of the halls, the floor material during the Period of Significance was wood. The intention of the original design was to create a fireproof building, and the initial choice of wood was mainly due to attempts to minimize cost. Replacement of wood floors with other materials began soon after construction, initially in the halls, with marble, slate, and colored concrete, and continued with concrete and terrazzo until all the wood in the public spaces was replaced. During the Period of Significance, there was the intent to replace the wood floors but it was
not entirely materialized. The existing terrazzo floors at the
galleries should be preserved and repaired; reconstruction
of wood floors at any of the original public spaces is not
recommended.

In the courts and ranges, the wood floors also
were gradually replaced with concrete and
terrazzo floors. Non-historic materials, including
vinyl composite tile, carpet, and ceramic tiles at
bathrooms should be removed; care should be
exercised to uncover the historic surfaces without
additional damage. At locations where the historic
materials have survived, they should be retained
and repaired or, if damaged beyond repair, replaced
with in-kind materials. Some of the wood floors at
the ranges were replaced only after the Period of
Significance; they should not be reconstructed.

Non-historic floor materials at the pavilions and
towers should be removed. The mosaic floor in the
North West Pavilion should be preserved. Wood strip
floors uncovered should be retained and repaired to
the extent possible. New wood floors matching the
material and the size of the strips of the original floors
should be constructed in the pavilions and towers
where historic floors were removed or existing ones
are damaged beyond repair.

Walls
All the original interior brick masonry piers and walls
should be preserved. The missing pier on the west
side of the North Hall should be reconstructed (See
Figure 14). The plaster should be repaired at load-
bearing walls throughout the interior. The horizontal
bead profile at the walls in the public spaces should
be repaired. The chipped or broken plaster capitals
should be repaired.

All non-historic partition walls and infill — including
gypsum block, brick, concrete masonry block, and
gypsum board on wood-studs — should be removed
at the public spaces to restore the unity of each space
and the continuity and openness of the original exhibit
area. However, if there are spaces where historic
photographs show that the partitions were already in
place by 1902, (e.g. the wall between the North West
Court and the West North Range was already infilled)
they should remain (See Figure 15).
At the pavilions, the load-bearing walls should be retained, repaired, and refinished.

Ceilings
At the public spaces, the original plaster ceilings began failing soon after construction and were replaced with corrugated sheet metal panels. The replacement began in 1882 and stretched over several years; the last to be replaced was the ceiling in the Rotunda (1922–1923). The replacement of the plaster ceilings resulted from the shortcomings of the original design and reconstruction of this failing system is not recommended. Most of the historic panels still exist in the Rotunda, halls and some of the courts. Deteriorated sheet metal panels should be replaced with new panels that match size and profiles of the existing ones; lead paint should be abated from salvaged panels in spaces where this has not been done already. Work should be coordinated with the replacement of the roof.

All the non-historic acoustic tile ceilings should be removed so the original height of the spaces is restored. All the pilasters and arches should be exposed as originally intended.

At the pavilions and towers, the vaulted plaster ceilings should be retained exposed as originally designed (See Figure 16). They should be repaired and refinished. None of the original third floor ceilings remain (See Figure 17), as they were replaced during the 1980s roof restoration project. The metal ties are the only historic fabric remaining and they should be retained. Interior Doors
The doors now located at the infilled arches at halls, courts, and ranges are not historic and they should all be removed when the infill partitions are removed.

Some doors at the pavilions and towers appear historic; however, it remains unclear how many are original and how many are replicas. Historic doors at the original load-bearing walls at the first and second floors of the pavilions as well as those at the towers should be retained and repaired or restored. The replica doors at original openings should also be retained, repaired if needed, and refinished. The replica doors should be refinished to allow for differentiation between historic doors and replicas. The original doors should be refinished with a lacquer finish as originally specified. No false uniform appearance of all doors should be recreated, as historically there appears to have been several types of doors. A paint analysis should be commissioned to confirm which are the historic doors and to document the paint scheme during the Period of Significance. The acorn detail at the door openings should be repaired. The operability of the door transoms should be restored.
Galleries
The original balconies in the Rotunda and halls as well as the side galleries at the halls constructed during the Period of Significance should be retained and preserved. Railings at the hall galleries date from the Period of Significance and should be retained and repaired (See diagram of galleries and railings at halls). This would involve repairs to insure lateral stability of the posts, repairs of the broken sections, reconstruction of the missing wood handrails, refinishing of all wood hand rails, and new finishes for the metal rails. The missing cast iron caps at the posts should be reinstalled. Some of the existing cast iron post caps at the hall railings should be salvaged when the light fixtures are reconstructed (see Light Fixtures section below) and should be used for the Rotunda balconies. A new guard rail should be designed and constructed to be compatible with the existing assembly and meet the existing building codes. The original Cluss railings should not be reconstructed.

At several galleries at the courts and ranges, the structural framing survives within later additions and should be restored after the non-historic additions are removed. These galleries include: South East Court, South West Court, East South Range, West South Range, South West Range and North West Range. There were no galleries at the North East Range and East North Range during the Period of Significance. The galleries at the North East and the North West Courts were removed when new full second floors were added; they should be reconstructed. The design should match the historic appearance. These two courts had railings identical to the ones in the halls, less the light stanchions. The existing “Union Jack” railings that the Smithsonian Institution has in storage are likely from the North East and North West Courts and should be reinstalled. However, a guard rail should be added to meet code requirements (See diagram of galleries and railings at courts). The South East and South West courts never had the same type of railings. Historic photographs show that these courts had wood case railings, with a glass parapet. The design of the new railings should be compatible with the proportions and character of the original railings. The design of the new railings should avoid creating a false sense of unity of design.

Aside from a section of a “Union Jack” rail that is located at the South West Range — not original but likely reused from a different location — none of the early 1900s railings at the ranges survives. An identical replica of the existing railing at the hall galleries is not recommended since none of the historic photographs shows the same type railings as existing at the halls, but rather case railings (See diagram of galleries and railings at ranges). No documentation has been identified for the original railing at two of the ranges — West North and North West. If no information is located regarding the original design, a new design should be provided that would not create a false history.

The second floor of the South East Range should be retained as it dates to the Period of Significance.

All the wall infill should be removed to recreate the openness and visual continuity of the space.

Diagram of galleries and railings at halls
North East Court from 2nd floor, 1900’s  
(SIA Neg. No. 2002-12155)

Note: NE & NW courts had Union Jack metal railings

North West Court from 1st floor, c.1914  
(SIA Neg. No. mah-28077)

South East court from 2nd floor, 1900’s  
(SIA Neg. No. 2002-12210)

Note: SE & SW courts had panel case railings with glass above

South West court from 1st floor, 1920’s  
(SIA Neg. No. mah-28515)

GALLERY FLOOR PLAN

Diagram of galleries and railings at courts
Diagram of galleries and railings at ranges
Stairs
Cast iron stairs are character-defining features original to the building and should be retained and repaired. Missing sections should be reconstructed to match the original design and materials. The configuration of the stair between the first and second floors on the east side of the north tower should be restored. Railings at all cast iron stairs should be retrofitted to meet life-safety requirements, as they do not meet code requirements for height and spacing (See Figure 18). It is recommended that the new design is compatible with the historic railings. Additional stairs should be constructed at the pavilions to meet egress requirements for the second and third floors.

The spiral cast iron stairs leading to the third floor of the towers are very significant features however they do not meet the code (See Figure 19). A code compliance variance would be required; in addition, the use should be restricted and appropriate signage installed. Several of the spiral stairs need wall anchoring upgrades.

Non-historic stairs at the courts should be removed and new stairs should be reconstructed to meet future programmatic needs.

Elevators
The current elevators should be removed and new elevators should be constructed according to future programmatic needs. New elevators should not be located in the most significant public spaces — the Rotunda and halls — and they should be designed in a way that minimizes the need for alterations to the existing historic fabric.

Interior Finishes
The interior finishes at the primary spaces — the Rotunda and halls — should be restored to the Period of Significance (See Figure 20). This involves restoring the original decorative scheme, including areas that were not restored during the 1970s project, as identified in the 2001 Original Interior Finishes study. Additional paint analysis will be required to identify the paint scheme of the later painting campaigns. The 2001 Original Interior Finishes report notes that part of the problem of paint peeling is a result of the types of paint used. The original distemper paints tend to release from the plaster substrate when painted over with oil paints. This might result in future failure of the paint; however, this cannot be mitigated by removal of the oil paints, a treatment too intrusive to comply with The Secretary of the Interior Standards of Treatment of Historic Properties.

At the primary spaces, the original colors of the plaster walls surfaces, pilasters, shafts, capitals, wainscot, and ceilings varied, with accented colors used to emphasize architectural features. Originally the pigments were included in the finish plaster coat. Removal of all
Subsequent layers of paint is not recommended. The new finishes should be selected to match the original color scheme and the matte, textured appearance of plaster surfaces during the Period of Significance. The scoring of the plaster should be replicated to recreate the impression of stone blocks (See Figure 21).

Interior lighting
The first choice would be to replicate the historic pendant light fixtures in the halls, courts, and ranges as seen in the historic photographs around 1900 (Figures 22 and 23). However, these fixtures alone would not meet the required levels of light. New light fixtures should be distinct and avoid any false interpretation of history. The stanchion lights at every other post of the gallery railing in the halls, except the North Hall, and at the balcony railings in the Rotunda should also be replicated from historic photographs (See Figures 20 and 22). No historic photographs have been located to identify the type of light fixtures used beneath the galleries during the Period of Significance and, unless documentation is found, the selection of new light fixtures should be modern not to create a false sense of history.

Reconstruction of light fixtures at the pavilions and towers is not recommended as historic photographs show many type of fixtures, some electric while others still powered by gas.

Fountain and Statuary
The fountain basin is a replica dating to the 1970s restoration project. The profile of the basin is not an exact replica of the original profile; if more exact documentation is located, it should be reconstructed to match the original.

The “Freedom” statue should be reinstalled. If the Smithsonian Institution cannot acquire the original plaster model of the statue currently on display at the Capitol Visitor Center, a replica should be installed in the Rotunda or a decorative piece of similar scale that would serve to give scale and adorn the space as well as orient the visitors in a similar way as “Freedom” did.

Library
The wood cases of the library in the North West Annex are replicas of the original ones. They appear to be accurate and should be retained.

Structural System
The following is a summary of recommendations provided in the building structure report:

- A detailed future assessment of the North West Court trusses including evaluation of connections at the most heavily corroded areas;
- Mitigation of non-structural hazards, especially those items that could affect exit or egress from the building;
- A comprehensive roof analysis including all primary elements of the roof system, secondary framing members, connections, and a full snow load analysis modeling drift for all areas of the roof, especially drifts adjacent to the Rotunda;
- Additional coupon testing on the wrought iron and steel materials comprising the roof; and
- Additional seismic analyses considering the future use scenarios and the compatibility of seismic upgrades with the proposed configuration of the building spaces.

Additional recommendations are included in section 2.4.1 and are not restated here as they need to be understood in the context of the analysis in that section.

Structural Masonry and Roof Deck
Foundation
- Perform an investigation to determine the condition and configuration of the foundation walls and assess the causes of foundation wall leakage.

Effective and durable waterproofing repairs will likely require installation of a foundation wall waterproofing membrane.

- Review grounds-keeping operations. Modify, if appropriate, to avoid exposing the masonry to deicing salts.
- Review roof drainage and surface drainage. Modify drainage provisions to avoid run off over masonry and ponding water along the foundation wall.
- Remove damaged and exfoliated portions of the granite masonry plinth. Repoint granite mortar joints.
- Replace basement doors and the entrance to the basement on the south elevation.

Brick Masonry
- Perform an investigation and analysis to determine the causes of step cracking, displaced soldier courses above the segmental arches, and similar masonry distress and displacement. Develop and implement a program of structural repairs that addresses the causes of this distress.
- Document the exterior masonry to determine the extent of pointing required. Perform mortar analysis on representative existing mortar to determine its material properties. Develop a replacement mortar specification based on material properties, configuration, and appearance of the existing mortar joints. Perform a materials analysis to identify the black coating on brick
masonry. Perform a review and analysis to locate appropriate replacements for red brick, blue glazed brick, and black coating.

- Develop a procedure to remove existing mortar without damaging the brick. Repoint portions of the buildings where missing or deeply eroded mortar joints exist. Repoint masonry at the perimeter of the Rotunda. Alternatively, consider repointing all brick masonry to achieve a uniform appearance and mortar durability.

- Perform a survey to document the extent of damaged brick masonry. Damaged masonry includes spalled, saw-cut, and cracked bricks.

- Reconstruct badly damaged masonry with replacement bricks. Replacement bricks should match existing brick masonry in size, shape, color, and texture. Replace individual crazed and spalled blue-glazed brick masonry. Replace individual spalled and cracked buff brick masonry. Replace damaged masonry at the west entrance to the AIB.

- Replace damaged black bricks in the decorative bands at the perimeter of masonry.

- Reconstruct roofs — including roof gutters and downleaders — that contribute to the deterioration of the masonry. (See recommendations below.)

- Clean masonry of algae, dirt, and miscellaneous stains at the conclusion of the work.

Sandstone
- Document the sandstone sills. Note the location and size of spalls, cracks, and delaminations in the sandstone window sills.

- Replace or repair the sandstone sill based on the size and type of damage as noted below:
  - Full Stone Replacement: Replace the sandstone sill. This approach is appropriate for severely deteriorated individual stone, with damage to 1/3 or 1/2 of the sill.
  - Dutchman Repairs: Replace the deteriorated portion of the stone with a carved partial replacement fabricated from matching stone and fastened to the remaining stone. This approach is appropriate to address larger spalls and cracks.
  - Mortar Patch Repairs: Remove and replace the deteriorated portion of the stone with restoration mortar that matches the stone in shape, color, texture, and the permeability of the existing stone. This approach is appropriate for small spalls.

- Sound and document sandstone patches at the entrances to the AIB and other miscellaneous locations. Remove and replace delaminated patches.

- Remove sealant at the perimeter of the sandstone sills and at the head joint between sandstone sills. Replace sealant with mortar.
Recommendations for Treatment

- Remove the coating on the sandstone at the perimeter of the Rotunda.

Medallions
- Perform a survey to document the location and configuration of spalled medallions. Develop a repair approach.
- Repair spalled medallions using materials that match the texture, color, and vapor permeability of the original material.

Flashing
- Develop a repair strategy that addresses window deterioration and water leakage at window perimeters. Implement window repairs and window perimeter waterproofing repairs, including installation of window perimeter flashing.

Metal Roofing
- Develop a roof replacement strategy that addresses the deteriorated deck and ceiling assembly, roof leakage, defective perimeter conditions, and roof drainage. Consider other demands on the roof assembly, such as interior humidity that may be introduced by a future AIB program. Select a roof assembly that is appropriate for the roof slope and configuration.
- Remove metal roof assemblies including the roof deck. Reconstruct roofs. The roof replacement must address the deteriorated deck and ceiling assembly, roof leakage, defective perimeter conditions, and roof drainage.

Mechanical System
Criteria for a new mechanical system are included in Section 4.3 Building Systems Scenarios. A new system should be designed to minimize alterations of the historic structure, particularly intrusions into the primary spaces.

Electrical and IT Systems
As the use of the building has not been defined, this section includes a comparison of existing conditions with current code, standards and best practices.

Site Power
The existing 13.2kV electric services feeding the AIB meet current code and design standards and provide sufficient power capacity to meet existing and future power demands. The existing system operates at the highest voltage level recommended for an "owner operated and maintained" campus distribution network, providing redundancy and efficiency by utilizing multiple 13.2kV underground feeders. In addition, the network, originating from the National Museum of Natural History (NMNH) switchgear, is considered a “primary service” and is billed by PEPCO, the local utility company, at a lower billing rate.

Main Electric Service
The existing service transformers (2250kVA @480/277V and 2250kVA @208/120V) have sufficient kVA capacity to meet future power demands of all renovation scenarios. However, a more efficient interior power distribution system can be realized with new service transformers appropriately sized and located in the main electric room (first floor, North West Court).
Also, note that the load on the existing 208/120V service transformers will be reduced, since the majority of lighting loads can now operate at 277V in lieu of 120V. In addition, new transformers are required to meet the latest Department of Energy (DOE) energy efficiency requirements, which will result in lower operating costs.

The optimum distribution system would consist of replacing the existing three 480/277V and three 208/120V service transformers with three new 480/277V service transformers, networked to a common bus for redundancy. From new 480/277V switchgear, distribute 480/277V feeders to satellite electric rooms within each quadrant of the building. A satellite electric room will be provided on each floor and vertically stacked. Each room should house lighting, power, and appliance panels to serve the respective floor. A 480-208/120V, step down transformer will be provided on each floor to serve the 208/120V appliance panels.

Normal Power Distribution

The existing power distribution system should be removed in its entirety under all renovation scenarios. New material and methods meeting current codes and best practices are as follows:

Lighting and appliance panelboards shall be dead front type, hinged door and cover (door-in-door) with bolt-on circuit breakers. Panelboard mains shall be main circuit breaker. Bus bars shall be copper. Each panel shall be provided with a minimum capacity of 20% spare circuit breakers.

All panelboards shall be surface mounted and installed in dedicated electrical rooms accessible only to qualified personnel, except for main telecommunications and mechanical rooms where dedicated for their specific equipment.

Panels shall be strategically located for efficient distribution and to limit total voltage drop on feeders and branch circuits to 5%.

Voltages will be used as follows:

- 480 volts, 3-phase to all motors 3/4 horsepower and larger
- 277 volts, single-phase to all fluorescent and H.I.D. lighting fixtures
- 120 volts, single-phase to all motors smaller than 3/4 horsepower
- 120 volts, single-phase to all general and computer receptacle outlets.
- 120 volts single-phase, 208 volts single-phase, or 208 volts three-phase to specific use, "solid connection".

Capacitors and Harmonic Trap Filters: Power factor correction capacitors will be provided by Division 15 for all motors larger than 15HP. Variable Frequency drives shall be provided with line reactors or broadband filters to limit the total harmonic distortion (THD) in accordance with IEEE 519, 1992.
All feeders and branch circuit wiring shall be copper conductors and color-coded to identify phase and neutral of each voltage system. Minimum wire size shall be #12 AWG. Conductors sized #10 AWG and smaller shall be solid copper conductors.

An equipment ground conductor sized in accordance with the NEC, will be installed with all feeder and branch circuits.

All branch wiring shall be concealed where possible. EMT conduit shall be provided for all exposed normal and emergency branch circuits located below 12’ above finished floor. Concealed wiring above ceilings and within hollow dry wall partitions may be (MC) Metal Clad Cable with an insulated ground conductor.

Multi-wire branch circuit homeruns (shared neutrals) will not be allowed. All lighting, appliance, computer and equipment branch circuits shall have dedicated neutral conductors.

Minimum conduit size shall be ½”. All wiring devices shall be specification/commercial grade.

Emergency Power Distribution
As described in Section 2.6 Electrical Systems, the capacity of the existing generator (150kW) may meet the emergency egress lighting and fire pump requirements for all of the renovation scenarios; however, the generator is approximately 16 years old and is located in a confined space. Future design considerations would be to relocate the existing unit and fuel storage tank to a more accessible location or replace the unit with a new larger unit at a new location.

A new emergency power distribution system will need to be provided in accordance with NFPA 110 and the NEC. The fire pump should be provided with a separate circuit breaker, directly connected to the generator bus feeding an ATS, integral to the fire pump controller. The generator would serve a new main distribution panel that would feed “life safety” and “optional emergency” transfer switches and associated panels, strategically located throughout the building.

Information Technology (IT) Systems
Under the potential reuse of the existing building, it is recommended that the SI consider the following industry standards, current trends, and best practices for the incorporation of the future cabling infrastructure:

- Dedicated room for the utility demarcation equipment and MDF; room shall be dedicated, have fire-rated plywood on all walls, have a dedicated HVAC system, and be secure;

- Dedicated IDF rooms preliminarily sized at 120 square feet and located in accordance with the recommendations of EIA/TIA/ANSI to limit the distances of the copper horizontal workstation cables; similar to MDF room, with fire-rated plywood on all walls, dedicated HVAC systems, and secure doors;

- Backbone and workstation cabling terminations shall occur within floor-mounted relay racks as opposed to wall mounted equipment in order to maximize density of cabling infrastructure; wire managers shall be incorporated to maintain cable organization throughout the racks;
• Fiber optic backbone rated for 10 Gigabit communication rates sized for present network needs, potential migration to VoIP and future communications system growth;

• Fiber optic terminations shall be in accordance with industry standards using either LC or SC termination types in accordance with current SI standards; terminations shall occur in rack- or wall-mounted cabinets as required to suit installation;

• Copper backbone cables rated for Category 3 communications to support analog/voice communications, as well as video conferencing access provider services as determined under future building reuse;

• Copper trunk riser terminations shall use rack-mounted patch panels in lieu of terminal blocks to expedite workstation outlet activation via patch cords for future Moves/Adds/Changes (MACs);

• Workstation cabling standard consisting of multiple dedicated Unshielded Twisted Pair (UTP) cables rated for Category 6 communications supporting network speeds up to 1 Gigabit to the desk;

• Workstation cable terminations shall use rack-mounted patch panels suitable for Category 6 communications;

• Dedicated grounding system to ensure network integrity; and

• Creation/expansion of the existing SI labeling scheme for identification of the cabling infrastructure system.

Plumbing System
All plumbing systems in the AIB should be completely removed and replaced with new with the exception of the incoming domestic water service, backflow preventers, and booster pump.

The plumbing to be removed includes domestic cold and hot water systems, sanitary waste and vent systems, and storm water rain leaders. Equipment to be removed includes electric water heaters, sump pumps, and sewage ejectors. All plumbing fixtures and floor drains shall be removed including all piping above the basement floor slab. Piping below the basement floor slab shall not be used and shall be either abandoned or replaced with new as required.

All new design shall incorporate the following: LEED shall be incorporated into the design. Plumbing fixtures should maximize water conservation. The use of low water consumption water saver water closets and urinals should be utilized. Water closets with 1.28 gpf and urinals with .125 gpf are available. Lavatory faucets should be provided with 0.5 gpm aerators to limit water consumption. Wall-mounted water closets and urinals are recommended for cleanliness. Rainwater harvesting from roof drainage could be utilized to provide irrigation for the site.

Domestic water should be provided with point-of-use water heaters to eliminate the need for recirculation piping routed through the building.
Life Safety and Fire Protection Systems
A more detailed discussion of the Life Safety and Building Codes is found in Section 4.0 Opportunities and Limitations.

Comparison of Existing Conditions with Current Applicable Code Requirements and Best Practices with the Following:

Egress / Code
Based upon its intended use, the AIB exceeds the height/area limits of current prescriptive building codes. The International Existing Building Code would not require this existing noncompliance to be remedied unless the building’s occupancy type was changed or an addition was constructed. However, SI OSHEM Design guidance requires this issue be mitigated in some way. Typically, this condition is addressed by increasing the existing construction type (applying spray-applied fireproofing, mastic coatings, or gypsum enclosures to building structural steel) or building firewalls to create independent buildings. A third option is to include this risk into a performance-based life safety assessment. Such an assessment could include those life safety features that are above and beyond prescriptive code requirements.

There are numerous areas with exit arrangements that do not meet prescriptive code requirements found in the LSC. Such deficiencies include:

- The southwest basement has a single exit stair resulting in an excessive common path of travel. Northwest and northeast basements have a single exit stair. Such spaces should be designed for a low occupant load and with a use acceptable to OSHEM (LSC Table A7.6).

- The first floor occupant load exceeds the exit capacity. This condition should be addressed in a future performance-based analysis (LSC Table A7.6).

- All second floor exits discharge to the first floor. The LSC and IBC each require that at least 50% of exits discharge to the exterior or through rated exit passageways (LSC 7.7.2).

- If the building is used for exhibitions, the second floor occupant load will exceed egress capacity.

- The pavilion stairs are too narrow. The 30” width does not meet the LSC requirement of 36” minimum width for existing stairs. (LSC Table 7.2.2.2.1.1(b))

- Pavilion stairs have winders that do not meet minimum tread depth requirements for existing stairs (LSC 7.2.2.2.1).

- The third floor computer room and pavilion areas require a second means of egress or a modified single exit (LSC 38.2.4).

The halls communicate to the first and second levels floors. Per SI Design Guidelines, such vertical communication must meet the Life Safety Code requirements. In many spaces, there is inadequate separation of the first and second floor. Either:
• Remove the second level;
• Modify the second level so it meets the requirements and definition of a mezzanine. Such a modification would include a reduction in area to 1/3 of the room onto which it opens (LSC 8.6.9);
• Modify the space to meet the eight requirements for a “Communicating Space” (LSC 8.6.6). This would entail providing self-closers or automatic hold-open devices activated by the fire alarm system on all doors that open onto the second floor balconies and securing closed the operable windows at the end of the halls; or
• Modify the space to be an Atrium (LSC 8.6.7). This would allow the stories to be open to each other but will require a smoke control system. Such a system may be minimal based on the large volume of space above the halls.

Combustible construction (plywood without FR treatment) is visible in the northeast mechanical room. Combustible construction should be removed when the building is renovated. Construction materials must be noncombustible or those specific combustible items permitted in Section 603 of the International Building Code.

Fire Protection Suppression Systems
Any major construction activity will require extensive sprinkler system modification. The existing service will suffice for reuse, however, a redundant water supply is suggested. A redundant supply, including a 100% backup booster pump, may be warranted once the nature of any modification is known.

Many existing sprinkler heads are 35 years into their maximum 50-year lifespan and should be replaced as part of any major improvement. Existing piping may be investigated for corrosion during a future design process for the possibility of remaining in place.

While not a code deficiency, the building is divided by numerous sprinkler zones. At least 25 control valves are visible on the first floor. Numerous valves make the system difficult to maintain.

There are numerous locations where ceiling tiles have been removed. These ceiling tiles are necessary for proper sprinkler activation and should be replaced.

Fire Detection and Alarm Systems
The fire detection and alarm system is at the end of its useful life. The system offers little or no flexibility for modifications. There is little or no capacity to add the numerous visible notification appliances required for a major construction improvement. The system should be replaced. It may be possible to salvage the hall beam detectors and beam detector panel.

There are numerous locations where ceiling tiles have been removed. These ceiling tiles are necessary for proper smoke detection actuation and should be replaced.

Security Systems
The extent of the security infrastructure, improvements, and systems to be installed as part the rehabilitation of the AIB will be defined by the Office of Protection Services’ (OPS) current standard for security system design in SI buildings (Smithsonian Institution Security Design Criteria) and an accompanying matrix that assigns specific security
requirements for every use of space. The security design criteria define requirements for OPS facilities such as (but not limited to): control rooms, unit control rooms, equipment rooms, etc. Acceptable and unacceptable adjacencies are also described, as well as requirements for new construction, existing buildings, and substantial renovations. The design criteria affect numerous disciplines in addition to the security consultant, including, but not limited to the architectural design team and structural, mechanical, and electrical engineers.

While many of the security design criteria do not apply to existing buildings, and a lower standard is often applied to existing buildings with substantial renovations as compared to new construction, every reasonable effort must be made to conform to the highest standards achievable, due to the significance of the AIB in the history of the Smithsonian Institution. There does not appear to be any exemption in the security design criteria for work in historic buildings beyond the exemption for existing buildings. In reality, it might not be possible to comply fully with every requirement of the security design criteria due to historic fabric issues. Examples of this include the required door contacts and hard-wired building alarm components: door contacts may cause damage to historical doors and conduit for hard-wired alarm components may be exposed and visually unacceptable in more significant historic spaces.

In addition, requirements such as a secure perimeter with at least one form of redundant protection and the security of windows from intrusion and from terrorist attacks may adversely affect other non-security-related design issues or requirements. It is recommended that design criteria-consistent glazing be provided that is resistant to bomb blast and attack by a burglar. Such windows will have some aesthetic impact on the exterior, and in most applications, would be inoperable, affecting sustainability concerns and natural ventilation. Therefore, the security system designer and others on the design team, with the consultation of OPS, should make every effort possible to achieve similar ends using alternative means. The comprehensive nature of the security design criteria document makes participation in its application the responsibility of every member of the design team.

It is recommended that the security infrastructure allow for adaptation to all reasonably-anticipated future uses of the building because it is necessary to provide for worst case scenarios in security control rooms, equipment rooms, security control panels, etc. This can be achieved by overdesigning security infrastructure where required. This is routinely done in museum projects. For example, changing exhibit areas are deliberately overdesigned to accommodate all eventual configurations. The added cost of providing the added security infrastructure to a project of this magnitude would be minimal. The most appropriate areas to overdesign with regard to security are interior public spaces and any space with significant historic fabric whether public space or non-public space.

Application
The following are recommended application requirements. Not every detail is addressed due to the specificity and definitive nature of the security design criteria.
The Smithsonian Institution has embraced Crime Prevention Through Environmental Design (CPTED) principles with which the design team must be familiar. Although CPTED concepts are intended more for new construction than for rehabilitation projects, careful attention should be paid to the “Infrastructures and Lifelines” portion of it. By eliminating single point vulnerabilities the risk that critical services will be disrupted intentionally or unintentionally can be reduced. If power, gas, water, wastewater, and communications services can’t be relocated with redundancy, then the security system must provide for physical countermeasures, surveillance, and other safeguards to prevent loss of services.

Perimeters
Consideration should be given to whether it is possible to harden the perimeter to guard against a car bomb. The proximity to the parking lot and street parking is of concern. On the Mall side of the building, physical countermeasures are required to protect the building from a vehicle bomb by limiting the ability to approach the building in a vehicle. Decorative countermeasure elements serving as barriers, bollards, benches, and other features can be used to separate vehicles from the building perimeter. It should be noted that the Independence Avenue (south) side of the building will be difficult to address in this regard.

Since there might be little that can be done to fortify the perimeter of the AIB, the Independence Avenue perimeter remains the most vulnerable both from a perimeter breach perspective and with regard to attack by explosives. The security design criteria require that all perimeters within 18’ of the ground surface be treated with laminated glass. Their distance from the street necessitates the use of blast resistant glass.

From a security standpoint, windows that cannot be opened by the user in normal use and that are secured shut with a mechanism defined by the security design criteria are preferred. This allows the security system to eliminate individual contacts on each window and use a more cost effective means of securing the perimeter than individual contacts. However, this may contradict historical and architectural recommendations.

Doors or roll down gates are recommended to secure galleries when they are being installed or not in use, but the historic nature of the existing building fabric may prohibit this.

Alarm, access control, and CCTV system perimeter issues will not be difficult to address as the requirements of the security design criteria are specific.

Operational issues with regard to the use of the tunnel between the Smithsonian Institution Building (SIB) and the AIB should be resolved by OPS. Previously, employees from the SIB used the tunnel to access the AIB security office at the end of the day and check out. If this procedure will continue in the post-renovation era then provisions should be made to accommodate this procedure.
The security design criteria address in detail requirements for doors and mechanical locks. While the provisions do not apply to existing buildings, they do and should apply to major modernizations and should be applied here. Use of the SI proprietary keyway is required.

Access to emergency responders is required and a rapid entry box of the type required by the local code authority must be provided at the fire command center.

Provisions must be made for a security guard post at all public entrances.

It is not anticipated that public weapons screening will be required for this facility although it may be during the life of the facility. Provisions for power at the public entrances to accommodate screening equipment installed in the future should be made.

Cash rooms shall have a secure perimeter and address the security design criteria requirements. Teller windows, etc., shall be UL Level III glazing.

Interior Architectural Design
A general CPTED philosophy is provided in the security design criteria and should be considered by the architect. Key assets such as the security control room and high density collection storage, if any, should be located as far into the center core of the building as possible. Other adjacencies and location requirements must be respected.

Crossover points between public and non-public spaces need to be defined architecturally by physical barriers so electronic security measures such as card readers can be applied. The use of Herculite doors at these crossover points should be avoided as they do not conform to the security design criteria.

In general, if required adjacencies are provided and the security department facilities are accommodated in the locations specified, the security design criteria can be met.

Collection Storage
It is recommended that collection storage be located at the building interior in areas free of potential mechanical and plumbing system failure and resulting damage. Electronic security is to be defined by OPS and the security system designer, and the appropriate level applied. See the security design criteria for adjacencies and electronic and structural security requirements.

Mail Room
The design team must consider acceptable adjacencies for the mail room on an exterior wall and sharing the main loading dock used for shipping and receiving. More importantly, prohibited adjacencies require that the mail room be located away from critical infrastructure as indicated in the security design criteria.

Security Spaces
The design criteria define the following security spaces that are to be provided:

- Main Control Room
  - Adjacent Equipment Room (minimum 200 square feet)
- Unit Control Room (minimum 400 square feet)
- Key/Weapons/Radio Room (minimum 80 square feet)
- Security Locker Room
- Security Break Room (minimum 21 square feet)
- Security System Storage Space (minimum 100 square feet)

There are adjacency requirements for all of the above to be considered by the design team. (See the security design criteria for requirements)

Electrical Engineering
There are significant references to electrical requirements in the security design criteria. Lighting for the control room and other spaces is defined. The conduit system for electronic security systems is also defined and will depend on the final use of space although provisions for the grid system in anticipation of future use changes in the life of the building should be made. The security design criteria also define emergency power requirements for security systems.

Special attention is called for in the lighting section to minimum requirements for use with CCTV cameras.

Fire Alarm Monitoring
The security system plan must provide and coordinate space for the fire system computer at the console.

Some integration of the fire system with the security system is required. This primarily involves electronic locking devices and their power supplies. While this does not apply to existing facilities or facilities with major modernizations, the extent of this rehabilitation seems to justify that integration. (See the security design criteria document.)

Elevators
Some elevators may require access controls. The mechanical system must be coordinated with the security system at to the requirements for card access equipment, intercoms, and CCTV for elevators.

Access Control System
The Software House C-Cure 800 is used exclusively in all SI buildings. Servers are assigned to groups of buildings. The AIB, currently with minimal demands and in a “closed” mode, shares a server with the Hirshhorn Museum and the SIB. That server has been moved out of the AIB but will be replaced with a new server adequate for the new requirements. Post renovation, the AIB control room with a dedicated equipment room will house a server with a separate standby server. These units will control the AIB, the Hirshhorn Museum, and the SIB. The unit admin/protection services office space will also be located in the AIB. Since the security design criteria define requirements for adjacencies, this must be considered in the building layout.

Currently Software House iStar alarm control panels (APCs) are located in approximately five locations within the building, most of which are likely to be affected by the renovation. A minimum of five similar locations will be required in the renovated building to house iStar panels. The number of panels will likely increase as the number of reader controlled doors
increases. These security rooms must be dedicated to security equipment only and be alarmed to a level defined in the security design criteria. Medeco locks keyed to the current Protection Services keyway are to be used on these doors. The design criteria define space requirements for this function.

While it might be technically feasible to salvage and reuse the existing iStar panels, this is not recommended. The existing panels should be recovered for replacement parts inventory and new panels specified for this building. None of the current equipment infrastructure can be salvaged and reused without considerable risk and little if any cost savings. Replacement assures total compatibility and warranty coverage.

A dedicated security fiber network currently enters the building and connects security closets. It is unknown if this will need to be relocated but it is preferred that the current fiber network remain in its current termination point. This point could be the first of the five closets dedicated to security use. This fiber backbone will need to be protected during renovation or recreated in the renovated space. It is assumed that it is less cost effective to work around, attempt to protect, and modify the existing iStar wiring infrastructure beyond this point than it is to replace it.

Exhibit Protection
When possible, exhibit cases should be hard wired to the Software House system. The security design criteria define an infrastructure for this purpose. When a hard wired connection is unachievable, the SI standard is Inovonics wireless detection for exhibit security on free standing cases not reached by floor grid wiring.

It is recommended that all public spaces, not just anticipated gallery spaces, be equipped with Inovonics receivers in sufficient quantities to assure that exhibits that must be alarmed can be alarmed if installed in any of these spaces. Prior to design, field tests must be conducted in a manner specified in the security design criteria to test signal strength and define adequate receiver locations.

The historic nature of the Rotunda and adjacent public decorative spaces may preclude using hardwired case alarms in these areas. This must be coordinated with and approved by OPS.

Minimum Requirements for the Security Management System (SMS)

These are as defined in the design criteria and must be provided as defined. Requirements for the SMS include the following:

- Guard tour stations
- Conduit Systems as defined in the design criteria
- Gallery Junction Boxes
  - Consideration should be given to providing this grid in gallery and non-gallery areas in anticipation of future need, particularly if the later addition of conduit would have an impact on historic fabric.
- Wireless Receivers
**CCTV Junction Boxes**
- Consideration should be given to providing this grid in gallery and non-gallery areas in anticipation of future need, particularly if the later addition of conduit would have an impact on historic fabric.

**Card Readers**
- Reader-controlled doors also are to be equipped with conventional key locks per design criteria.
- Electric strikes (not magnetic locks) are to be used where possible.
  - Fail secure where code permits
  - One hour battery back-up on lock power supply where emergency power exists or eight hours where no generator is provided.

**Delayed egress per design criteria**
- Elevator access control per design criteria
- Intrusion detection per design criteria
- Most of the first floor including the Rotunda, and the four great halls will require large area volumetric motion detection
- Other spaces can conform to the standard practices for ceiling and wall mounted detectors as appropriate.

**Duct detection** must be coordinated with mechanical engineers. This may not be possible in an existing building of this nature and some duct protection may already exist that can be salvaged and re-used.

**Video Surveillance System (CCTV)**
The video surveillance system must conform to the design requirements. Video recording for this facility should be defined in coordination with OPS. At the time of this report, the standard method is DVR recording. Advancements in technology are likely to result in a server-based system becoming the standard by the time the building rehabilitation occurs. Intellex by American Dynamics is the CCTV system used campus-wide by OPS. While there is no one camera model used, cameras must be approved by OPS. This requires coordination to assure that cameras are chosen that minimize visual impact in historic spaces.

Similarly, the security design criteria requires coaxial cable for cameras to DVR use. Unshielded twisted pair is rapidly becoming the industry standard and is likely to be accepted when this rehabilitation occurs. This must be coordinated with OPS prior to design.

Other CCTV requirements are addressed in detail in the criteria as are CCTV requirements by space. Spaces addressed include specific requirements for:
Recommendations for Treatment

- Building perimeter
- Cash rooms
- Collection storage
- Elevators
- Corridors
- Dining rooms/food selection areas
- Exhibit galleries
- Perimeter windows
- Entry and egress points
- Library reading rooms
- Loading docks
- Parking areas
- Security equipment rooms
- Unit control rooms
- Gift shop
- Ticket booth.

Note that the design criteria require that corridors where future exhibits might be placed are to be provided with CCTV coverage.
The zones of intervention are defined according to the level of architectural significance of the spaces and the integrity of the significant historic fabric. While all significant spaces and features should be retained and preserved, and character-defining features should be restored in these spaces as nearly as possible to their original form, some level of intervention would be needed to accommodate a new use. Changes and alterations should be limited to those necessary to accommodate modern systems, to achieve code compliance, and to provide access for the disabled.

Spaces of the building with the highest level of architectural detail and finish, with the highest degree of integrity, should be restored to the Period of Significance. No alterations of the configuration during the Period of Significance and their significant features should be permitted in these spaces. The approach to the intervention in these spaces includes:

**Preservation**
- Rotunda
- North Hall
- East Hall
- South Hall
- West Hall
- North West Annex (Rare Books Library) and Gallery
- North West Pavilion
- South East Court Gallery
- South West Court Gallery

**Restoration**
- South East Court
- South West Court
- North East Court and Gallery
- North West Court and Gallery

These spaces are identified as highly sensitive areas in the following Diagrams of Recommended Level of Intervention.

The halls are the main spaces of the museum and their preservation is critical to the understanding of the original design. While the courts have been modified by addition of non-historic features, minimal historic significant fabric has been removed to accommodate previous uses. These spaces were intended as more representative than the ranges and have retained a higher degree of integrity (e.g. the significant roof structure).

Minimal changes necessary for the new use would be allowed in spaces that were less adorned and have fewer significant features, or spaces where some of the integrity of the features has been lost. The approach to the intervention in these spaces includes:

**Rehabilitation**
- North East Pavilion
- South East Pavilion
- South West Pavilion
- North Tower
- East Tower
- South Tower
- West Tower
- North West Range and Gallery
- West North Range and Gallery
- East North Range
• North East Range
• South East Range and Second Floor
• East South Range and Gallery
• West South Range and Gallery
• South West Range and Gallery
• North East Annex
• South East Annex
• South West Annex

These spaces are identified as a medium level of sensitivity areas in the following Diagrams of Recommended Level of Intervention.

The most changes would be possible in spaces that are not architecturally significant, utilitarian in function and finish, or have been so completely altered that they now contain little or no remaining significant architectural fabric. The approach to the intervention in these spaces includes:

Rehabilitation
• Basement Rooms
• Tunnel to Smithsonian Institution Building

The conditions in the basement spaces should be well documented prior to undertaking any modifications as they may have early construction technology information. These spaces are identified as having a lesser level of sensitivity areas in the following Diagrams of Recommended Level of Intervention.
Diagram of Recommended Level of Intervention

This document is a general plan reference. Recommendations in section 3.2 define the recommended retention of volumes, sight lines, and massing.

Level of Sensitivity
- 1 (Highly Sensitive)
- 2
- 3 (Less Sensitive)
Diagram of Recommended Level of Intervention

This document is a general plan reference. Recommendations in section 3.2 define the recommended retention of volumes, sight lines, and massing.

1 (Highly Sensitive)
2
Level of Sensitivity
3 (Less Sensitive)
Diagram of Recommended Level of Intervention

This document is a general plan reference. Recommendations in section 3.2 define the recommended retention of volumes, sight lines, and massing.

1 (Highly Sensitive)

2

Level of Sensitivity

3 (Less Sensitive)
Prioritizing repairs can be critical for the long-term preservation of the AIB. “Urgent,” “High Priority” and “Desirable” work items are recommended to preserve, restore or replace significant building elements and features. The “Urgent” category identifies items that should be addressed as soon as possible to make the building weather tight, protect it against further deterioration, and eliminate safety hazards. The “High Priority” category includes work recommended to be undertaken to avoid further deterioration but where no imminent peril is noted. Recommendations in the “Desirable” category include work that is not critical but would enhance the proper function of the building as well as restore the character of the building.

These items do not address any specific scope based on a determined use of the building.

The new use of this building will require a performance-based assessment. Recommended modifications from this assessment will need to be evaluated to comply with criteria defined in Zones of Intervention.

**Urgent**
- Replace roof and flashing at Rotunda, halls, courts, ranges, and all monitors
- Replace roof drainage at Rotunda, halls, courts and ranges
- Repair skylights at courts
- Repair and refinish structural trusses
- Upgrade trusses if additional analysis shows need
- Repair metal deck at halls and courts
- Construct perimeter and site drainage

**High Priority**
- Repair, replace, and repoint brick masonry and stone features
- Repair slate roofs at pavilions and towers
- Upgrade building systems
- Construct supplemental roof structure, if required, by installation of a new roof
- Replace lightning protection
- Construct new code-compliant stairs and elevators
- Life-safety upgrades, including retrofitting railing at galleries and stairs, and improving egress, including second and third floor egress at pavilions and towers
- Perform upgrades to comply with ADA requirements, including repair at floors, door hardware
- Remove or abate hazardous materials
- Repair and refinish plaster walls and ceilings
- Repair cast iron stairs
- Repair and refinish original exterior door at the North West Pavilions
Desirable

- Replicate original exterior doors at the four entrances
- Paint the Buberl Statue
- Repair and refinish metal ornaments at roof
- Demolish all non-historic interior infill at original arches
- Reconstruct missing brick pier
- Demolish all non-historic interior partitions, ceilings and floor finishes within the courts and ranges
- Remove non-historic structural infill floors at courts and all ranges with the exception of the South East Range
- Retain and repair galleries along the South East and South West Courts
- Retain galleries along the North West, West North, East South, West South, and South West Ranges
- Construct railings at salvaged galleries in courts and ranges
- Reconstruct galleries at the North West and North East Courts
- Replicate the original configuration at the north entrance
- Remove non-historic partitions at first and second floors of the pavilions
- Repair historic terrazzo and concrete floors at courts and ranges
- Repair encaustic tile floors at Rotunda and vestibules
- Install new compatible materials at courts and ranges where historic materials have been removed previously or cannot be salvaged
- Repair wood strip flooring at pavilions and doors, replicate where missing or damaged beyond repair
- Replace metal panel ceiling at the Rotunda with a new material imitating the original plaster
- Restore the fountain and reinstall the “Freedom” statue
- Restore the original decorative painting at the Rotunda, halls, and courts
- Perform additional paint analysis to document the various decorative and non-decorative paint schemes in all spaces
- Restore original scoring at all original public spaces
- Replicate original interior windows between halls and ranges, ranges and towers, and pavilions and ranges
- Replace lighting that is appropriate to the Period of Significance in the primary significant spaces
- Develop signage and way-finding that is sympathetic to the Period of Significance for the building
- Replace interior window treatments in pavilions and towers with a type that is sympathetic to the Period of Significance for the building
- Replicate light fixtures in front of the building during the Period of Significance
- Trim vegetation within five feet from the structure
Recommendations for Treatment

This section develops guidelines and standards for planners, project managers, architects, and maintenance staff to identify appropriate approaches to work that will be done in the AIB in order to avoid damaging historic and character-defining materials and spaces during routine renovation and maintenance activities. This section is organized by element to align with the existing conditions assessment and the treatment recommendation sections of this report.

Exterior Masonry
All the masonry elements will require a regular survey schedule for condition and to monitor repairs. The entire masonry exterior should be physically surveyed at a minimum of once every five years by preservation professionals. The survey should be a physical survey of each façade rather than a visual at-grade survey to ensure that masonry and mortar condition issues can be identified early, potentially reducing repair costs or the development of related damage from water infiltration.

Following the initial repair recommendations, the masonry should be included on a regular inspection cycle for cleaning, cracks, and erosion. Cleaning should begin with the least invasive methodology and then proceed only to chemical cleaning as determined by an architectural conservation professional following the protocol of the AIC Code of Ethics and the Secretary of Interior Standards for Historic Properties. Cleaning should include removal of biological growth, pollution, and metallurgical stains.

Efflorescence is well known as the unsightly white deposits or stains that sometimes appear on the surfaces of mortar, concrete, or brickwork on buildings and block paving. Three categories of efflorescence are lime bloom, lime weeping, and crystallization of soluble salts.

White deposits of lime bloom usually become visible as thin sections when the structures concerned start to dry out. These deposits commonly disappear in the longer term by natural weathering. The effect of lime bloom upon mortar, concrete, or brickwork is usually superficial.

Lime weeping is a much thicker localized build-up or encrustation of white deposits than lime bloom. Lime weeping is normally seen at cracks and joints where water appears to be coming from within the mortar, concrete, or brickwork. This phenomenon is usually observed on more mature structures, where the originally light build-ups of efflorescence, lime bloom, have grown to a greater perceptible thickness. Lime weeping is generally permanent because of its thickness and is unlikely to disappear through natural weathering. Even with lime weeping, the durability of the structure is not normally in question. Lime weeping, like lime bloom, is a manifestation of water flowing through the concrete, mortar, stone, or brick, which is in itself undesirable.

Crystallization of soluble salts is the least common form of efflorescence and usually takes place where concrete has been produced with seawater or upon retaining walls. This is not likely to be found as an

Footnote 1: http://www.aicnet.org/about/code_of_ethics.asp
Footnote 2: http://www.nps.gov/history/hps/tps/standguide/
Primary efflorescence observed with lime bloom and lime weeping presents as homogeneous calcite deposits arising from the flowing of calcium hydroxide in solution through capillaries within the structure to the exterior. The solution evaporates and leaves behind deposits of solid white calcium hydroxide.

Secondary efflorescence arises where water penetrates the surfaces and dissolves soluble calcium salts in a sporadic or blotchy pattern. The main chemical reaction is the same as that in primary efflorescence. Secondary efflorescence originates from reaction in solution, usually caused by rain or condensation.

It is important not to consider all white deposits as always being due to efflorescence, particularly on hardened mortar and concrete. Gypsum, often observed in efflorescence, can be found as a white deposit where ordinary sulfate attack has arisen. The damage to structural integrity should be evaluated, but if the condition is in the early stages, it may not be fully presenting itself. All efflorescence should be examined further for clarification.

- **Cast Stone Medallions**
  Replacements should be determined and details developed by preservation professionals. Included are references for approaches to treatment and survey. Evidence of failures includes spalling, chipping, cracking, and staining.

- **Blackened and Glazed Brick**
  Replacements should be determined and details developed by preservation professionals. Included are references for approaches to treatment and survey. Evidence of failures includes crazing of glazing in conjunction with cracks in the brick, spalling, chipping, cracking, and staining. Efflorescence may be present not as a failure condition but as a symptom of moisture infiltration or curing. The glaze and blackening will wear with age and is an aesthetic issue if not related to cracking. Replacement should be considered in relationship to prominence of location and impact on the overall appearance of the façade. Repairs should be developed by an architectural conservation professional following the protocol of the AIC Code of Ethics and the Secretary of Interior Standards for Historic Properties.

- **Buff and Red Brick**
  Replacements should be determined and details developed by preservation professionals. Included are references for approaches to treatment and survey. Evidence of failures includes spalling, chipping, cracking, and staining. Repairs and cleaning should be developed by an architectural conservation professional following the protocol of the AIC Code of Ethics and the Secretary of Interior Standards for Historic Properties.

- **Sandstone**
  Replacements should be determined and details developed by preservation professionals. Included are references for approaches to treatment and survey. Evidence of failures includes spalling, chipping, cracking, and staining.

- **Granite**
  Repairs and replacements should be determined
Recommendations for Treatment

Guidelines and Standards 3.4

and details developed by preservation professionals. Included are references for approaches to treatment and survey. Evidence of failures includes spalling, chipping, cracking, and staining.

- Concrete Paving and Pads
  Following the recommended replacement to correct the perimeter drainage, this material should be included on a regular inspection cycle for cleaning, cracks, and erosion. Included are references for approaches to treatment and survey. Evidence of failures includes spalling, chipping, cracking, and staining.

- Mortar
  Mortar mix, color matching, and pointing repairs and methodology should be developed by preservation professionals. Although a specific mortar analysis was not included in this scope of work, it is likely given the period of construction and the age of the building that there are a variety of mortars within different and similar materials. Included are specific notes to request for mortar analyses, pointing techniques, and indicators of damage, failure or water infiltration. Evidence of mortar failures includes cracking, chipping, abscesses, gapping, and staining. If mortar analysis is required, the samples must be taken from deep within the joints as the building has been repointed.

- Sealants
  Sealants will have specific limited uses within the exterior masonry and are typically recommended at transitions to other materials such as wood or metal. Sealants will not likely be recommended and have not tended to perform as well as mortar within masonry systems. Silicone sealants should not be used with porous materials. Determination of the appropriate sealant and detail of the joint should be developed by a preservation professional. Evidence of sealant failures includes bubbling, cracking, abscesses, gapping, detachment, and staining.

- Flashing
  Refer to roofing system notes for flashing information.

Roof

The entire roof system will require a regular survey schedule for condition and to monitor repairs. The entire roof exterior should be physically surveyed at a minimum of once a year by preservation professionals. The survey should be a physical survey of each roof component, the flashing, and expansion joints associated with the roof system. A visual at-grade survey is not recommended to ensure that condition issues can be identified early, potentially reducing repair costs, or the development of related damage from water infiltration.

As sections of the roofing system are replaced or in the event of a major renovation, the dimensions of the existing systems should be documented and in the initial replacement documentation for connections, pan widths, slate nailing patterns, and other materials from the initial and later roofing installations.
Following the initial repair recommendations, this material should be included on a regular inspection cycle for cleaning, cracks and integrity of joints, welds, and sealant connections.

- Stainless Steel, Terne Coated Copper Flashing
  Flashing materials and details should be developed by preservation professionals. Included are specific notes on standards and flashing material requirements. Evidence of flashing failures includes abscesses, detachment, and gapping, with evidence of efflorescence or staining on adjacent materials.

- Slate Roofing
  Slate roofing materials, patterns, details, and repairs should be developed by preservation professionals. Included are specific notes on standards for slate roofing and slate material recommendations. Evidence of slate roofing failures includes missing tiles and cracked tiles, often with evidence of efflorescence or staining on adjacent materials. This roofing system is not compatible with a high level of foot traffic and is not to be used on low slope roofs.

- Metal Roofing
  Metal roofing materials, connections, details, and repairs should be developed and inspected by preservation professionals. Included are specific notes on standards for metal roofing and material recommendations. In particular, information is included for flat-seam roofing quality assurance and inspection from the Copper Development Authority (CDA) to assist in the development of a request for proposal or qualifications for an annual inspection. Terne-coated metals are recommended for longevity and aesthetics. Evidence of metal roofing failures includes water infiltration and absorption under and within lateral and vertical seams. There can be evidence of efflorescence or staining on adjacent materials. This system can have many applications from high to low slopes. Each has particular details for the system and related flashing details. Seaming and details should reflect the flat style roofing at the initially flat seamed roofs and other details may be used to replicate the texture of slate if metal is used as an alternative material.

- Sealants and Expansion Joints
  Sealants will have specific uses within the roofing system and are typically recommended at transitions. Determination of the appropriate sealant and detail of the joint should be developed by a preservation professional and should be maintained without substitutions. Evidence of sealant failures includes bubbling, cracking, abscesses, gapping, detachment, and staining.

- Gutters and Downspouts
  The roof drainage systems should be designed by a preservation professional to be compatible with the appearance during the Period of Significance and comply with modern codes. In addition to annual condition inspections, this system will require monthly inspections for flow management of water and to ensure that downspouts and gutters are clear of debris. Clogging of these
locations can cause water to back up into components of the exterior envelope that are not meant to manage water and, over time, will deteriorate the integrity of the exterior enclosure of the building. Included is information on systems, typical details, and common issues as the bulk moisture management system ages. Care should be taken not only to review the function of the system at the roof level but also as it transitions through the walls and into the grade at the exterior perimeter of the building.

- Ornamental Metal Details and Finishes
  Metal coatings, gilding, and repairs should be developed by preservation professionals. Included are specific notes on standards for material recommendations. Evidence of coating and gilding failures includes peeling, abscesses, detachment, and gapping with evidence of efflorescence or staining on adjacent materials.

Door and Window Openings
The window and door openings will require a regular survey schedule for condition and to monitor repairs. The windows and doors should be physically surveyed at a minimum of once a year by preservation professionals. The survey should be a physical survey of each opening and the integrity of the perimeter of the component with the structural opening. For windows above the first floor, a physical survey in lieu of a visual at-grade survey is recommended to ensure that condition issues can be caught early, potentially reducing repair costs or the development of related damage from water infiltration.

Following the initial repair recommendations, these openings should be included on a regular inspection cycle for cleaning, cracks and integrity of joints, function, glazing conditions, and sealant connections. Typical failures for doors and windows include broken or missing glazing; missing glazing putty or pins; or cracked, delaminated, or missing components. Common finish failures include peeling, abscesses, detachment, and gapping with evidence of staining on adjacent materials. Standards for coating systems are included in the reference material.

Replacement of sashes or window components shall remain consistent in the profile, configuration, and dimensions. Glazing replacement shall remain consistent with the use of clear vision and translucent glazing installed initially at the AIB.

- Metal grilles and gates
  Metal grille and gate materials, connections, details, and repairs should be developed and inspected by preservation professionals. Included are specific notes on standards for details and material recommendations. Evidence of failures includes loose or missing connections with masonry and peeling finishes with evidence of staining on adjacent materials.

Lighting
Entrance Fixtures
Light fixtures need to be maintained depending on the material. SI could consider a low voltage solution

Historic Structure Report & Conditions Assessment
Smithsonian Institution Arts & Industries Building 08.31.2009

Guidelines and Standards 3.4
for these fixtures as long as the lighting is maintained consistent with the historic appearance.

**Interior**

**Protection of Fabric During Selective Demolition and Maintenance**

Protection of significant fabric is required for any adjacent work, maintenance, or finishing of systems in the building. Protection solutions will vary based on scope and duration of the project. Care should be taken to ensure structural stability, minimization of vibration, limitation of airborne chemicals, dust and finish materials, secure separation of public and work spaces, and protective measures to prohibit damage to adjacent building surfaces. Included in the referenced materials are some standards for evaluation of the type of protection and specification of processes for protection within historic structures. Protection should not only include adjacent areas next to, above, and below the work but also include the path for the materials, equipment or personnel to reach the location.

**Floors**

All floors will require a regular survey schedule for condition and to monitor repairs. The entire surface should be surveyed at a minimum of once every five years by preservation professionals.

Following the initial repair recommendations, the floors should be included on a regular inspection cycle for cleaning, cracks, and wear. Cleaning should begin with the least invasive methodology and then proceed only to chemical cleaning as required. Measures should be taken in the new design to mitigate dirt brought into the building thought the entrance doors. Floors should be cleaned daily to prevent wear and damage. Specific maintenance for marble, slate, mosaic tile, terrazzo, granolithic, cement, and wood floors will be included in the referenced materials.

Evidence of failures in the marble, slate, and mosaic tile floors includes loose or missing connections with tiles, cracked or chipped tiles, missing mortar, and staining on the tile and/or mortar. Evidence of failures in the terrazzo, granolithic, or cement floors includes loose or cracking, chipping, spalling, and staining portions of these materials. Evidence of failures in the wood strip floors includes gapping, loose or missing strips, cracked or chipped strips, and staining.

**Plaster Walls**

In addition to the recommendations for treatment, plaster walls will require a regular cycle of inspection for repairs. Minor hairline cracks are common in this material as it expands and contracts with environmental changes. Failures can be indicators of potentially systemic issues related to moisture or settlement. Common indicators of failures include cracking, chipping, delamination, abscesses, gapping, efflorescence, and staining.

Repairs to plaster walls should be done to ensure a solid bond to adjacent material or key into the substrate. Plaster finishes should be allowed to cure completely before coatings are applied to the surface to avoid burn through and degradation of the finish. Coatings should be compatible with plaster substrates.
Recommendations for Treatment

Information on condition, repairs, and coatings is included in the referenced materials.

Decorative Finishes
All the decorative finishes will require a regular survey schedule for condition and to monitor repairs. As with the plaster, failures can be indicators of potentially systemic issues related to moisture or settlement. Common indicators of failures include cracking, chipping, delamination, abscesses, gapping, efflorescence, and staining.

Because of the recommendation not to remove later coatings and to wash the walls to remove the distemper paint and recreate the finishes, inspections will be required to address peeling and delamination of painted wall surfaces in the Rotunda.

Following the initial repair recommendations, this material should be included on a regular inspection cycle. Cleaning and repairs should begin with the least invasive methodology and then proceed only to chemical cleaning as determined by an architectural conservation professional following the protocol of the AIC Code of Ethics and The Secretary of Interior Standards for Historic Properties.

Stairs and Rails
Cast iron stairs and rail materials, connections, details, and repairs should be developed and inspected by preservation professionals. Included are specific notes on standards for details and material recommendations. Evidence of failures includes loose or missing connections, cracking, and peeling finishes. Repair of cast iron is limited due to the age and nature of the material. Sources for replica materials can be provided for missing or damaged portions of these units.

Following the initial recommended repairs, the gallery railings should be included on a regular inspection cycle for their structural integrity, finish, and condition. Evidence of failures includes missing elements, cracked or deformed elements, and missing or scratched finishes. Repair of these elements depends on the determination of materials used to construct the rails. Commonly, these elements can be field repaired and finished to disguise repair locations.

Structure
Repair of exposed trusses and metal roof structure is included in Section 3.1 of this section. Assessment, survey, and repair should be conducted by a structural engineer with preservation expertise. Failures can be indicative of other systemic issues including water infiltration, inappropriate loading, and settlement of the structure. The primary maintenance efforts should include an inspection of the connections and the finish coatings on these elements. Reference materials on the process for survey and repair materials are provided.

Openings
The door openings will require a regular survey schedule for condition and to monitor repairs. The survey should be a physical survey of each opening and the integrity of the perimeter of the component with the structural opening.

Guidelines and Standards 3.4
Following the initial repair recommendations, these openings should be included on a regular inspection cycle for cleaning, cracks and integrity of joints, function, glazing conditions, and sealant connections. Typical failures for doors include broken or missing hardware, broken or missing glazing; missing glazing putty or pins; or cracked, delaminated, or missing components. Common finish failures include peeling, abscesses, detachment, and gapping with evidence of staining on adjacent materials. Standards for coating systems are included in the reference material.
Recommendations for Treatment

Bibliography of Resource Documents:

1. Preservation Brief 1 Assessing Cleaning and Water-Repellent Treatments for Historic Masonry Buildings
2. Preservation Brief 2 Repointing Mortar Joints in Historic Masonry Buildings
3. Preservation Brief 3 Conserving Energy in Historic Buildings
4. Preservation Brief 4 Roofing for Historic Buildings
5. Preservation Brief 9 The Repair of Historic Wooden Windows
6. Preservation Brief 10 Exterior Paint Problems on Historic Woodwork
7. Preservation Brief 21 Repairing Historic Flat Plaster Walls and Ceilings
9. Preservation Brief 28 Painting Historic Interiors
10. Preservation Brief 29 The Repair, Replacement & Maintenance of Historic Slate Roofs
11. Preservation Brief 33 The Preservation and Repair of Historic Stained and Leaded Glass
12. Preservation Brief 42 The Maintenance, Repair and Replacement of Historic Cast Stone
13. National Park Service Technical Preservation Services Preservation Tech Notes From Asbestos to Zinc, Roofing for Historic Buildings, National Park Service


59. “Roofing Materials”, by Tyler Steward Rogers and Walter McQuade, AIA; From American Architectural Reference Data No. 16 (February 1935).


Opportunities and Limitations
Any proposed building use must work within the limitations of the building envelope (see Section 4.2) to mitigate any potential problem with thermal and moisture migration into the walls and roof structure of the Arts & Industries Building (AIB). These scenarios should also be matched with mechanical system scenarios to completely understand how each combination may create specific solutions or challenges (see Section 4.3 Building Systems Scenarios). Since the AIB was conceived as an exhibition building, it is most likely that some future program elements will include exhibitions. However, prior to considering collections, the first criteria to consider must include other core “values” that are significant character-defining elements as defined in Section 1.4.

These building use scenarios range from lowest to greatest impact on the building fabric; the visual experience of the space, as originally intended; and in inverse relationship to the amount of collections present in the building under Smithsonian Institution (SI) criteria for 68 degrees and 45% relative humidity (RH).

### No Relative Humidity (RH) Sensitive Collections Present
- **Collections Uses:** No RH sensitive collections present since the building systems provide thermal comfort and track outside humidity in the winter and average 45% RH in the summer.
- **Non-collections Uses:** Orientation, information, retail, food, education, library, office, and support spaces. Special care should be taken to ensure the open quality of the AIB is not compromised with any proposed use.

### Collections Present with Fluctuating RH
- **Collections Uses:** Exhibit collections that can tolerate a range of RH (45% in the summer to a seasonally low range in the winter based on the maximum level of RH the exterior wall and roof system can properly manage, around 25% RH)\(^1\). Systems should provide a narrow range in the summer and manage a slow drift downward in winter.
- **Non-collections Uses:** Similar to A above.

### Collections Present with Freestanding Exhibit Case Vitrines
- **Collections Uses:** Create stable environments for collections by using freestanding collections cabinets (similar to original installations) with independent HVAC and lighting or systems fed through the floor from a central system to minimize maintenance.
- **Non-collections Uses:** Similar to A above.

### Collections Present with Freestanding Vitrine Rooms
- **Collections Uses:** Create stable environments for collections by building freestanding glass vitrine rooms within and independent from all historic fabric. The rooms will require an independent HVAC system from the “outside” spaces that could be conditioned per Scenarios A or B. Each vitrine should have vestibules to minimize the vapor migration as the doors are opened.
- **Non-collections Uses:** Similar to A above.

---

**Footnote 1:** This estimation was developed from the existing conditions survey and exterior wall documentation from the *Exterior Wall Probes* report prepared by Dell Corporation dated December 7, 2001.
Collections Present with Vitrine Courts/Ranges

- Collections Uses: Create stable environments for collections with 70 degree 45% RH by isolating specific spaces (only spaces where plaster and no brick is exposed as a finish). This would include all eight ranges and the four courts. All walls would need to be re-finished with insulation, vapor barrier, and new interior wall/ceiling finish. All ceilings and roof decks would need to be replaced and designed to prevent moisture migration issues. The arched openings to adjacent non-conditioned space would need to be filled with glass panels.

- Non-collections Uses: Similar to A above.

Space Allocation Options

- Option 1: 65,000 sq. ft. of collections; 20,000 sq. ft. café/retail; 20,000 sq. ft. office/support space.

- Option 2: 55,000 sq. ft. of collections; public auditorium/theater space for 500 (20,000 sq. ft.); Classrooms, etc. 20,000 sq. ft.; 10,000 sq. ft. support spaces.

- Option 3: 65,000 sq. ft. tech museum with lots of interactives, cutting edge technology, heavy use of computers, data, etc.; 20,000 sq. ft. café/retail; 20,000 sq. ft. office/support space. No collections.
Opportunities and Limitations

As a baseline, it is assumed that any restoration of the Arts & Industries Building (AIB) will include replacement of the roof and roof deck insulation as well as all windows—except for the decorative glass panels in the halls. This is an opportunity to improve the thermal and moisture performance of these elements through replacement with high performance products and assemblies. The exterior brick cavity wall system will be the primary weak link in temperature and moisture migration, a condition that may or may not need to be addressed depending upon whether collections will be present and current Smithsonian Institution (SI) standards for 68 degrees and 45% relative humidity become the criteria for environmental conditions year round. At a minimum, repointing of exterior masonry will be critical to prevent cold outside air that would significantly impact the dew point of moisture in the wall from migrating into interior wythes of brick.

Summer conditions with air conditioning will not be critical. However, winter conditions will be. In winter, low outside relative humidity with interior conditions at 45% RH will drive moisture into the uninsulated brick cavity walls and this has the potential to be destructive to the brick. Section 4.1 Potential Building Use Scenarios and Space Allocations describes potential scenarios that assume no active humidification unless the design creates vitrines independent of exterior walls or interior walls retrofitted on all surfaces with insulation, vapor barrier, and a new wall finish.

If the exterior walls do not receive internal thermal and moisture performance upgrades, then it is important to understand that the current wall assembly (2 wythes of brick, a cavity, and an interior wythe of brick) can potentially reach 32 degrees on the inside surface at the weakest points—near window frames and existing plaster, for example. At 32 degrees, condensation will form if the RH reaches 25% to 30%. Therefore, any active humidification to SI standards will require an interior retrofit (insulation, vapor barrier, and interior finish) that should be carefully weighed against the significance of original interior fabric as identified in this report.

This analysis is a starting point rather than a final recommendation of the dewpoint, but this should be carefully developed in any scenario of future building use.
Building Systems Scenarios
Since the original AIB mechanical system consisted of operable windows and a low pressure steam radiator system for the first 50 years, building systems had little visual or physical impact on the space. This baseline should inform the selection and design of all potential building systems, whether it is consideration of location of equipment or distribution of building systems throughout the AIB. For this reason, it is highly recommended that building system selection and design should have the least visual impact possible, leading to consideration of four scenarios, and remembering that ventilation using natural air movement should be a primary design tool; mechanical system design should be supplementary.

This is a challenge since there are no concealed spaces within the AIB to run ductwork. Ductwork run from above would have significant visual impact, particularly given the volume of space and the need for a large "throw" on any system. Therefore, four mechanical systems scenarios have been developed ranging from least to most impact on the historic fabric and aesthetic experience of the AIB. Each should be measured against their capacity to provide human comfort and a proper collections environment, as well meet sustainability goals, whether measured under LEED or any additional criteria such as Btu/sq. ft./year. It should be noted that energy recovery systems that may be part of a system design require significantly more ductwork and equipment space than systems that do not recover energy.

Scenario 1 Heat Only with Natural Ventilation (Original Design)
The original building design provided low pressure steam pipes from a basement boiler room through a tunnel system to radiators throughout the museum. Operable windows provided fresh air and summer ventilation. While unlikely to meet current criteria, as a baseline, the AIB systems should be able to provide hydronic heat from the GSA and operable windows with supplemental air movement through very large low speed fans. This will provide an environment in winter of 70 degrees with RH tracking outside conditions. Summer conditions would track outside temperature and RH, using air movement as the only mitigation against exterior conditions. Given these criteria, no collections could be displayed outside conditioned vitrines. This scenario will also require creative solutions and possible limitations on security.

Scenario 2 Quadrangle Vault and Tunnel System
Provide a single underground service vault on the west side between the AIB and the National Museum of African Art (NMAfA) for mechanical systems. Provide supply and return air through a series of underground tunnels in order to control the temperature and humidity within criteria established as appropriate to the capacity of the building envelope and building use. The size of intake and exhaust air towers will be larger.
and more intrusive in the Enid A. Haupt Garden in this scenario than within Scenarios 3 and 4, which follow. This proposal is consistent with the RTKL report from 1993.

**Scenario 3 Range or Court Vault and Tunnel System**
Provide four vaults by excavating under the floor slabs for mechanical equipment (one to serve each building quadrant) under the North East, North West, South East and South West Ranges (or the courts). Provide distribution through ductwork in a new concrete tunnel system to each zone of the building. The greatest challenge is to bring outside air and exhaust air into each mechanical vault, especially on the east side due to the 9th Street vehicular tunnel. An option to the range system is to place the vaults under the four courts to take advantage of the size and shape and their more "central location" for distribution through shorter tunnels. An option is to distribute air using exposed overhead ductworks system.

**Scenario 4 Quadrant Range Interstitial Floor System**
Provide four mezzanines for HVAC equipment (one to serve each building quadrant) in the North East, North West, South East and South West ranges. Ductwork could be run through either a concrete tunnel system to each zone of the building or a combination of tunnel/exposed ductwork system. Space below each mezzanine would be for program support spaces such as offices, storage, kitchen, etc. Outside air could enter either through existing window openings, which may be aesthetically less acceptable, or through tunnels to areaways just outside the building. This scenario has the advantage of being the least costly to construct, but does "interrupt" any concept of maintaining an open floor plan experience as intended in the building by Cluss and later, Hornblower & Marshall.

Whatever scenario is selected, the impact on the existing building should be carefully studied and matched to the Potential Building Use Scenarios and Space Allocations (Section 4.1) to ensure overall goals for public engagement are met. Variations on the systems could include integration of sustainable alternative sources. The viability of these types of solutions will be determined by their payback timeframes, durability, productivity, and functionality (Section 4.5).
Building codes are set as the minimum requirements needed for safety and occupancy of a structure. These codes are adopted at state and local jurisdiction levels with the exception of the Americans with Disabilities Act (ADA), which is a federal law. The current applicable codes are noted in the life safety section of this report. Often, these adopted codes will have clauses and requirements for existing and historic buildings. Applicability of the historic codes often requires that the building be listed on either the local or national register.

**Defining Scope**
Scope is defined by the owner and project team as the goals for the end use and function of the structure. With the scope defined, a range of options for the intended extent of work required can then be identified. Often, the options are identified at the conceptual or schematic design phase of a project to a level of definition that allows the team to document the work required to bring the building into compliance and note the anticipated changes to the structure. The scope should be accompanied by a written program or detailed list of functions needed in a space and the equipment and environments needed for the related functions. This is critical to establish since it not only defines the type of work needed to complete the project, but also defines the types of uses and functions for the project.

**Historic Significance and Integrity**
The AIB will require an examination of the existing building that includes the program and use overlaid with the history, architecture, and detailing as they relate to historic events, periods, or technologies. This is critical to define a range of significance within the building. Further examination or exploration will be required to understand the integrity of the remaining significant material.

The combination of significance and integrity is the basis upon which the relative areas of significance of the physical building are defined. This hierarchy should be integrated into the options developed from the initial expression of scope and program.

**Performance Based Life Safety Analysis**
Performance based assessments focus on the intent of the code requirements and the outcomes the design team needs to achieve for code compliance. This approach begins with the development of an understanding of the code systems as they relate to the needs for fire resistance, egress, or fire protection. In historic buildings, this allows for goals and objectives to be set to preserve human life and include measures to be taken to preserve irreplaceable fabric or materials. The team then works to design a solution or solutions that achieve these goals.

A Performance Based Life Safety Analysis will be required to assess and resolve life safety and egress needs. The analysis will address life safety and egress given the programmed occupancy, the potential limited capacities of exits, and the historic preservation requirements of the building. A preliminary analysis using the prescriptive criteria of the Life Safety Code indicates the exit capacities are insufficient to meet the programmed occupant loads of the AIB. However, there are architectural features in the building that enhance life safety and are not considered when using a prescriptive code approach.
A very similar analysis will be required during the design process of any reconfiguration of the AIB. Modifying the contents and spatial arrangement of the facility will obviate the fire and egress models used in this analysis.

**Egress / Code**

The specific components required for the analysis — including height/area, egress, circulation, construction type, and configuration — are discussed in the code and life safety section of this document.
Opportunities and Limitations

The AIB was designed at a time when building technologies and systems began to change the way buildings were designed and constructed. Programmatic goals and use of natural systems were of equal importance in how Cluss conceived of the National Museum Building. As he wrote, the design allows for the “greatest possible available floor space, of easy communications, efficient drainage, a well-calculated and pleasing admission of light, free circulation of air and all other hygienic data.”

The AIB was as heavily influenced by concerns for programmatic space as for the ability to use natural light and ventilation to make it a sustainable structure using traditional as well as innovative building technologies. These goals could almost be read as the foundation for current LEED criteria. The current commitment of the SI to sustainability using LEED Silver as a baseline will dovetail well with the core values behind the original design of the AIB:

- Fresh air and natural light in every space
- Use of local materials, such as brick from Baltimore, slate from Virginia (with decorative colors from far off Vermont), and stone trim from Ohio. Belgian glass and tin from abroad were used as cost-saving measures and because domestic manufacturing capacity was not yet capable of meeting the demand of a growing country.
- Construction innovations
  - Slab on grade construction rather than a supported slab was cost-and material-efficient, and allowed the AIB the capacity to display heavy objects.
  - Double glazed windows tempered the interior environment.
  - Brick cavity wall construction provided some tempering and moisture mitigation.

This innovation was appropriate, as the AIB became the showcase for the exhibition of new technologies, new natural history and cultural discoveries, and the history of a young country.

The efficiency of the enclosure — delicate, long-span iron trusses spanning to brick masonry bearing walls with large punched openings — was extremely efficient in covering a maximum amount of space with the fewest materials. The economy of materials, using a limited palette of brick colors and a few sculptural elements on the exterior and decorative plaster on the interior, displayed the same economy of means with its contemporary exhibition buildings, but with permanent materials. Materials were largely local: rubble foundation walls on concrete footings, brick from Baltimore, stone trim from Ohio, slate roofing from Virginia with decorative color slate from Vermont, and iron trusses from the mills in the mid-Atlantic region.

Built prior to the development of many building systems such as mechanical ventilation and electric lighting, the AIB was designed to be flooded with natural light and benefit from natural ventilation. The volumes of the exhibition spaces allowed air to enter through the lower windows and to exit high through the spires of the towers, the monitors, and the dome via operating iron sash, which provided for air movement in the hot summer months. Unlike contemporary exhibition buildings, in plan, the AIB

Footnote 1: Cluss & Schultze, Report of the Architects, January 1, 1880 in SI AR 1879, pg 130-1
is a compact but dense 327’ × 327’ box, creating a series of 17 open galleries. Since the building is a dense block, the masonry walls of the halls, ranges, and courts needed to be a much lighter series of piers rather than solid walls to facilitate movement of air through the building.

The different heights found in the halls, ranges, courts, and pavilions were needed to allow each space to receive natural light from high windows, clerestories, and skylights. As Cluss wrote “…90,000 square feet of floor space are lit by 12,600 Sq. Ft. of glass equal to 1/7th of floor space for glass. According to best authorities, 1/9th of floor spaces are required under similar conditions for glass, to exhibit art matters properly.” As a result of these strategies, the interior space was a series of rooms open to one another, flooded with light. From the outside, the overall effect created a picturesque roofscape that is one of the dominant exterior features of the building. One of the great innovations — using double glazed windows as a means to both filter light and provide some insulation — moderated temperature from exterior to interior.

Once contemporary systems were developed to overcome the limitations of natural ventilation and light, the AIB became increasingly less dependent upon open space, volume, and the windows and skylights to make the space usable for exhibitions. As mechanical systems were introduced, the space became increasingly cluttered with them and visually compromised as it evolved into a series of closed exhibition and support workspace environments totally dependent upon large mechanical building systems, which were installed in the courts to make the AIB “habitable.”

Past changes to the AIB reflect the fact that building environmental criteria and visitor expectations for contemporary museums have changed significantly over the past 100 years. In another sense, it was also the failure in the past to work with the AIB that contributed to some of the conditions observable in the building today. It will be difficult but not impossible to achieve SI environmental criteria with low carbon input and a low visual footprint in the future reuse of the AIB. However, sustainability also is a core SI value that should be used to inform the reuse and guide redesign of all future interventions in the AIB:

- Options for the reuse of the AIB based on building envelope limitations (thermal and moisture migration) and by extension, sustainable principles, are covered in Section 4.1, Potential Building Reuse Scenarios and Space Allocations. Since new technologies can allow installation of insulated windows, and physical deterioration of the roof deck will necessitate its replacement, the capacity of the brick cavity wall system to manage temperature and moisture migration will be the determining factor in the ability to create a sustainable building solution. This is covered in Section 4.2, Envelope Limitations.

- Building Systems
  - By examining and understanding the design of the AIB as expressive of sustainable principles and, too often, contemporary building systems to be in direct contrast to those principles, it is possible to inform future programmatic use and redesign of the AIB. Future design should preserve but also leverage these natural features to the maximum degree possible, then look to con-

---

Footnote 2: SI Archives, National Museum Building commission, plans and Contracts 1879 – 1882, Box 1
Integration of Sustainability and LEED Principles 4.5

Opportunities and Limitations

Temporary systems as supplements to the AIB’s natural light and air stratification/movement. All of this should be done within the context of the needs of a contemporary museum and expectations of a contemporary museum visitor.

- Design of those systems should not visually clutter the AIB with ductwork and system components in order to avoid detracting from its original intent as a space characterized by visual economy. Only if proper weight is given to the spatial and visual impact of certain building systems — and how they distribute air and supplement natural light — can the experience of the AIB reflect the period of significance recommended in this report while also creating a smaller carbon footprint.

- Options for the integration of contemporary building systems are covered in Section 4.3, Building Systems Scenarios. System scenarios are based on visual impact, but should also be informed by sustainability in the broadest sense to permit the original intent of the building.

- Future selection of materials in any interventions should be informed by the traditional use of a limited palette of materials, preferably local, with an emphasis on sustainable practices.

Balancing what could seem like huge technical limitations against sustainability goals should not lose sight of the fact that the reuse of an existing building with 111,700 square feet of usable space is an enormous asset from a sustainability standpoint. The energy embodied in the building’s materials and its construction is the most sustainable approach to construction. Embodied and operating energy are critical components to be considered in the evaluation of life cycle cost evaluations for the AIB.

Including embodied energy in this evaluation will add the value of existing character-defining features of the building such as the exterior masonry skin, interior roof structure, and slab on grade construction. An appraisal to determine the potential extent of modification to this historic building, along with energy-saving opportunities, begins with determining an approach based on the Secretary of the Interior’s Standards defined in Section 3.0 Recommendations for Treatment and an assessment of the embodied energy balanced with the building’s operating energy. The result from this evaluation incorporates long-term costs and authenticity of materials with daily functional energy usage.

Embodied Energy and Operating Energy

Initial sustainable efforts focused primarily on operating energy costs, which is a significant portion of the expense and energy consumption of a building. Operating energy is the cost incurred for the annual function of the building to provide shelter for the occupants. The primary cost considered in this evaluation is the heating and cooling system of the structure. Secondary consideration is often given to the exterior building envelope, roof, and wall systems, and the number of occupants and their activity as they impact energy loss or heat gain within the structure on a daily basis. Operating energy is a significant measure of sustainability that enables
straightforward comparisons between alternative building technologies.

Consideration of embodied energy is a relatively new “cradle to grave” view of sustainability. Embodied energy is the energy consumed in the production of a building, from the acquisition of natural resources, to the fabrication and delivery of materials and products, to the installation of these materials and products. Essentially, embodied energy becomes the total amount of the energy and labor involved to fabricate, acquire, and install a material or product in the place where it is eventually encountered and considered for continued use in a building.

Buildings also consume energy for heating, cooling, ventilation, lighting, equipment, and appliances. Passive energy systems rely on the building enclosure or envelope to take advantage of natural energy sources such as sunlight, wind, water, and the surrounding soil. Active energy systems represent mechanical, electrical, and/or chemical processes. Occupants of buildings can also contribute to the heating of buildings by virtue of the heat produced through concentrations of occupants and their activities. Building energy demands exceeding those captured and/or supplied by renewable sources must be supplemented by non-renewable sources.

**Balancing Historic, Economic, and Economic Value**

Evaluating the AIB for reuse can be a complex balance of opposing and intersecting values. Consideration needs to be given to the fact that retaining existing building elements can have a financial benefit for the project, and, at times, the quality of the existing materials can exceed the current industry standards.

To maximize the continued use and value of embodied energy, it is essential to understand structural and exterior skin systems since they comprise a substantial quantity of materials related to the footprint of a building. They also are critical to the unique definition and identity of the building making them important elements in defining the significance of a building.

Some systems, such as wood windows, may have a lower embodied energy and a low investment cost in order to gain continued life from the original materials. Other building materials, such as brick, concrete, or steel, have a high level of embodied energy and require specific evaluations for durability and compliance with codes and possible new uses. It is this high level of embodied energy that balances what may be a significant investment in order to gain continued life from the initial construction.

Achieving a sustainable solution requires a comprehensive analysis that examines these elements as well as building components, current building code requirements, and new uses.

By understanding these principles, sustainability will add to the outcomes of all future AIB interventions and will assist in the design and long term preservation as well as activation of the AIB as a significant venue for the Smithsonian Institution.
UNPUBLISHED SOURCES—listed by location

1. American Institute of Architects Library. 

2. District of Columbia Historic Preservation Office 
   a. Nominations to National Register of Historic Places, Scott, Pamela. Architects Database. Standing Files


4. New York Public Library, Rare Books and Manuscripts Division 

5. Smithsonian Institution Archives. 
   b. Arts & Industries Building. Drawings. Photographs. Oversize Photographs. RU 95
   c. Exposition Records of the Smithsonian Institution and the United States National Museum 1867-1940. RU 70
   d. Office of the Assistant Secretary in charge of the United States National Museum. Correspondence, 1877-1896. RU 54.
   e. Office of the Assistant Secretary in charge of the United States National Museum. Correspondence and Memoranda, 1860-1908. RU 189.
   f. Office of the Secretary. 1863-1879. Incoming Correspondence.RU 27.
6. University of Delaware Library, Special Collections Department

7. University of Pennsylvania Libraries

8. University of Virginia Library

**PRIMARY PUBLISHED SOURCES**


12. *Encyclopaedia Britannica*: a Dictionary of Arts, Sciences, and General Literature, Ninth Edition. New York: Charles Scribner’s Sons, 1879-1881. Authoritative contemporaneous accounts of the manufacture of iron and steel, steam engines, glass, brick, etc. at the time the Arts & Industries building was under construction.


15. History of the British Museum of Natural History with plans and views of the building and other illustrations.

have influenced Cluss’ selection of polychrome effects in the Arts & Industries building.


18. Henry, Joseph. *First Report of The Secretary of the Smithsonian Institution to the Board of Regents; Giving a Programme of Organization, and an Account of the Operations During the Year, presented December 8, 1847*. Washington: Ritchie & Heiss, printers, 1848.


to present a global and historical range or ornament in color, the first to display “primitive” art for its design content, and among the first to suggest nature as a basic design source. Widely used and circulated, it was a prophetic work which marked a major change in Western aesthetics and heralded the move towards nonrepresentational art.


This edition presents all the plates in Series I of the latter work, which offers a superbly balanced selection of designs from all the major cultures. The first 100 plates appeared in ten installments between 1869 and 1873.


SECONDARY PUBLISHED SOURCES


Notes, Bibliography, and Appendices


Notes, Bibliography, and Appendices


43. Good account of the architects and their work. Excellent catalogue of their projects.


47. Easy to read explanation of glass manufacture.


Still an indispensable guide to the planning of monumental Washington.


NEWSPAPERS


3. Smithsonian Institution Building, Washington, DC. DC listing 11/08/64, NHL designation 01/12/65, NR listing 10/15/66. Within National Mall HD.

4. The Bureau of Engraving and Printing, Independence Avenue, NW, Washington, DC

5. Phoenixville Historic District, Phoenixville, Pennsylvania

6. United Brick Corporation Complex, 2801 New York Avenue, NE, Washington DC
Notes, Bibliography, and Appendices

Related Smithsonian Institution Studies and Reports:

8. Documentation of Program Overviews, Existing Areas, and Future Space Requirements for the Smithsonian Institution
12. Arts and Industries Building Smithsonian Institution Facilities Condition Assessment Report, SI Facilities Assessment Branch, 7/19/1991
13. Smithsonian Institution Arts and Industries Building Mechanical and Electrical Study, RTKL Associates Inc., 10/18/1993

Arts and Industries Building Administrative Offices
22. AIB Master Plan Renovations – Conceptual Plan Phase – Appendix B – Miscellaneous Reports, Polshek Tobey + Davis, 5/3/1999
32. AIB Master Plan 35% Submission Summary Report Volume 1 of 5, Polshek Tobey + Davis, 11/16/2001
33. AIB Master Plan 35% Submission Structural Design Report Volume 2 of 5, Polshek Tobey + Davis, 11/16/2001
34. AIB Master Plan 35% Submission Investigations of Selected Building Components - Volume 5 of 5, Polshek Tobey + Davis, 1/23/2002
38. Roof Investigation Arts & Industries Building
   Smithsonian Institution Washington DC,
   Hill International Inc. & Hoffman Architects,
   5/19/2003

39. AIB Master Plan Value Engineering Study
   Smithsonian Institution Arts and Industry
   Building, Bovis Lend Lease, 9/26/2003

40. Treasures in Trouble – the Decay in
    Smithsonian Facilities – Volume I – Arts
    & Industries Building, Office of Facilities
    Engineering & Operations/Plexus Research,
    Inc., 9/2003

41. Interim Roofing Repairs Investigation – Arts
    & Industries Building Smithsonian Institution,
    Hoffman Architects, 3/11/2005

42. Smithsonian Institution Arts & Industries
    Annual Structural Roof Framing Survey,
    Thornton Tomasetti Cutts LLC, 6/30/2004

43. Smithsonian Institution Arts & Industries
    Building Addendum to Roof Framing Survey
    – North Hall, Thornton Tomasetti Cutts LLC,
    3/25/2005

44. Arts & Industries Building – All Hazards Risk
    Assessment Report, URS Corporation &
    PBS&J, 5/18/2005

45. The Smithsonian Institution Arts & Industries
    Building - Mothballing Study, Beyer Blinder
    Belle Architects & Planners LLC, 8/30/2006

OFEO Project files exhibit significant variation in
quantity and quality of documentation. Projects
initiated during the past twenty years include:

1. 883312 COOLING TOWER 1
    REPAIR/REPLACEMENT

2. 883316 HVAC & ELECT. IMP., MASTER
    COORD. PLAN

3. 883318 AIB ENTRY STONEWORK
    RESTORATION

4. 893305 PAINT & REPAIR WINDOWS

5. 903303 MODS TO NW RANGE

6. 903310 RARE BOOK ROOM HVAC
    SYSTEM

7. 903322 SECURITY LIGHTING

8. 903323 OUTSIDE AIR FOR TOWERS
    AND PAVILIONS

9. 913302 INSTALL SPRINKLER IN
    TRANSFORMER VAULT

10. 913307 ASBESTOS ABATEMENT SW
     BASEMENT

11. 913311 RENOVATE CONTROL ROOM
     AND GUARD OFFICE

12. 913324 RARE BOOKS ROOM HVAC
     SYSTEM REPLACEMENT

13. 923301 ENTRYWAY RECONSTRUCTION

14. 923302 LIGHTING RENOVATION

15. 923305 REMOVE ASBESTOS FLOOR TILE,
     NE PAV, 2ND FL

16. 923323 ASBESTOS REMOVAL-NORTH
     TOWER CRAWL SPACE

17. 933311 ROTUNDA HAND RAILS

18. 943301 EMERGENCY EXIT FROM NW
     MECH RM 1435

19. 943304 STORM/SANITARY SEPARATION
<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>953301 FIBER-OPTIC UPGRADE</td>
</tr>
<tr>
<td>21</td>
<td>953304 CONDUIT FOR FIBER OPTICS CABLE</td>
</tr>
<tr>
<td>22</td>
<td>953308 CHILLER #2 REPAIRS</td>
</tr>
<tr>
<td>23</td>
<td>953309 SAFETY IMPROVEMENTS, AIB</td>
</tr>
<tr>
<td>24</td>
<td>953312 AIB ELECTRIC PANEL #12 REPLACEMENT</td>
</tr>
<tr>
<td>25</td>
<td>963301 ASBESTOS REMOVAL - FLOOR TILE</td>
</tr>
<tr>
<td>26</td>
<td>973302 AIB FIRE PUMP REPAIRS</td>
</tr>
<tr>
<td>27</td>
<td>973303 COOLING TOWER REPAIRS, AIB</td>
</tr>
<tr>
<td>28</td>
<td>973305 AIB ROOF REPAIR STUDY</td>
</tr>
<tr>
<td>29</td>
<td>973314 SANITARY DRAIN MODIFICATIONS</td>
</tr>
<tr>
<td>30</td>
<td>973315 AIB, NORTH ENTRY MARBLE REPLACEMENT</td>
</tr>
<tr>
<td>31</td>
<td>973316 AIB MASTER PLAN</td>
</tr>
<tr>
<td>32</td>
<td>983303 RIPLEY MEMORIAL FOUNTAIN</td>
</tr>
<tr>
<td>33</td>
<td>983305 AIB PAINT/REPAIR EXTERIOR WINDOWS</td>
</tr>
<tr>
<td>34</td>
<td>983307 MECHANICAL ROOM 3150 MODIFICATIONS</td>
</tr>
<tr>
<td>35</td>
<td>983308 OFFICE RELOCATIONS</td>
</tr>
<tr>
<td>36</td>
<td>993303 AIB ROOF (INTERIOR PROTECTION)</td>
</tr>
<tr>
<td>37</td>
<td>993303A NW SKYLIGHT REPAIRS</td>
</tr>
<tr>
<td>38</td>
<td>003301 CONDENSATE PIPE REPAIR IN AIB B22</td>
</tr>
<tr>
<td>39</td>
<td>003302 IN-BUILDING RADIO ANTENNA SYSTEM</td>
</tr>
<tr>
<td>40</td>
<td>0015105 AIB SIGNAGE</td>
</tr>
<tr>
<td>41</td>
<td>0315102 LEAD DUST RUNOFF FROM ROOF</td>
</tr>
<tr>
<td>42</td>
<td>0315103 INFRASTRUCTURE IN CRISIS - AIB</td>
</tr>
<tr>
<td>43</td>
<td>0315105 AIB COMMISSIONING</td>
</tr>
<tr>
<td>44</td>
<td>0315106 OSECS AIR CONDITIONING - AIB</td>
</tr>
<tr>
<td>45</td>
<td>0315107 AIB ROOF REPAIRS</td>
</tr>
<tr>
<td>46</td>
<td>0315110 AIB TENANT RELOCATION PROJECT</td>
</tr>
<tr>
<td>47</td>
<td>0315111 REMOVE LEAD PAINT FROM PIPE AT AIB SEECC</td>
</tr>
<tr>
<td>48</td>
<td>0415101 AIB INTERIM REPAIRS &amp; MOULD BANDING</td>
</tr>
<tr>
<td>49</td>
<td>0415102 CHILLED WATER CONNECTIONS FOR AIB, SIB, QUAD</td>
</tr>
<tr>
<td>50</td>
<td>0415105 RELOCATE OCIO STAFF AND DATA CENTER</td>
</tr>
<tr>
<td>51</td>
<td>0515101 AIB INTERIM ROOFING REPAIRS</td>
</tr>
<tr>
<td>52</td>
<td>0815101 AIB DEVELOPMENT INITIATIVE</td>
</tr>
</tbody>
</table>
Sources used for the development of this project included:

1. The Smithsonian Institution OFEO/AHHP
2. The Smithsonian Institution OFEO/OEDC
3. The Smithsonian Institution Archives
4. The Library of Congress
5. The Historical Society of Washington, DC
6. Google Books Collection
7. The Goethe Institute Collections
8. The American Institute of Architects Archives, Washington DC
9. The Association for Preservation Technology
10. The American Institute of Conservation of Art
11. The Architect of the Capitol

**Abacus** - The flat stone slab underneath the entablature that forms the top of the capital of a classical column supporting a beam.

**Acanthus** - A stylized leaf motif, one of the primary decorative elements of classical architecture. With its origins in Greece, it was adopted by Romans and transmitted into the general classical tradition.

**Air Space** - A space provided in exterior wall construction to prevent passage of moisture and allow the wall to dry out.

**Align** - The faces of objects that are in line with each other, or when their center-lines lie on the same axis.

**Anchor Bolt** - A bolt or threaded rod used to secure the sill to the foundation wall.

**Angle Iron** - Provides supporting lintels for openings in masonry wall construction.

**Apron** - The horizontal member directly beneath the stool or inside sill of a window.

**Apse** - A semicircular and usually vaulted projection from a rectangular structure. Origins of the word are classical, but it is most commonly used to describe an element of a Gothic church. A recess, usually singular and semi-circular, at the east end of a Christian church.

**Arcade** - A series of arches supported by piers or columns.

**Arcading** - An uninterrupted series of arcades.

**Arch** - A curved structure used as a support over an open space, as in a doorway. A semicircular opening in a wall, or a freestanding structure dependent for its structural stability on the horizontal load threatening to push it apart. Usually made from cut stone blocks forming interlocking wedges.

**Architectural Details** - The small details like moldings, carved woodwork, etc. that add character to a building.

**Architrave** - Originally a simple, flat, structural lintel spanning an opening in a wall, it is the lowest part of the classical entablature. Subsequently a term used to describe any molded door or window frame.

**Archival Resources** - Refers to collections of corporate or organizational records or manuscript or photograph collections. The term once implied paper records but increasingly can refer to electronically-produced records including CDs, audio or video tapes, or computer tapes or disks.

**Area Wall** - The retaining wall surrounding a basement window which is below ground level.

**Areaway** - The excavated area between the area wall and the basement window.

**Asbestos** - A fibrous, incombustible material once used in building construction. No longer allowed due to health risk.
Ashlar - The practice of laying stone in smooth cut - or dressed - blocks in regular courses, separated by only the thinnest of joints. Originated by the ancient Egyptians and adopted as an important element of classical architecture.

Ashlar Masonry - Masonry construction using a square stone.

Atrium - In the Roman period, this was the inner courtyard of a house, left open to the sky, and generally built by the affluent urban classes. In the 20th century, the word has been adopted to describe dramatic enclosed glass-roofed indoor spaces associated with high-rise hotels and office buildings that are treated as substitutes for the public realm.

Awning - A roof like cover extending over or in front of a place (as over the deck or in front of a door or window) as a shelter.

Axis (pl. axes) - The centerline of openings or objects that align in a row along an imaginary line. A primary element in architectural composition, around which it is possible to create a sense of symmetry both in plan and in the elevation of a building.

Balcony - A platform projecting from an upper story and enclosed by a railing.

Baluster - Any of the small posts that make up a railing as in a staircase; may be plain, turned, or pierced.

Balustrade - The combination of railing held up by balusters.

Baseboard - Finish trim where the floor and walls meet.

Base Molding - The decorative wooden strip along the top edge of the baseboard.

Base Shoe - The wooden strip (usually quarter round) along the bottom face of the baseboard at the floor level.

Barrier-Free Design - Refers to arrangements for accommodating persons with visual, hearing, or physical impairment to mobility.

Batt - A precut section of insulation designed to fit between studs.

Bay - Buildings are often divided into repetitive elements, or bays, defined by the space between two horizontal beams, or pairs of vertical columns.

Bead Molding - A small, cylindrical molding enriched with ornaments resembling a string of beads.

Beam - A horizontal load-bearing element that forms a principal part of a structure, usually using timber, steel, or concrete.

Bearing Partition - An interior wall supporting weight from above.

Belt-course - A horizontal band similar to but thicker than a string course, marking subdivisions of a building.

Beveled - A stone cut at angles for a more decorative display.

Black Asphaltum - A bituminous substance applied to the outside of foundation walls beneath the ground level to waterproof these walls.
Blind Stop - A strip of material fastened to the inside perimeter of a window frame used to hold a sash in place.

Board Foot - A unit of measurement based on volume. 144 cubic inches of wood equals one board foot.

Bond - A term adopted to describe the various patterns used to lay bricks in order to give them maximum strength. It is an approach that has its origins in the period before the invention of high-strength cement mortars, which made bonding of this kind unnecessary; but the patterns survive, representing a cultural tradition now, rather than a functional necessity. English bond, for example, has been in use for 400 years, and is based on a mix of bricks laid end on, and side on, in such a way that the cross joints are regularly spaced. Other patterns include Flemish bond, heading, stretching, and American. Refers to the pattern formed by mortar joints between bricks, blocks, or stones.

Boss - A carved stone positioned at the apex of a ribbed vault.

Bottom Rail - The lower rail of the bottom sash of a double-hung window.

Bracket - A small supporting piece of wood or stone, often formed of scrolls or other decorative shapes, designed to bear a projected weight, such as a window.

Brick - One of the oldest building materials, brick is based on a mix of clay with silt and sand pressed in molds and then burned in a kiln, which gives the characteristic slightly glazed finish. Standard brick sizes vary from country to country and over the years. In mainland Europe, for example, bricks are often more slender than those commonly used in the USA and Britain.

Brick Veneer - A type of wall constructed with facing brick covering a backing wall of frame or masonry.

Bridging Cross - Wood or metal strips nailed diagonally between floor joist to prevent lateral movement and dissipate weight.

Bridging Solid - Wooden blocks used to separate floor joists beneath partition walls.

Building Code - A set of laws drafted by the governing body of a borough, town, or city to control building construction “to promote the public health, safety and general welfare” of the people in that locality.

Buildings Construction - Can refer to the actual construction of a building or to a discussion of the materials of which it is constructed (sub-categories include masonry, steel-frame, wood).

Buildings History - Used only when a detailed and extensive history of a building is given.

Buttress - A structure built against a wall to support or reinforce it. Usually an exterior masonry structure that opposes the lateral thrust of an arch or a vault and adds extra support.

Canopy - A projection or hood over a door, window, niche, etc.
Cantilever - A projecting elements, such as a beam or porch, supported at a single point or along a single line by a wall or column, stabilized by counterbalancing downward force around the point of fulcrum.

Capital - The elaboration at the top of a column, pillar, pier or pilaster.

Casing - The trim bordering the inside or outside of a window or door, commonly referred to as “inside” or “outside” casing.

Cast Iron - Refers to the use of cast iron (distinguished from other types of iron) as a building material, often in building facades but also as a structural material. See also Wrought Iron, Ironwork and Metalwork.

Caulking - A putty-like substance used to seal joints against the weather.

Cement Plaster - A mixture of sand and cement that is applied to the exterior foundation wall beneath ground level to aid in waterproofing.

Ceramic Tile - Any of a wide range of sturdy floor and wall tiles made from fired clay and set with grout. May be glazed or unglazed. Colors and finishes vary. May be used in doors or out.

Chair-rail Molding - A wooden molding placed along the lower part of the wall to prevent chairs, when pushed back, from damaging the wall. Also used as decoration.

Chimney - A passage or structure extending above the roof, through which smoke escapes.

Chiseled - A stone shaped by a sharp-edged hand tool.

Chamfer - A beveled edge.

Cinquecento - Sixteenth century.

Circa - Used only when the exact date is not known. If an article says, “Mark Twain’s Hannibal tree house, constructed around 1840,” “ca. 1840” is used. But if an article says, “Charlotte Perkins Gilman’s mansion built in the 1890s,” “1890s” alone is used; no circa is necessary. The same goes for centuries.

Circulation - Architecture is not experienced statically. Circulation routes, the means by which access is provided through and around a building, are very often key elements in creating an understanding of architecture as users move from one part of a building to another through a carefully considered sequence of spaces. That part of a room or building required for movement of people from place to place.

Cladding - The lightweight outer skin of a building that does not carry any weight or support the building, but does keep wind and rain out. A term used to describe the siding or materials covering the exterior of a building.

Classical - Refers to the architecture and design ideas of ancient Rome and Greece.

Classicism - The architectural vocabulary that has shaped Western architecture ever since ancient Greece. Characterized by a set of compositional rules and architectural elements, in particular, columns and orders. It is a language that has continually reinvented itself, providing scope for successive generations to explore the fundamentals of design.
**Clean-Out** - An opening in the fireplace foundation for disposal of ashes from the ash dump, or a fitting attached to waste and soil pipes to allow the system to be cleaned out.

**Clerestory** - The fenestrated part of a building that rises above the roofs of the other parts. Upper elements of a Romanesque or Gothic church, bringing light into the center of the building from side windows pierced through stone.

**Clerestory Window** - A window (usually narrow) placed in the upper walls of a room, usually at an angle, to provide extra light.

**Collar Beam** - Horizontal members spanning roof rafters to supplement roof strength and/or form ceiling joist in half-story construction.

**Colonnade** - A row of columns forming an element of an architectural composition, carrying either a flat-topped entablature or a row of arches.

**Column** - A slender, upright structure, usually a supporting member in a building. Freestanding or self-supporting structural element carrying forces mainly in compression; either stone, steel, or brick, or more recently, concrete.

**Common Brick** - A brick used where strength in construction is required rather than a pleasing appearance.

**Competition** - A means for selecting an architect for a significant commission; architects are invited to take part in a competition, which can be either open to all comers or by invitation only. Open competition is regarded as an important way of discovering innovative new talent.

**Compound Pier** - A pier composed of a group or cluster of members, especially characteristic of Gothic architecture.

**Conservation and Restoration** - Refers to efforts to rehabilitate, structurally and cosmetically, downtowns whose buildings have generally declined as commercial centers.

**Concrete** - A mixture of sand, cement, and aggregate (stone or gravel) that may be reinforced with ferrous metals.

**Concrete Blocks** - Masonry blocks commonly used for foundation and backing walls.

**Coping** - A flat cover of stone or brick that protects the top of a wall.

**Corbel** - A projecting wall member used as a support for some elements of the superstructure. Also, courses of stone or brick in which each course projects beyond the one beneath it. Two such structures, meeting at the topmost course, creates an arch.

**Corbeling** - Stone, brick, or wood projecting from a wall or chimney for support or decoration.

**Cornice** - Decorative projection along top of wall.

**Corinthian Column** - In classical architecture, a column decorated at the top with a combination of curlicues, scrolls, and other lavish ornamentation.

**Corinthian** - The type of Greek column characterized by simulated acanthus leaves.
Cornice - The uppermost section of moldings along the top of a wall; any molded projection of similar form.

Cornice Return - A short continuation of the face board at the gable end of a house.

Course - A continuous row of building materials, such as shingle brick or stone.

Crawl Space - The open space beneath the first floor in a basement less house.

Cresting - The top line or surface of a structure.

Crowning - A molding where the wall and ceiling meet; uppermost molding along furniture or cabinetry.

Cupola - A small, dome-like structure on top of a building to provide ventilation and decoration.

Cut Stone - Large stones cut individually, used for a foundation or wall of a house.

Dado - The zone between a chair rail or lower part of a sill and the baseboard.

Damper - An adjustable metal plate controlling convection currents in a fireplace.

Dead Load - The weight of things and materials that are always present at the same place in a building.

Design Criteria - Standards of appropriateness or compatibility of building design within a community or historic district. Often in the form of a handbook, design criteria (also called design guidelines) usually contain drawings accompanying “do’s and don’t’s” for the property owner. In some situations an Architectural Review Board or similar group has authority to administer the design criteria.

Doric - The simplest of the three classical orders of Greek architecture.

Double-hung Window - A window that operates by means of two sashes that slide vertically past each other.

Drip Cap - A projection found, along the top edge of exterior windows and doors to allow water to fall directly to the ground.

Duct - A sheet metal enclosure carrying warm or cool air from a forced air heating or cooling plant.

Eave - The projecting lower edge of a roof.

Elevation - An orthographic view of some vertical feature of a house. (Front, rear, side, interior elevation)

Entablature - The area above an entryway in which the transom is contained.

Excavate - To dig out a volume of earth for a basement, footings, or foundation.

Exterior Wall - An outside wall.
Facade - One of the exterior faces (walls) of a building.

Face Brick - A finished, non-defective brick yielding good appearance and construction quality.

Fenestration - The stylistic arrangement of windows in a building.

Finial - A knob or spire like ornament.

Finish Floor - A finished walking surface.

Fire Brick - A fire resistant brick used to line a fireplace.

Fire Stop - A board placed within a frame wall to prevent a flue-like action in case of a fire.

Flashings - Sheet metal fitted around chimneys, valleys, drip caps, etc. to seal out moisture.

Flat Roof - A pitch less roof type.

Floor Plan - An orthographic section of an intended floor layout with the cutting plane passing through windows and doors.

Flue - The hollow passage that carries smoke and heat to the outside from the fireplace or furnace.

Flue Liner - The fire resistant material that lines the flue.

Footer - The concrete slab that supports all foundation walls.

Footing - A type of stone edging on a masonry wall.

Foundation - The base of a house providing stability and rigidity.

Foundation Wall - The masonry wall that rest on the footer.

Foyer - An area just inside the main exterior door for the removal of wraps, overshoe, etc.

Framing Plan - A top view plan of the roof of floor level showing the layout of rafters, ridge, joist headers, trimmers, etc.

Frieze - A band with designs or carvings along a wall or above doorways and windows.

Frost Line - The underground level that frost will reach during the coldest days in a given locality.

Furring Strips - Wooden strips nailed to masonry walls to provide the necessary air space between masonry and wood or plaster.

Girder - A structural member spanning foundation walls designed to support joist ends.

Girt - Supports the second floor joist in two-story construction.

Grounds - Wooden strips of plaster thickness found behind inside window and door casings and baseboards to provide adequate nailing surface.

Gutter - A trough along the edge of a roof that collects water off the eave and carries it to the down spout.
**Hanger** - A formed sheet steel device that anchor together floor framing members that meet at right angles.

**Head** - A term that applied to the construction that comprises the entire lintel of a door or window.

**Header** - This term applies to several construction features: the top horizontal support of a rough opening, the support for joist-ends on the foundation walls sill and, the support for joist-ends in a floor or roof opening.

**Heat Loss** - The heat that is lost (in BTU’s) through ceilings, roof, floors, and exterior walls of a house.

**Heating Systems** - Different heating methods for heating buildings: hot water, warm air, steam, electric, heat pump, geo-thermal, etc.

**Heritage Areas** - Used only when the article uses this terminology. As opposed to a park, historic district, or scenic byway, a heritage area possesses the following broadly-defined components: a “sense of place”; regional scope; natural or cultural resources that unify the region; varied land uses; (usually) private ownership; local, regional, state, and/or national significance. This term is used only when the article covers: 1) the subject of heritage areas or 2) officially designated heritage areas.

**Historic Districts** - Used only when referring to a neighborhood or region designated by national, state, or local officials as a historic district.

**Historic Landmarks** - Used only when referring to a site designated by national, state, or local officials as a historic landmark. Primarily used to refer to National Historic Landmarks.

**Historic Registers** - Refers to any local, state, national, or international list of significant sites, districts, buildings, or objects. Used when such a list is the focus of the article. Examples: the National Register of Historic Places; the World Heritage List. Articles that simply state that a building (site, etc.) has been listed are not included unless the article provides substantial information about the building.

**Historic Registers Criteria** - Refers to the standards a site, district, building, or object must meet in order to be listed in a historic register.

**Historic Sites** - This term is reserved for use for historic sites related to famous or important events or persons (i.e. Independence Hall, Philadelphia; Monticello, etc.).

**Historic Structure Reports** - An HSR is an analysis of a building’s structural condition, involving written and photographic or photogrammetric evidence. The purpose of an HSR is usually to provide a record of a building’s condition before beginning restoration or renovation of the building.

**I-Beam** - A steel beam often used for floor support. Cross section of beam resembles a capital I.

**Infiltration** - The act of air blowing into the building through windows and doors with gaps between the masonry opening and frames, missing weather stripping, or missing window or door components.

**Inside Stop** - See blind stop.
**Glossary of Terms 5.3.1**

**Insulation** - A material designed to control the passing of heat and/or sound.

**Interior Elevation** - An orthographic view of an inside wall.

**Ionic** - The type of Greek column characterized by scroll-like decorations.

**Ironwork** - Usually refers to decorative ironwork on old buildings such as in the French Quarter, New Orleans, La. See also Cast Iron and Metalwork.

**Jamb** - The vertical members of a window or door frame.

**Joist** - Wood framing members, usually set 16” apart on center, carefully chosen to support all “live” and “dead” loads.

**Keystone** - The central, topmost stone of an arch.

**Knee Wall** - A wall supported by jack studs in half-story construction.

**Lally Column** - A post supporting a girder or I-beam.

**Lath** - Mesh metal, plasterboard, or thin wooden strips used as a foundation for plaster or stucco.

**Lattice** - A grille created by crisscrossing or decoratively interlacing strips of material.

**Leaded Window** - A window decorated by inserts of lead.

**Leader** - Down spout

**Ledger Strip** - A wooden strip nailed along the bottom face of one support to aid in the support of another member brought.

**Light or Lite** - A window glass.

**Lintel** - A horizontal supporting crosspiece over an opening.

**Live Load** - The weight of people, things, and materials that are not always present at the same place in a building.

**Louver Vent** - An opening fitted with a series of sloping slats arranged to admit light and air but shed rain.

**Masonry** - Stonework or brickwork

**Meeting Rails** - The name applied to rails of window sash that meet one another when the window is closed.

**Millwork** - Finished woodwork, cabinetry, carving, etc.

**Molding** - Shaped decorative outlines on projecting cornices and members in wood and stone.

**Mullion** - The vertical member separating adjacent windows.

**Muntin** - Wood or metal strips separating lites.
Museums Collections - Distinguished from Museums Interpretive Programs in that it is limited to description of a particular collection or set of collections without special reference to the particular interpretive method at work in the presentation of the collections.

Museums Interpretive Programs - Attempts to provide a context for or explain the significance of artifacts, works of art, historic places, cultural sites, or historic events at museums, historic sites.

Newel - The terminating baluster at the lower end of a handrail.

Niche - A recess in a wall to place various decorations.

Nosing - The rounded fore-edge of a stair tread.

Outlet - A passage connecting the gutter to the down spout.

Outside Stop - A strip of wood or metal fastened to the inside perimeter of a window frame that holds the sash against the parting strip.

Palladian - A motif having three openings, the center one being arched and larger than the other two.

Palladian Window - A three part window featuring a large arched center and flanking rectangular side-lights.

Parapet - That portion of the wall that extends above the roof (wall surrounding a flat roof).

Parget or Parging (colloq.) – Rough set, plaster. (Parging is a colloquial term referring to the application of cement plaster.)

Parting Strip - A wood or metal strip fastened to the inside perimeter of a window frame used to separate adjacent sliding sash.

Partition - The name given to an interior wall.

Pediment - A low triangular gable above a cornice, topped by raking cornices and ornamented. Used over doors, windows, or porches. A classical style.

Pendant - A bulbous, knob-like ornament which hangs downward.

Pilaster - A rectangular vertical member projecting only slightly from a wall, with a base and capital as with a column.

Pier - A vertical, non-circular masonry support, more massive than a column.

Pillar - Similar to but more slender than a pier, also non-circular.

Pitch - The rate at which a roof or other surface slopes.

Plaster - A surface covering for walls and ceilings applied wet and dries to a smooth, hard protective surface.
Plate - The 2x4 nailed along the top edge of all stud walls. A plate also is secured to the top of all solid brick or masonry walls.

Ply Cap - A plain shaped molding, 1/4 rounded to provide a smooth edge along the baseboard.

Preservation Techniques - Methods of maintaining the historical integrity of a building with limited alterations or additions; methods of stabilizing and preventing further decay. The term should be distinguished from Restoration Techniques, which denotes rebuilding in order to achieve authenticity, and Conservation Technology on the basis of the difference between preservation and conservation; in the U.S., the former can refer to buildings, while the latter refers to other cultural objects and natural resources.

Rafter - A roof beam sloping from the ridge to the wall.

Raking Cornice - The sloping moldings of a pediment.

Range - A single story exhibit space in the AIB; refer to Section 1.3

Restoration Techniques - Methods used in rebuilding buildings and structures with historically accurate materials to achieve historical authenticity in keeping with a particular time period or event. The term should be distinguished from Preservation Techniques on the basis of the difference in meaning between restoration and preservation, which is a matter of degree. While both seek to achieve historical accuracy, preservation does not imply rebuilding. Restoration Techniques should also be distinguished from Conservation Technology, a distinction having to do with the range of reference present in each term. While restoration can include buildings, in U.S. usage the term conservation cannot.

Revival - Used to describe later revivals of historical styles. If the building was designed after the original style period, “Revival” is added to the style name.

Ridge - The top-most portion of a roof from which roof sides fall away.

Rise - The vertical distance from one stair tread to the next.

Riser - The vertical portion of a step. The board covering the open space between stair treads.

Roof Pitch - Degree of roof slant stated in inches rise per foot.

Roof Run - The horizontal distance from the outside of a bearing wall plate to the center of the ridge rafter.

Roof Span - Equal to twice the roof run, or the horizontal distance between the outside faces of bearing wall plates.

Rough Opening - The frame wall opening to receive a door or window unit.

Rough Sill - The bottom rail of a window rough opening.

Rubble - Masonry construction using stones of irregular shape and size.

Rusticated Stone - Stonework, sometimes roughly finished, distinguished by having the joints deeply sunk.
**Saddle** - A small ridged roof designed to carry water away from the back side of a chimney.

**Sash** - An individual window unit (comprised of rails, stiles, lites, muntins) that fits inside the window frame.

**Sheathing** - A covering over the structural frame of a building, onto which the cladding is attached.

**Shed** - A roof type with one high pitched plane covering the entire structure.

**Shingles** - Wood, asphalt, or other material that is applied in small sections as an outside covering on roofs of exterior walls to convey the run off of water.

**Shutter** - A movable cover for a window used for protection from weather and intruders.

**Shutter Dogs** - Small metal structures used to hold the shutters against the wall.

**Seismic Retrofit** - Refers to the shoring-up of buildings them better to enable to withstand earthquakes.

**Sidelights** - Windows on either side of a door.

**Sill** - A horizontal piece forming the bottom frame of a window or door opening.

**Site** - The section of town or general location in which the building lot is located.

**Skylight** - A window in a roof to give light to a loft or room without other lighting.

**Slate** - A roof material made from a hard, fine-grained rock that cleaves into thin, smooth layers.

**Sleepers** - Joist set in concrete to provide nailing strips for flooring.

**Sliding Window** - A window that opens by sliding large panes from one side to the other.

**Soffit** - The underside of a member such as a beam or arch, or of an eave, overhang, dropped ceiling, etc. (Same as bed board)

**Solar Orientation** - The relationship of a room or building to the sun’s light.

**Sole** - The horizontal wooden member supporting wall studs.

**Spandrel** - The part of a porch facade that reflects the balustrade.

**Specifications** - A document prepared with a building’s drawn plans that includes quantity and quality of material to be used in construction and a general description of how the work should be done and what will be included.

**Spire** - The pyramidal structure soaring from a tower or roof a church.

**Square** - A unit of measure equal to 100 square feet. Three square of shingles, for example, will cover 300 square feet of wall or roof area.

**Stairwell** - The enclosure of a stairway.

**Stile** - The vertical sides of a window sash.
Stool - The inside window sill.

Story - A horizontal division of a building, from the floor to the ceiling above it.

String-course - Similar to a belt-course but thinner; a horizontal band or molding marking architectural subdivisions, such as stories.

Stringer - The board nailed to the exterior wall sheathing to support returns. The diagonal supporting members for treads and riser, also called horses.

Striking Joints - The act of forming the mortar at the joints of brick, stone, or tile construction for the purpose of decoration.

Stucco - A mixture of cement, sand, lime and water spread over metal screening or chicken wire or wooden lath on wooden walls to form the exterior covering of and exterior wall.

Stud - A vertical wood support in a frame wall.

Sub-floor - A floor beneath the finish floor designed to strengthen the bearing surface and prevent dust from passing through floors.

Surround(s) - The molding that outlines an object or opening.

Symmetrical - When two halves of an object are mirror images of each other.

Sympathetic Additions - Additions to structures that follow or complement the architectural style or scale of the original building.

Terra Cotta - A mixture of sand and baked clay commonly used to make pipe for sewage disposal systems. Also a mixture of sand and baked clay used to form a shingle used on certain styles of architecture.

Terrazzo - A colorful flooring material made of cement and marble chips or certain stones. After the floor has hardened it is ground and polished to a smooth and durable finish.

Thermopane - Two or more sheets of glass set apart from one another with a vacuum space between to prevent condensation and reduce heat loss.

Thermostat - An automatic device to control heating or cooling.

Three-way Switch - Electrical switches installed in pairs to allow a light or appliance to be controlled from two locations.

Threshold - The wooden or metal strip directly beneath an exterior door. Some have an added rubber or plastic strip feature for better weatherstripping.

Tongue and Groove - A type of wooden siding with the edge of one board fitting into the groove of the next.

Top Rail - The upper rail of the top sash of a double hung window.

Transom - A small window just above a door.

Trap - A plumbing device preventing sewage odors from entering the house.
**Tread** - The horizontal portion of a step, usually with a rounded edge, or 'nosing' that overhangs the riser.

**Truss** - A framework for supporting a roof.

**V-Type Ridge Cover** - A series of clay shingles used to cover the ridge pole on tile and slate roofs.

**Valley** - A low region on a roof between gables.

**Valley Jacks** - Rafters that run from the ridge rafter to the valley rafter.

**Valley Rafter** - The rafter under the valley proper.

**Veneer** - A thin facing of finishing material.

**Veneer Wall** - The covering of one wall construction by a second material to enhance wall beauty. (Brick or stone over frame, brick or stone over concrete block.

**Vent Stack** - A metal, plastic, or composite pipe (usually 4” in diameter) leading from the sewage network out through the roof to prevent pressures during sewage flow.

**Vinyl** - A synthetic type of siding used for its economic value and durability.

**Wall Tie** - A galvanized iron strip used to tie a veneer wall to its backing wall.

**Wainscot** - A paneling applied to the lower portion of a wall.

**Waste Pipe** - The name generally applied to all household drainage pipes.

**Water Closet** - Commode or toilet.

**Water Table** - Similar to a drip cap in function, sometimes found around the perimeter of a house near the ground line.

**Weatherstripping** - A strip of fabric, plastic, rubber, or metal found around exterior wall openings to reduce infiltration.

**Well-Opening** - A stair enclosure.

**Window Frame** - The window unit less sash.

**Window Types** -

- **Double Hung** - Two sash, vertical sliding
- **Casement** - Side hinged
- **Awning** - Top hinged
- **Hopper** - Bottom hinged
- **Oriel** - Windows that generally project from an upper story, supported by a bracket.
- **Picture Window** - Fixed sash
• **Jalousie** - Glass slats, Venetian blind principle

• **Horizontal Sliding** - two or more sash designed to slide over one another

• **Bay** - Extends beyond the exterior face of the wall

• **Bow** - Projected window with a curved surface often in the glass itself.

• **Combination** - The integration of two or more of the above into one unit.

**Wrought Iron** - Used for wrought iron, as opposed to cast iron; usually a building or structural material.
The following terminology is from The American Institute of Conservation of Historic and Artistic Works (AIC):

**Definitions of Conservation Terminology**
The legacy of our collective cultural heritage enriches our lives. Each generation has a responsibility to maintain and to protect this heritage for the benefit of succeeding generations. Those who care for cultural property - the material aspects of that heritage - use special terminology currently defined by AIC as follows:

**Conservation:** The profession devoted to the preservation of cultural property for the future. Conservation activities include examination, documentation, treatment, and preventive care, supported by research and education.

**Examination:** The investigation of the structure, materials, and condition of cultural property including the identification of the extent and causes of alteration and deterioration.

**Documentation:** The recording in a permanent format of information derived from conservation activities.

**Treatment:** The deliberate alteration of the chemical and/or physical aspects of cultural property, aimed primarily at prolonging its existence. Treatment may consist of stabilization and/or restoration.

**Stabilization:** Treatment procedures intended to maintain the integrity of cultural property and to minimize deterioration.

**Restoration:** Treatment procedures intended to return cultural property to a known or assumed state, often through the addition of nonoriginal material.

**Preventive Care** (also referred to as preventive conservation): The mitigation of deterioration and damage to cultural property through the formulation and implementation of policies and procedures for the following: appropriate environmental conditions; handling and maintenance procedures for storage, exhibition, packing, transport, and use; integrated pest management; emergency preparedness and response; and reformatting/duplication.

**Cultural Property:** Objects, collections, specimens, structures, or sites identified as having artistic, historic, scientific, religious, or social significance.

**Preservation:** The protection of cultural property through activities that minimize chemical and physical deterioration and damage and that prevent loss of informational content. The primary goal of preservation is to prolong the existence of cultural property.

**Conservator:** A professional whose primary occupation is the practice of conservation and who, through specialized education, knowledge, training, and experience, formulates and implements all the activities of conservation in accordance with an ethical code such as the AIC Code of Ethics and Guidelines for Practice.

**Conservation Administrator:** A professional with substantial knowledge of conservation who is responsible for the administrative aspects
and implementation of conservation activities in accordance with an ethical code such as the AIC Code of Ethics and Guidelines for Practice.

**Conservation Educator:** A professional with substantial knowledge and experience in the theory and techniques of conservation whose primary occupation is to teach the principles, methodology, and/or technical aspects of the profession in accordance with an ethical code such as the AIC Code of Ethics and Guidelines for Practice.

**Conservation Scientist:** A professional scientist whose primary focus is the application of specialized knowledge and skills to support the activities of conservation in accordance with an ethical code such as the AIC Code of Ethics and Guidelines for Practice.

**Conservation Technician:** An individual who is trained and experienced in specific conservation treatment activities and who works in conjunction with or under the supervision of a conservator. A conservation technician may also be trained and experienced in specific preventive care activities.

**Collections Care Specialist:** An individual who is trained and experienced in specific preventive care activities and who works in conjunction with or under the supervision of a conservator.
Sources for Definitions
The following organizations provided information for definitions of terms and concepts related to Historic Preservation and Technology.

1. The Smithsonian Directive 418 and Appendices
3. The Americans with Disabilities Act of 1990, Title III
4. The International Building Code
5. The American Institute for the Conservation of Historic and Artistic Works
6. The American Institute of Architects
7. The Association of Preservation Technology
9. The Brick Institute of America
10. The General Services Administration Historic Preservation Division
11. The United States Green Building Council
12. The Athena Institute
13. The Canadian Conservation Association
14. The National Paint and Coatings Association
15. The Marble Institute of America
16. The National Forest Products Laboratory, The U.S. Forest Service
17. The American Society of Heating, Refrigerating and Air-conditioning Engineers (ASHRAE)
This section contains a pair of building chronologies. The first chronology was prepared for this report and is organized by year. The second chronology is taken from the *Preservation Plan for the Arts and Industries Building*, prepared by Oehrlein & Associates for the Polshek Tobey + Davis Master Plan Renovations, and is organized by building component.
AIB building chronology organized by year to include institutional and architectural histories:

1876
- May 10, 1876: Centennial International Exhibition opens in Philadelphia. It formally closes on November 10, 1876.
- Smithsonian Secretary Joseph Henry advocates museum separation from Smithsonian Institution (SI). Henry transmits to Congress the need for new building, requesting appropriation of $250,000.
- General Montgomery C. Meigs offers a plan and construction superintendence.
- Report of Assistant Secretary Spencer F. Baird on the Centennial, including removal and proposed storage of exhibits to Washington.
- Memorandum to Congress for need for new building to house increased collections.

Report of the Assistant Secretary, [S.F. Baird], 1876. (SI-AHHP, Box 2)
Includes a discussion of the need for increased accommodations to be presented to Congress, suggested by General Meigs, with “the details worked out by Mr. Cluss” to include “an edifice with a floor area 300 feet square, and so arranged as to be capable of being excellently lighted. A concrete floor is proposed, for the purpose of keeping out moisture and preventing the lodgement of vermin, with brick walls and an iron, slate or metal roof... at a cost not to exceed $250,000, or about $2.84 per square foot. By its simplicity and uniformity of structure, and the absence of cut stone or carving, it is thought that the whole can be completed and ready for occupation within ten months’ time from its commencement... protection against the elements and fire. It is thought that by laying a concrete floor on the ground, using brick walls and piers and a roof with iron beams, and wooden sheathing covered with tin, these requirements will be most readily met.”

1877
- Meigs plan submitted to Congress.

January 31, 1877 - Excerpts from memorandum re proposed building (SIA. RU 7081, Box 28)
“300 by 300 feet in size... upon a solid concrete foundation, the outside walls to consist of best hard-burned bricks, laid in cement-mortar, with oiled and penciled fronts. The base-course, sill-courses, coping of low wall of interior colonnade, etc., to consist of cut-stone. The main floor to consist of an approved concrete or its equivalent. Any floors above in pavilions, etc., to be fireproof and to be approached by fireproof stairs. The frame of roof to consist of trussed wrought iron work of ample strength, to be supported by ornamental iron columns where it does not rest upon brickwork and to be covered in with metal for the flat surfaces, and slate for the pavilions. The whole building to be thoroughly sewered and to be supplied with water, fire-plugs of standard size... gas pipes, and the usual modern accommodations in due proportions. The inside brickwork, etc., is to be plastered, and the clerestories are to be glazed with extra-thick
fluted glass. An improved steam-heating apparatus is to be provided."

February 5th, 1877 - Request from Board of Regents to Congress for an appropriation of $250,000. Subsequent bill pass the Senate but did not pass in the House of Representatives.

1878
- Armory fitted to receive collections from Philadelphia.
- Bill for erection of new building reintroduced to Congress.
- May 13th, 1878: Smithsonian Secretary Joseph Henry dies. Later that year Spencer F. Baird becomes the new Secretary.

1879
Edward Clark, Architect of the Capitol and General M.C. Meigs of the Army confirm that the estimate for work is sufficient for completion of work. (AR 1880, Report of the Building Commission, p. 126)

Contracting begun, completion expected by June next.

No provision for display cases.

January 7, 1879 - 45th Congress, 3rd Session, S. 1574. (SI-AHHP, Box 4)
Congress appropriates $250,000 for construction of new fireproof museum building (300 square feet) to house collections from Philadelphia Centennial Exhibit of 1876 and overcrowded SIB. The location of the building “to be placed east of the Smithsonian Institution, leaving a roadway between it and the latter of not less than fifty feet with its north front on a line with the south face of the buildings of the Agricultural Department and of the Smithsonian Institution...”

January 17, 1879 – Board of Regents authorizes the Executive Committee of the Board and the Secretary to act on its behalf “in carrying into effect the provisions of any act of Congress that may be passed providing for the erection of a building for the National Museum.” (AR 1879, Report of the Building Commission, p. 125)


March 25, 1879 - Memo from Cluss & Schulze to S.F. Baird indicating itemized estimate (including contingency) for the amount of $250,000 for the National Museum. (SI-AHHP, Box 12).

March 25, 1879 Cluss & Schulze selected as superintending architects.

April 3, 1879 - Letter from Cluss & Schulze to S. F. Baird (SI-AHHP, Box 12). Accepting appointment as superintending architects and superintendents of “this fireproof building for the National Museum.”

Request for separate proposals for “furnishing and delivering the concrete-stone, rubble-stone, bricks, cement, lime, and sand; and also for excavating and grading, for all labor in laying concrete foundations, for all labor in building foundations and cellar walls of rubble-stone, and for all labor in laying bricks.”

April 14, 1879 - Contract entered with John Miller for provision of sand. (AR 1879, Report of the Architects, p. 139)


April 21, 1879 - Contract entered with Jos. A. Blundon for provision of gneiss rubble stone. (AR 1879, Report of the Architects, p. 139)

April 23, 1879 - Contracts entered with Gleeson & Himber for provision of grading, labor for concrete foundations, labor for rubble stone masonry, and material for concrete stone. (AR 1879, Report of the Architects, p. 139)

April 26, 1879 - Contract between Cluss & Schulze and Richard Rothwell and Richard H. Lloyd for $7,446.21+ (SI-AHHP, Box 2).

For cut stone work including: granite work at base; wrought work of four main entrances; window sills; and North River bondstone.

April 29, 1879 - Concrete foundations begun (AR 1879, Report of the Building Commission)

April 30, 1879 - Contracts entered with Carson & Son for provision of lime and with Cumberland Hydraulic Cement Company for provision of cement. (AR 1879, Report of the Architects, p. 139)

May 5, 1879 - Rubble-stone work of gneiss, laid in cement mortar upon concrete foundations begun (AR 1879, Report of the Building Commission)

May 10, 1879 - Contract entered with Barber, Henderson & Co. for provision of window frames and sash. (AR 1879, Report of the Architects, p. 139)

May 19, 1879 - Letter from Adolf Cluss to S.F. Baird (SI-AHHP, Box 12)

Cluss requests “1 cargo of slate, size 14 by 24 inches, for use under the brick work as an isolating course...”

May 19, 1879 - Begins the cutting and laying granite base course.

May 20, 1879 - Letter to S. F. Baird from Adolf Cluss (SIA, RU 71, Box 10).

Cluss requests substitution of Rosendale Cement for black mortar work of building front. He also seeks permission to buy 13,000 yellow bricks from Peerless Brick Company and 9,000 sandblasted blue bricks from Enameled Brick Company, both in Philadelphia.

May 21, 1879 – Brickwork of walls begun (AR 1879, Report of the Building Commission)
May 23, 1879 - Contract entered with Gleeson & Himber for provision of labor for brick work. (AR 1879, Report of the Architects, p. 139)

May 28, 1879 - All excavation is complete (AR 1879, Report of the Building Commission)

May 30, 1879 - All concrete foundations are complete. (AR 1879, Report of the Building Commission)

June 9, 1879 - The rubble-stone work of gneiss, laid in cement mortar upon concrete foundations are completed. (AR 1879, Report of the Building Commission)


June 19, 1879 - The rolled-iron floor beams arrived and put in place as needed. (AR 1879, Report of the Building Commission)

Summer 1879 - Unidentified note from “S” (SI-AHHP, Correspondence)

   Cluss wanted 9,000 blue bricks to be “sand blasted”, not “highly polished.” Bricks were obtained in Philadelphia.

June 19, 1879 - Contract entered with New Jersey Steel and Iron Co, for provision of rolled iron beams. (AR 1879, Report of the Architects, p. 139)


July 12, 1879 - Contracts entered with Stockstill & Co. for provision of material and labor for galvanized iron work and with Blinkhorn & Hannan for provision of material and labor for drainage. (AR 1879, Report of the Architects, p. 139)


August 10, 1879 - Letter from Adolf Cluss to S.F. Baird (SIA. RU 71)

   “I have your letter with your ideas about inscriptions. All I meant to convey was that there is a large blank-space, designed originally for an inscription, in each gable. I have always thought and am borne out by plenty ancient and modern precedents, that it is appropriate to study the progress of taste in a nation by the monuments and edifices we leave to succeeding generations. Inscriptions and dates help in this direction. If you differ, let us fill the space in a neutral way by an appropriate scroll with or without the (1879) worked into it…”

   The letter continues with a brief discussion concerning the bricklayers, Gleeson & Himber, and their confusion between a “red brick front” and a “pressed brick front” and between “a tucker or cut joint” and a “flat or stuck joint.” It appears the contractors believe they are making a “pressed brick front” and are employing the “flat or stuck joint.”
August 14, 1879 - Contracts entered with Ed. Roberts for provision of blue slate and with Story & Wilbur for provision of red and green slate. (AR 1879, Report of the Architects, p. 139)

August 19, 1879 - Blue slates ordered from Ore Banks, VA; red and green slates from Vermont cases.

August 22, 1879 - The 1st Warren girder of lean-to roofs set in place. (AR 1879, Report of the Building Commission)

September 19, 1879 - Notice from Cluss & Schulze (SI-AHHP, Box 2)
Invitation for bids to furnish and deliver “375 mille, more or less as may be required, of beveled strips, 1-3/16” wide, and in thickness one half of them to be 1-1/2 inches and the other half 1 inch. All to be of clean seasoned white pine lumber...”

September 22, 1879 - Notice from Adolf Cluss, Office of the Secretary, Smithsonian Institution (SI-AHHP, Box 2). Invitation for bids for covering the flat roofs of the National Museum with leaded sheet-iron.

October 4, 1879 - Notice from Cluss & Schulze, Superintending Architects (SIA, RU 71, Box 10).
Invitation for bids for 300 barrels of Plaster-Paris for filling in of grating under the roofing. JG and JM Waters and LW Guinand both of Washington, DC bid $1.35 per barrel. Notes indicate that Baird accepted dividing the order between the two.

October 9, 1879 - Begins the roofs of naves. (AR 1879, Report of the Building Commission)

October 14, 1879 - Letter from Cluss & Schulze to Gleeson & Himber (SIA RU 71, Box 10) notifying the contractors that their work is unsatisfactory.

October 22, 1879 - Letter to Robert Briggs, Civil Engineer, from M. C. Meigs, Quartermaster General, USA (Montgomery Meigs Papers, Box 32, Letterbook 1, pp. 4-15, LC; copy in SI-AHHP, Box 5) Meigs urges Briggs to submit a bid for heating the new National Museum and describes the building:
“This building is a square 300 x 300 feet with towers 40 x 40 feet at the corners, projecting 14 feet and gate towers in center of each face of same projection. Fifty feet from the exterior wall is a line of piers and arches which support the roof and have above outer lean to roof clerestory windows.

The central hall is an octagon roof, provided by wide and lofty arches. Above the roof this hall is 16 sided and has 16 large windows. No skylight in this hall.
There are skylights and vertical glass over the 4 naves and in the center over the 4 square halls to supplement the clerestory window lights.

The outer gallery is lighted by large windows in outer wall; sills 7 or 8 feet above floor.

Roof, iron trusses and purlins.

The transept 65’ wide forming a Greek cross across each other in the central octagonal hall which is 95 feet high and 65 feet diameter.

The roofing is of slate on iron purlins and trusses and it is intended to plaster under the slate on wire or something for finish and in order to get a non-conducting layer under roof.

The gallery roofs are of tin over about 4 inches of plaster filling the intervals of [sic] and covering up above and below a diagonal lathing of 2 layers of thick wooden lath crossing each other diagonally.

The wood will be so protected by being embedded in plaster that in case of fire among the cases in the Museum, the roof will yield by bending of red hot iron girders and beams before the wood can be charred. The outer walls are built with a 2 inch space to cut off heat and cold.

Now here is a great hall, 25 feet high on outer line, 95 feet high in middle of octagon with non-conducting walls and roof, and windows so far, as they can be made non-conducting. The floor is to be of concrete, covered with asphalt, also a good non-conductor.

The mean temperature of the earth here is about 54 degrees. It is probable that the hall whose floor covers with the lower floor of towers, about 97,000 square feet should be kept, in winter at 60 degrees. Its visitors will be in outdoor costume, coats and shawls and cloaks.

The upper stories of the towers will be used as offices and workshops and there 70 degrees will be needed.

Difference of temperature between earth under non-conducting floor and air of hall 60 [degrees] - 54 [degrees] = 6 [degrees] only. 54 [degrees] is about...

The building should, it seems, be a cheap one to heat. Probably the most effective cooling surfaces will be those of the windows which, however, are glazed with two layers of double thick glass with an interval of not less than one inch - sash frames and bars wood and non-conducting therefore.

It appears to me that the true way of heating is to run large flow steam pipes along the walls under the clerestory windows which are including the 16 windows of the octagon about 1200 feet in linear development of sills to warm the sheet [?] of air cooled by glass are descending.

To carry the steam through these on its way to radiate under the windows of the exterior wall of which in the great hall there are about 64 windows. So that these points being well provided with steam radiators the rest of the
hall will need only a few near doors of entrance to which visitors on first entering can go to warm themselves when fresh from the outer air. At these places too should be or hot plates in the floor on which people can stand and warm their feet and legs. Once warmed on entering, they will find the air and floor generally at a pleasant temperature. The lower floor of the towers both corners and gates are to be used as refectories, as dressing and cloak rooms, as water closets and as offices.

They will need about the same temperature as the main halls.

The advertisement will probably call for 70[degrees] when outside air is at +1 O[degrees], but in practice, while it should be attainable, I think that 60[degrees] will be as much as the public will desire and call for through the newspaper complaint and critical columns.

The upper floors of these towers should be provided with radiators so that the temperature will be habitually like that of ordinary clerk and working rooms, and living rooms. The tower floor and cellar vaults and [ ] of corner tower are to be devoted to boiler, pumps, coals, etc. To supply several large aquaria and in case of fire, these pumps will be needed and a circulation of water, even when the street mains may be shut off by accident and for repairs..."

October 25, 1879 - Letter to Messrs. Stockstill & Co. from Adolf Cluss (SIA, RU 71, Box 10)

"It is absolutely necessary that you show life in executing our contract for tinning National Museum. The gutters on two sections are ready and must be laid at once, also the copper connections made. The tin for roofing should be squared, turned and painted ready for putting. We are commencing to fill the grating and as soon as this is dry it must not be exposed to the weather, but covered in. This mortar is gauged with Plaster Paris, hence it will have little time to set."


States that “all [window] glass lighting the Museum proper is ground; the plain glass is required for the numerous offices connected with the building...” For the exterior windows:

“for the better heating of the building to have in the sash two putty-rebates with intermediate airspace and of course the ground glass is only inserted in one of the two panes.”

The letter also requests an additional “2 boxes plain double thick, size 18” x 32”, and 2 boxes plain double thick, size 20” x 52”. (This is required for transoms of interior doors.)

October 31, 1879 - Letter from M.C. Meigs to Prof. S.F. Baird (SI-AHHP, Box 2)

“The walls of the National Museum Building are up to the square. The appropriations were made in March, contracts made in April and May. The walls of a building of 328 by 328 by 75 feet complete- on October 31st! This is almost unexampled rapidity of construction in a public U.S. Building, and as an example of economy and efficiency a record should be made and preserved... “
October 1879 - Miscellaneous receipts for payment, signed by Cluss & Schulze (SIA, RU 71, Box 1).
Payments included:
- $1,213.30 for laying 400,000 bricks to Gleeson & Himber
- $42.37 for 3 casks of “Pulp Mortar Black” to L. Martin & Co.
- $1,282.50 for 51,300 hand moulded arch brick to Washington Brick Machine Co.
- $645 for 15,000 buff bricks to Peerless Brick Co.
- $89.55 for materials for cleaning and oiling the face brick and painting exposed iron work including raw linseed oil, Spanish brown, Eng. Ven. red, red lead, muriatic acid, and dryer to L. Martin & Butler.
- $742.50 for cut stone work on main entrance and 300 feet lineal sandstone to Richard Rothwell & R.H. Lloyd.

November 1, 1879 - Main walls completed. (AR 1879, Report of the Building Commission)
The contracting for steam heating in the building begun. (AR 1879, Report of the Building Commission)

In 1879, the mean temperature of the earth was measured at 54 degrees Fahrenheit and the initial ground floor heating apparatus was meant to heat the indoor air to 68 degrees Fahrenheit. It was expected that visitors would be wearing outdoor clothing while viewing exhibits. The upper stories of the pavilions and towers were meant to be heated to 70 degrees Fahrenheit and radiators would be placed along the walls containing windows throughout the building. (AR 1879, Report of the Building Commission)

November 4, 1879 - Memo to Mr. Leech from Cluss & Schulze to make out payment voucher to Brick Machine Co. for 300,000 common bricks and 50,000 face bricks. (SIA, RU 71, Box 10)

November 4, 1879 - Notice from Spencer F. Baird for invitation for bids for steam heating apparatus. (SIA, RU 71, Box 10)

December 1879 (c.) - Proposal for Invitation of bids for flooring (SI-AHHP, Box 2)
“...80,000 square feet B.M. of 5/4” thick, thoroughly seasoned Georgia or Florida Pine Flooring... 40,000 square feet of 4/4 inch thick, thoroughly seasoned Georgia or Florida Pine Flooring... (3) Inches in width and none to be more than four inches in width...”

December 3, 1879 - Letter to Adolf Cluss from Wood Bros. (SI-AHHP, Box 2).
Submitted bid ($775) for four sets of “walnut doors with oak panels; and jambs for same (two (2) sets to be with transoms).” [Report of Architects 1879 declares that Aug. Grass is paid $730 for his work.]

December 8, 1879 - Letter to General W. T. Sherman from Cluss & Schulze (SI-AHHP, Box 12).
Recommending acceptance of bid by Baker, Smith & Co. of New York ($19,768) as the “lowest offer for the best interests of the
Government” for “heating building, by direct radiation, with low pressure steam.” Baker, Smith & Co. proposed to “generate the heat in four boilers representing in the aggregate 256 horsepower and to convey it through two separate, gradually reduced main flowpipes of eight inches diameter to radiators which warm the building by means of heated surfaces aggregating 13,680 square feet...

If, as is accepted by the best authorities, one square foot of steam pipe transmits per hour as much heat at 68 [degrees], as will raise the temperature of one pound of water by 18 [degrees] F., then the amount of radiating surface, provided for by B.S. & Co. will suffice for severest weather, if incorporated in the coils and set up in positions to best advantage. This is due to our precautions of inserting 2 panes of double thick glass with intermediate airspace, in the windows, of building the exterior walls hollow, and of fireproofing the roofs with nonconducting material...

December 9, 1879 - “Memorandum of glass for one corner pavilion” by Cluss & Schulze. Describes glass size requirements for first and second story office windows, lanterns, and attic story. (SIA, RU 71, Box 10)

December 9, 1879 - Contract entered with Jos. Thomas & Son for provision of interior doors and frames. (AR 1879, Report of the Architects, p. 139)

December 10, 1879 - Letter to unsuccessful bidder from Spencer F. Baird (SI-AHHP, Box 12). Informing other bidders that bid of Baker, Smith & Co. has been accepted.

December 19, 1879 - The roofs of square halls (courts) are begun. (AR 1879, Report of the Building Commission)

December 23, 1879 - Letter to Messrs. Cluss & Schulze from L. E. Gannon (SI-AHHP, Box 2). Proposal to furnish 12 illuminated windows for front of building in “Rolled Cathedral Glass, cut to sizes and ornamented in full accordance with the plans and designs; including glazing” for $568.

Also offered to furnish double ground glass substituted for Rolled Cathedral Glass in central lights for $450.40. The proposal was accepted by Cluss & Schulze and Spencer F. Baird [It is unknown which offer was accepted.]


December 27, 1879 - Letter to Messrs. Cluss & Schulze from A. Grass (SI-AHHP, Box 2). Proposal to “make four sets of main entrance doors... of prime, seasoned white pine skeletons with solid walnut veneers and oak panels... each to be twelve feet wide in four folds, and fifteen (15) feet high; two sets to have imposts and transoms... also to furnish and finish the frames and trimmings to correspond" for $730.

Proposal was accepted by Cluss & Schulze and Spencer F. Baird.
January 01, 1880 - Report of the Architects. (AR 1879 pp 130-140) (SI-AHHP, Box 12). (Relates work from March 25, 1879 to December 31, 1879.)
Detailed description of design and work, together with expenditures and contracts to date. John H. Bird, general superintendent; W.W. Karr, clerk in charge of platform scales, time books, and the miscellaneous office duties connected with the progress of the work.

«The building starts on the ground in the form of a square with sides of 327 feet [in] extreme length... surmounted by a cross and a dome...
It contains underground a coal-cellar of a storage capacity of nearly 300 tons. Besides, there are two cellars, containing 3,200 square feet floor space, for storage purposes. From one of these cellars a subterranean communication with the adjacent Smithsonian building is established, by an arched passage, which, besides ordinary uses, will serve in cases of panic, fire, tumult, robbery, &c.
A basement containing 1,600 square feet of floor space is fitted up for the boiler-room of a steam heating apparatus.
On the main floor there are available, in 17 halls which freely communicate with one another by wide and lofty archways, 80,300 square feet of floor space and a proportionate amount of wall space for exhibition purposes.
Further, there are available on the main floor and two upper stories 27,400 square feet of floor space, divided off into 135 rooms for administrative functions, offices, working-rooms, photographer, necessary accommodations, &c.
And finally there are about 4,000 square feet of floor space on galleries, formed on a level with the second floor of the offices; these are intended in part for special exhibits and in part to afford an unobstructed view of the ensemble of the exhibits.
On the whole, the one-story plan which has prevailed among experts ever since the Paris exhibition of 1867 has been adopted. But by the introduction of upper stories on those outlying sections reserved for offices, ample office-room has been secured without encroaching materially upon the floor space within the square of 300 feet, to which the building was primarily limited.
The center of the building is octagonal on the ground floor, and is surmounted by a 16-sided polygon of 67 feet diameter, which contains a tier of large windows and constitutes a domical structure with a slate roof and a lantern, crowned by a decorated finial. This room is 77 feet high on the side walls, or 108 feet to the top of the finial.
Four naves, of 65 feet in width and 117 feet in length, radiate from the dome and extend to the outside walls of the building; the naves form in this manner a Greek cross, over the center of which the dome rises, and part of the spaces in the exterior angles of the cross are fitted up; with halls of 65 feet square and of the same height as the naves.
The side walls of both naves and annexes are 42 feet high, while the height to the ridge of the slate roofs is 56 feet. These roofs are in part constructed double, for the purpose of so perfecting the drainage of the roofs that accumulations of ice and snow can nowhere obstruct it.

The spaces between the high walls of the Greek cross and the exterior walls of the building are allotted mainly to eight halls of reduced height, covered by lean-to metal roofs; the extreme height of which is 32 feet.

By this treatment wall spaces are obtained for the introduction of clerestory windows, which light the square halls and assist in lighting the naves...

The external architecture is based upon the general arrangement of the interior, and shows plainly the prominence of the four naves and the careful management of the light for the central portion of the building. The main entrances are in the centers of each façade between two lofty towers of 86 feet height, which act as buttresses for the naves. Between the towers, and receding from the doorways, there are large arched windows set with ornamented glass, and above those the gables of the naves are formed; they contain inscription-plates and are crowned by allegorical groups of statuary. The group over the northern gable, designed by C. Buberl, of New York, already in position, introduces Columbia as the protectress of science and industry...

In addition to the windows in the solid masonry of exterior walls, clerestory, and dome, lofty lanterns have been provided above the naves and square halls so as to afford perfect light for this enormous space without resorting to flat skylights, which for various reasons it was well to avoid...

All the masonry above ground is composed of brick-work, built with air spaces for outside walls, ornamented and laid in black mortar for the facing of exterior walls. To neutralize the monotony and commonplace appearance which could not have avoided with red brick fronts of such extent, a sufficient quantity of buff bricks, interspersed with a small number of blue bricks, in the cornices have been introduced.

A base-course of granite extends all around the building.

The wrought work of the main entrance, window-sills, inscription plates, copings, &c., are of gray Ohio freestone. Anything else in the line of decoration is in strict keeping with the principal designs, and executed in substantial metal work.

The floor beams, girders, and roofs consist or are constructed of rolled and shaped iron. The floors are fire-proofed by brick arches and concrete...

The light but solid frame-work of all the roofs will be left in full view, painted in light neutral tints.
The covering of the metal roofs is laid upon fire-proofed gratings, suggested by General M. C. Meigs.

The slates are hung to iron purlines.

The sashes... are each glazed with two panes of glass, with an intermediate air-space. This is done to facilitate the heating of the building.

The floors of the exhibition halls will consist of concrete, but the rooms and smaller halls will, for convenience sake, be floored with Florida pine, laid on concrete.

The interior is to be plastered in sand finish, washed in tints. Its lofty proportions do not require any elaborate decoration, and will thus rather heighten than interface with the objects on exhibition.

The heating of the building is to be done by low-pressure steam, on the system of direct radiation.

The wide main entrance doors of walnut and oak open outward on spacious tiled vestibules, with sides and arched ceilings of ornamental brick-work. These vestibules are closed at night and on Sundays by wide double gates, the solid frames of which consist of wrought iron, and the ornaments of cast iron; thus combining the utmost strength with great economy.

The northern entrance has been selected for general use, and hence it was necessary and proper to give it due prominence from the others for the guidance of strangers... A spacious tiled platform bounded by granite side blocks is constructed in front of this entrance. It is approached by four low and wide granite steps of 37 feet in length, which are flanked by molded base-blocks, carrying stately candelabras.

It should be remembered that in all our steps we were guided by the absolute necessity not to overreach the appropriation at disposal; and hence, to produce the best effect with utmost economy, the exterior decoration was combined to and concentrated on the centers of the fronts.

The erection of this building requires about 5,250,000 bricks, 3,000 barrels cement, 5,600 barrels lime, 4,000 cubic yards of sand, 2,000 cubic yards of rubble-stone, 1,230 cubic yards of concrete, 470 tons of wrought iron, 31,000 square feet of glass, 60,000 plates of slate, of 2 square feet each, 375 boxes of tin, &c...

We now proceed to give a history of the progress of the work during the past season, operations classed under a few general heads...

1. Excavation.-- The excavation for the foundations was commenced on the 17th April and finished on the 28th May. It was carried to solid ground, but nowhere less than 3 feet below surface, that the building should rest on earth below the disintegrating effects of frost and draught. Under the topsoil a thick stratum of hard clay was met, and under this a bed of clean, dry gravel, which was struck wherever cellars were dug; this porous layer drained the site by absorbing the rain-water as fast as it fell.
2. **Foundations.**—The foundations were, under date of April 29, commenced with a heavy bed of hydraulic cement concrete and were completed on the 30th May. Upon the concrete bed they were continued up to the surface with rubble-stone work of gneiss, laid in cement mortar; this work was commenced on the 5th of May and was completed on June 9.

3. **Brick-work.**—The brick-laying commenced on May 21, and the principal walls were completed on November 1, after 4,740,000 bricks had been laid under contract. The specifications call for a superior class of brick-work, laid in black mortar on the facades without resorting to the expensive “tucked” or “ruled” joints commonly used in first-class pressed brick-work, and this has been duly enforced... A large force of brick-layers has been kept at work by the day... in finishing the facades, piecing out the walls, building the steam-chimney, walling in the iron-work of the roofs as they progressed, doing plumbers' jobbing, turning and concreting floor-arches, laying foundations for platforms and steps, forming gutters with due grade, &c., &c.

This work is all well advanced, but still in progress, and will be finished by the building of ducts for the lines of pipes which will conduct the steam and return the condensed water of the heating apparatus.

4. **Cut-stone work.**—The cutting and laying of the granite base course was commenced on May 19... At intervals of about 5 feet in height, bond-stones of North River grey wacke-bluestone have been introduced in the high piers of the interior archways in order to increase their stability.

5. **Iron-work.**—The floor-beams arrived in good time and were put in place... On August 22, the first “Warren girder” of the lean-to roofs was set in place; on October 9 the roofs of the naves were commenced... December 19 those often square halls were commenced...

6. **Galvanized iron-work.**—This consists of a heavy amount of small cornice-moldings, of acroteria, chimney-heads, finials, facings and casings...

7. **Slates and slating.**—Under date of August 19 last, the blue slates have been ordered from Ore Banks, Va., and the red and green slates from the quarries in Vermont... The slates are 24 inches in length and expose 10 inches to the weather, thus giving what is termed double cover and 4 inches lap.

8. **Covering of the flat roofs.**—These metal roofs are supported primarily by the wrought-iron trusses laid 13 feet between centers; these again are subdivided and cross-laid by wrought iron beams of lighter sections so as to cut up the ceilings into spaces of 4 by 13 feet in size. At the suggestion of General Meigs these spaces were bridged by gratings formed in two thicknesses of light tapered wooden strips and fire-proofed by being filled in and inclosed with a non-conducting mixture composed of plaster of Paris, lime, coal-ashes, and cinders... The greater part of this work is done and the metal laid upon it in sheets of 14 by 20 inches in size, having flat joints. Each sheet is clamped down to the gratings by eight clamps of sheet metal, two on each side, in such a manner that each sheet, independent of all others, can expand and contract, which in such large roofs is an important consideration.

9. **Wooden floors.**—... Florida yellow pine....
10. Plastering.--- [Work had not been started at time of letter.]

11. Glass, glazing, and painting.-- the lowest bids were for Belgian glass, imported free of duty. The painting has so far been mostly confined to the metal cornices and piping, the iron-work and window-frames having been furnished...all primed.

12. Carpenter’s work.-- This has so far been mostly directed to the making of roof-gratings, described under another head. But, besides, a large amount of centers has been made and put up for turning arches in the brick-work and floor-arches. In the concrete about the floor-arches the thin sleepers have been laid to which flooring is to be nailed. The setting of door-jambs is about to be commenced... getting the building in readiness for the plasterer.

13. Sewerage, drainage, and plumbing.-- In the early part of the spring the main sewer on B street was cut out and a 12-inch glazed terra cotta sewer connected with it for the drainage of the new building. The numerous branch sewers within the building leading to some sixty conductors from the roofs, and to soil-pipes of closets and basins, were under a decision of the commission delayed until the completion of the walls, but have lately been completed, as also most of the extra heavy cast-iron piping which forms the conductors of rain-water, and the vertical soil-pipes. All these heavy pipes have air and water tight joints formed of gasket and lead, and are firmly supported by brick piers at their juncture with the sewer-pipes underground.

... Three parallel lines of 3-inch water-pipe running due north through the building were put in with supply for 16 fire-plugs, numerous street-washers, outlets for closets, basins, and bath-tubs, stop-cocks, &c.

14. Underground piping for heating apparatus.-- To avoid the unsightly appearance of exposed large-sized steam and water return pipes required for the successful heating of the vast building, it was decided to build the necessary ducts and introduce the pipes underground before the floors were laid, though this part of the work was not included in the estimates on which the appropriation for the building proper was made. The heating apparatus intended under the estimates... provides for four steam-boilers of 256 nominal horse-power in the aggregate. The generated steam is conducted by two separate main pipes of eight inches diameter to about 200 steam-heaters, containing in the aggregate 13,680 square feet of radiating surface. The hot water condensed in these heaters is to be returned and reused in the boiler.”
January 19, 1880 - Report of the National Building Museum Commission (WT Sherman, Peter Parker, and Spencer F. Baird.) (SI-AHHP, Box 14)

"...Ground was broken on the 17th of April, 1879. The concrete foundations were begun on the 29th of April, and the brick-work of the walls on the 21st of May, the main walls being completed on the 1st day of November... The estimate of $250,000 for the construction of a museum building did not include the heating apparatus... An appropriation of $30,000 has been asked of Congress for the completion of the heating apparatus throughout, for the gas and water fixtures and the electric apparatus required for clocks in the building, for signals, alarms, &c. Before the building can be occupied it must, of course, be furnished and fitted up with cases..."

1880


"[The National Museum] covers an area of 300 feet square within the extreme limits of the buildings in the centre and at the corners of the four fronts. The rooms in the buildings and towers forming ornamental projection of the front are sub-divided into offices, while the halls, which are merely separated by arched open doorways, are arranged for exhibition purposes.

The flat roofs are covered with metal laid on roofing felt upon a nonconducting fire-proofed grating, 2 ½ inches in thickness, the underside of which forms the ceiling of the covered rooms. The steeper roofs are covered in with slate hung to iron purlines and plastered on the underside. The ceilings underneath are in this case formed by arches of corrugated metal, with an air-space left between these arches and the plastering above. The building will be heated by a low-pressure steam heating apparatus..."


Requests for 21 boxes of IX (14x20) leaded charcoal tin for roof valleys from Philips Dodge & Co. and for 200 squares No.1 manilla concrete felt from A. D. Gordon.

Late February 1880 – The supply pipes for water and gas laid.

c. March 1880 - Memo from W.W. Kerr to Prof. Baird re: status of work including plastering and setting of galvanized iron cornices (SI-AHHP, Box 12)

March 4, 1880 - Memo from S.F. Baird to Cluss re: lightning rods. (SIA, RU 33, vol. 92, #227)

Interior plastering begins in March complete by mid August.

"Do not forget to make the necessary arrangements for connecting the iron frame
work on the roof of the dome, with the iron work of the lower roofs, so that there will be no questions as to the security against lightning. I think there might be rods of an inch in diameter carried down on four sides, connecting with the main roofs. Of course the more inconspicuous the rods the better; but probably these would not show at so great a height. “

Recommends acceptance of bid of G. W. Harkness for $1,252.33 for plaster work on corner pavilions, adjoining rooms, and towers.

March 17, 1880 - Letter to Clinton Wire Cloth Co. from Cluss & Schulze requesting an estimate for a “wire cloth” for the ceiling of the Rotunda, which encloses 3,200 sq. ft. (SIA, RU 71, Box 10)

March 28, 1880 - Letters to Prof. S. F. Baird from Cluss & Schulze (SIA, RU 71, Box 10).
In response to his request about substitution of marble tiling for concrete as flooring material in the Rotunda and four square halls, Cluss noted that black and white marble tile for the 22,400 square feet, laid on a bed of Portland cement on single concrete foundation, would cost an additional $8,702.
A second letter concerns the “crimped sheet iron ceiling of Northrop of Pittsburgh” which, if money is available, could be used for the ceilings of the main and square halls.

Late March 1880 – Iron work for the roofs completed. (AR 1880, Report of the Building Commission)
#4 glue, Burnt Umber, Cobalt, Indian Red., Alum, Yell. Ochre, Jet black in Japan, white lead, resin, sperm oil, Ultra marine dry, sunip (?) Alum and Gold leaf. (SI-AHHP, Box 2)

May 3, 1880 - Proposal from Thos. A Brown, house and sign painter; accepted by Cluss & Schulze and Spencer F. Baird (SI-AHHP, Box 2).
Proposal to “paint Iron Work of Ceiling of Main halls... with two coats of Lead & Oil paint”; to “Kalsomine the plaster work of same with two coats of Kalsomine in tints”; to paint the “Iron Work of Square hall as above”; and “to Kalsomine the plaster work of the same.”

May 28, 1880 - Memo from Cluss to Baird re: laying the concrete under wooden floors. (SIA, RU 71, Box 10)

June 3, 1880 - Proposal from Isaac R. Webster; accepted by Cluss & Schulze and Spencer F. Baird (SI-AHHP, Box 2).
Proposal for sum of $5000 to complete plastering of halls by August
1. Work was to include three main halls, three square halls, stairways of dome, wainscoting, and scaffolding.

States the difference of cost to lay four main halls and four square halls with “marble tiling solidly on hydraulic cement concrete, instead of the concrete paving in contemplation under the present appropriation” will be $25,000 for the 50,000 square feet.

June 22, 1880 - Letter to Semon, Bache & Co., NYC from Cluss & Schulze (SIA, RU 71, Box 10).
Summary (including dimensions) of glass shipped for plain and ground glass for building.

July 1880 – Plaster work that began in early March completed. (AR 1880, Report of the Building Commission)

July 26, 1880 - Letter from Cluss to Baird (SIA, RU 71, Box 10 and SI-AHHP, Box 12)
Memo includes progress on construction: locks for building are from Yale Lock Co., carpenters are busy flooring halls, and “winding stairs” are being installed.

Expressed concern over “continued frequency with which the plaster falls from the ceiling of the new building... Under these circumstances I think it will be best to consider the question of a ceiling either of strap iron or wire cloth...”

July 28, 1880 - Letter from S. F. Baird to Cluss re: exhibit cases and progress (SIA, RU 33, Vol. 98).
“Have you not made some arrangement for rough concreting of the main halls, preliminary to a better finish or tiling. I did not suppose they were to be left simply in the dirt. I think a concrete bed by the radiator should at least be made. If however, we must necessarily defer occupying the building until the new ceilings are inserted there will be no hurry about putting in the radiators [unreadable] in the main halls at least...”

The floors of Rotunda and halls remain
unfinished due to dispute with Congress over substitution of marble or tile for concrete. Pine floors are installed throughout the building.

August 2, 1880 - Proposal to Cluss & Schulze for painting from Thos. A. Brown; accepted by Cluss & Schulze (SI-AHHP, Box 2).
Proposal included painting iron stairways; iron girders, rods and pipes; iron balconies and railings; bronzing iron railing of halls and dome; for one coat of hand oil finish on 97 white pine doors and frames; and one coat offhand oil finish on 14 pairs of walnut doors and frames.

August 3, 1880 - Letter from [Baird] to Cluss re: ceiling plaster (SI-AHHP, Box 12)
"...I note what you say about the possible cause of the settling of the plaster. I fear that this may continue, + at any rate it will be better to be prepared with the means of introducing the inner skin which we have contemplated. If you think the corrugated iron will be cheaper of course we can use it... It should be sufficiently strong to hold firmly any mass of plastering that should fall upon it..."

August 6, 1880 - Letter from [Baird] to Cluss re: ceiling plaster (SI-AHHP, Box 12)
"I have your letter of 4th of August + am glad to receive so encouraging an explanation of the falling of the plaster. I would not be surprised, however if it became necessary to take down a great deal of that underneath the gratings. If that part had been left unplastered, or covered up with thin iron, or wire cloth, it would have been better..."

August 9, 1880 - Letter from [Baird] to Cluss re:

Webster’s plaster work (SI-AHHP, Box 12)
"Yours of the 6th reached here yesterday... I entirely concur as to the necessity of taking down the plaster coating in the main halls, but as I telegraphed, I do not see the necessity of going to the expense of the work of putting in nails + having these coated with plaster. I would prefer leaving the surface exactly as it is or treating it with some water[?]wash to make it more uniform... I think it likely that all the ceiling of the side halls better be removed but you are better able to form a judgement in this case..."

August 10, 1880 - Statement of National Museum by Mr. Cluss (SI-AHHP, Box 2).
Appropriations to date included $250,000 for construction; $25,000 for steam-heating apparatus; $12,000 for plumbing and electrical work; $1,000 for relining sewer; and $50,000 for furniture, etc.; totaling $338,000. Expended by August 10, 1880 was a total of $255,043.63. [Lists liabilities, subcontractors, and sums paid.]

August 13, 1880 - Letter from [Baird] to Cluss (SI-AHHP, Box 12)
Discusses progress issues: "... If we have no other way of reducing expenses it may be necessary to omit putting a flooring over the concreting of the outer + square halls... The floors of the balconies around the dome might also be omitted, as they cannot be seen at any rate. Is there any need, at present, of having stairways in the corners of the dome; There being nothing to reach thereby?"

August 15, 1880 - Letter from Cluss to Baird re: labor
issues and payment problems (SI-AHHP, Box 12).
Discussion concerning wood floors laid over concrete base, construction of four flights of stairs around dome, omitting of railings for stairs throughout the building to save money, fitting of frames for three (out of four) sets of main doors (with exception of East set, which was still being used to bring building materials through), and general labor complaints regarding the construction budget and the “indolence of others.”

November 8, 1880 - Memo from David Leech to Cluss to Baird re: concreting the remaining halls “at once” (SI-AHHP, Box 12).
At the end of the year there is documentation that painting and glazing are complete.

Wood floors down except in principal spaces, awaiting appropriation for change order from concrete to marble and encaustic tile.

Heating and electrical work is completed except for bronzing some radiators.

Other building systems are completed in this year to include the wires for burglar-alarm telegraph, telephone, and electric clocks and call-bells.

Wires were run through under floor trenches from a room in one of the north towers to each window, door, and case in the entire building, and also to the police and fire-alarm telegraphs.

In light of the additional funding request a list is prepared to document features not originally contemplated but done within budget. It includes:
- Double-glazing in all exterior windows.
- Improved skylight for photographer.
- 3 more cellars and annexes to corner pavilions with fireproof floors.
- Lofts in corner pavilions converted to additional finished space.
- Ornamental iron gates for all 4 entrances.
- Brickwork of extensive facades oiled and penciled.
- Terraces formed to regulate grade around building.
- Additional cut-stone on approaches to main entrance.

November 13, 1880 - Petition for using of new Museum for the inaugural reception of President Garfield. (AR 1880, Special Report of the Executive Committee)

December 8, 1880 - Special meeting of the Board of Regents to approve petition for using of new museum for the inaugural reception of the U. S. President. (AR 1880, Special Report of the Executive Committee)

During 1880, Congress appropriates $25,000 “for a steam-heating apparatus and for fuel” and $12,500 for water, gas, and electrical apparatus, as well as $1,000 for relieving B Street sewer. (AR 1880, Special Report of the Executive Committee)

End of 1880 - additional work undertaken: (AR 1880, Report of the Building Commission)
Painting and glazing complete
Wood floors down except in principal in the courts

Heating apparatus completed and tested (radiators not yet “bronzed”)
Installation of electrical wires for the burglar system almost completed

Work on new museum building substantially completed by the end of 1880. Work done within estimates.

(AR 1880, Report of the Architects)
North Tower: Tiled entrance platform bounded by granite side blocks and approached by four low and wide granite steps 37’ in length. Molded base blocks carry “candelabrums” or decorative Victorian light standards.

Ceilings: The ceilings were originally plastered. Plaster fell continuously in the halls, courts and ranges starting [in 1880]. It was suggested that “light iron ceilings about 1 ½” distant” from the original plastered wood gratings be constructed and the air space packed with insulation. Approximately 3,600 square yards of plaster was removed from the ceilings in 1881 and replaced with iron ceilings. The removal or covering of the plaster continued in the halls during 1882.

Painting: Rathbun comments that the interior walls were originally covered with a sand finish and a gray water-color paint. Documentation from 1880 notes the wide use of kalsomine paint. Calcimine (frequently spelled kalsomine) is a “glue distemper paint and paint containing casein as all or part of the binder.”


Much of the wall surfaces of the halls, courts, and ranges received decorative plaster work in the form of imitation stone joints which were lightly tinted with color to accentuate them and half-round horizontal beads.

Many of these joints have disappeared due to subsequent painting and skimcoating with new plaster.

Most of the horizontal beads that divide the shafts of the pier arches from their bases do exist and can be seen today. Many of these beads have been repaired and reproduced over the years.

Flooring: Original flooring at the Rotunda and four main halls was intended to be concrete with wood floors at the remainder of the spaces, but discussions of upgrading the concrete floors to marble began with the start of construction. By January 1881, the basement floors were laid with asphalitic concrete, the pine floors were laid on sleepers inlaid in hydraulic cement and a concrete base was installed at the main halls and courts. The courts would eventually be floored with white pine, but Congress appropriated $25,000 to cover the cost of marble and tile for the halls and Rotunda.

Temporary wood flooring was installed at the halls and rotunda for the 1881 inaugural celebrations.
July-November 1881: The temporary wood flooring in four main halls was replaced with 1” thick slate and marble floor: 12” x 24” “American-Italian” white veined marble, 18” x 12” grey Vermont slate, 12” square red Vermont slate and black slate tile. Parti-colored Portland cement (mostly red) and 1 W” thick dark blue Pennsylvania slate was laid around the perimeter. A pattern of encaustic tile with border was installed in the Rotunda.

The covered spaces in front of and sheltering the four main entrance doors were enclosed by ornamental iron gates at a cost of $1,804.08.

All the brick work of the extensive facades was oiled and penciled at a cost of $2,750.00.

Terraces were formed to regulate the grades of the ground around the building at a cost of $2,428.00.

There was expended for cut stone on the approaches to the main entrance $1,286.00 Total $14,733.08.

... The principle adopted to have all the windows in side walls and lanterns glazed with two sheets of glass, having an intermediate airspace, has led to favorable results, and it is desirable to extend the same feature over the under sides of the roofs in the halls by the introduction of light iron ceilings about 1-1/2 inches distant from those plastered undersides; the intermediate air-space in this case to be packed with a non-conducting fire-proof material, such as mineral-wool or its equivalent...

The system of heating by direct radiation has been adopted. For winter ventilation the spires of eight towers and the lanterns of hall and dome are made available whenever necessary, and for summer ventilation a sufficient number of improved iron sashes pivoting in iron frames have been added and inserted in the windows of the side walls and the lanterns of the building.

The heating coils and radiators are placed in the rooms to be warmed and heat the air by contact with the radiators; the surrounding
walls and solid objects absorbing a certain amount of radiant heat and again heating the air by contact...
[A detailed discussion of the steam heating system follows.]


“The iron work of the roofs was satisfactorily completed by the latter part of March, and the tin work and slating early in April. The plastering... was begun early in March and finished by the latter part of July...

The wood floors have all been put down, excepting in the four square halls. In the four main halls... and in the rotunda of the dome it was originally intended to lay concrete, but owing to urgent remonstrances against the use of this material as not being in keeping with the architectural beauty and design of the building, Congress has been asked for an appropriation of $25,000 to defray the expense of a marble or tile floor for these halls...

The work of putting in the wires for the burglar-alarm telegraph, telephone, and electric clocks and call-bells... is nearly finished. These wires, which are run through underground trenches... will extend from a room in one of the north towers to each window, door, and case in the entire building, and also to the police and fire-alarm telegraphs.... being at once automatically indicated in the central office, or instrument room, where a watchman will be on duty at all hours...

1881

Painting: Cluss & Schulze supervised the initial scheme which contains Moorish influences. It appears that the initial stenciling encompassed a larger area in the Rotunda than the one that exists today. A painting dated April 20, 1880 indicates that original decorative painting was more extensive than now exists. The proposal includes decorative work at the upper portions of the Rotunda dome a portion of which is visible in photos dating from 1881.

Walls: Brick pier arches, plastered with sand finish and imitation stone joints compose interior walls for the most part. Horizontal plaster half-round beads were added to top of pier arch bases and along exterior masonry walls.

Flooring: Original Flooring at Rotunda and four main halls intended to be concrete with wood floors at remainder of the spaces. But upgrading the concrete floors to marble began with the start of construction. January 1881: Basement floors laid with asphaltic concrete. Pine floors were laid on sleepers inlaid in hydraulic cement and a concrete base was installed at the main halls and courts.

Courts eventually would be floored with white pine, but Congress appropriated $25,000 to cover cost of marble and tile for the halls and Rotunda.

Temporary wood flooring was installed at halls and rotunda for 1881 inaugural celebrations.
July-November 1881: Temporary wood flooring in four main halls replaced with 1” thick slate and marble floor [12”x24” American-Italian white veined marble, 18”x12” grey Vermont slate, 12” square red Vermont slate and black slate tile. Parti-colored Portland cement (mostly red) and 1 ½” thick dark blue Pennsylvania slate was laid around the perimeter. A pattern of encaustic tile with border installed in Rotunda]

Notable Architectural Details:
Plaster half-round beads on pier arches separating base from shaft and along exterior walls below windows, have been continually copied over the years. Have been installed on non-significant, non-historic walls.

Iron railings along balconies and stairs bore design of Cluss & Schulze. (Many stairs did not receive railings for quite some time due to expense.)

Paint: Pilasters were clearly accentuated by careful outlining of the capitals and a darker color on the flat shafts and careful placement of imitation stone joints on the base.

Ceilings of several offices in the pavilions were treated with delicate striping and stenciling to accentuate the shallow scalloped plaster vaults.

Pavilions: [Report of the Architects for January 1881] lofts in corner pavilions were converted.

Annexes: Originally, the four annexes were all supposed to be large, open two-story rooms. [Report of the Architects for January 1881]

“Expensive” fire-proof floors were constructed. South East Annex remained a two-story room for the ladies’ retiring room.

Heating: In 1881, coal cellars were located in the South West Pavilion (storage available for 300 tons) supplying power for 4, 60-horsepower low pressure steam boilers; 200 radiators were bronzed; and steam-pipes covered with hair felt and asbestos. (An original chimney exists at the northeast corner of the South West Pavilion.) A separate steam furnace was introduced into the North East Pavilion in 1881 to supplement heating in this area.

Tunnel to SIB: Cluss mentioned the idea of building a tunnel as early as August 7, 1881. However, the existing tunnel was not constructed until 1903 when the change in mechanical equipment affected both the AIB and the SIB. Rathbun notes that the tunnel was “70 feet long, 5 feet wide, and 7 feet high” and was primarily constructed to run heating pipes and electrical conduits.

Service Trenches: The service trenches that are depicted on the current set of building floor plans are mentioned very early in the history of the building.

Professor Baird’s report of 1881 notes that “a series of tunnels permeates the floors for the building in every direction, and in these are stretched the various wires, some 200 in number, by means of which any electrical services can be maintained...” (Pg 2-5 thru 2-9 of Summary Description and History of Building Construction)
February 5, 1881 - Memo from Baird to Cluss re: “putting iron grating on the outside of the ground glass windows of the partitions as a protection against robbery. Mr. Duly lost his coat a day or two ago by someone taking it + jumping through the window…” (SI-AHHP, Box 12)

February 9, 1881 – Congress appropriates $26,000 “to place a flooring of marble and encaustic tiles in the large halls of the National Museum building.” (AR 1881, Report of the Executive Committee)

March 4, 1881 the Presidential inaugural reception is held in the new building for James A. Garfield. Program for Inauguration Ball for President James A. Garfield and article in The Capital (SI-AHHP, Box 5).

“The museum furnished the handsomest of ball rooms and was most exquisitely decorated. Electric lights beautified the surrounding scenery, and standing out in bold relief amidst the forests of trees about it, the edifice seemed as an ancestral castle...

The crowd went in at the main entrance, the ladies turning to the left to their dressing-rooms, while the gentlemen went to the right. Here were long rows of hastily made, yet neatly subdivided into thousands of huge pigeon-holes for the coats, hats, etc. of the guests. There was a barbershop where the disordered hair and boots of the unlucky ones were set to rights. The ladies had a similar set of alcoves. Then the guests stepped out into the north hall, where they suddenly found themselves in full view of the great rotunda with its beautiful decorations. Here was a colossal statue of Liberty, high above the clustered palm and subtropical plants clustered at its base, holding in its outstretched hand a torch into which an electric light had been ingenious inserted...

The hall in which the guests entered is one of four exactly like it, all radiating from the rotunda, 125” length each, and 60’ wide... terminated by large doors with arched hall vestibules over and on which are galleries clear across. These hallways are only defined from the rest of the interior by the brick pillars and arches which, finished in stone imitation, rise sixty feet above the heats of the crown to support the iron and slate roof, where a simple but pleasant arrangement of iron trusses and girders gives support to the ropes of garlands and bunting that sway to and fro. Near the base of each one of these pillars, and there are eighty of them, a State coat of arms has been emblazoned on a shield, and fringed with American flags, harmonizing exceedingly well with the dark painted pedestals and the soft lavender fresco tints above. Gas has been carried all around, and illuminates every shadow that would otherwise exist in the corners from the electric light of the Rotunda.

The Rotunda is beautiful; its octagonal width of fifty feet rises into a window-arched dome above, sheer eighty feet from the floor, while at the points of intersection of the four grand hallways are as many sub-balconies, little platforms about fifteen or twenty feet above the heads of the company where twenty-five or thirty can sit or stand under the swelling arches.”
March 31, 1881 - Request for “Proposals for Marble and Slate Tiling and for Slate Floor Slabs,” Smithsonian Institution (SIA, RU 7081, Box 28).

Proposals were requested “for furnishing, delivery, and laying new marble and slate tiling and slate floor slabs required for flooring four main halls” for “about 1,752 square feet of slate slabs, 1,564 square feet of blue slate tiles, and 19,270 square feet of marble tiling with slate dots.”

Slate slabs: 3’ wide and 1-1/2” thick, were to be placed over ducts with two moveable slabs in each hall to allow access to ducts for repairs.

Slate tiles: 1” thick, were to be used “around the halls in continuation of those formed by the slabs over the ducts.”

Marble tiling: “within the slate borders consists of geometrical figures, of three feet by three feet in size, formed of four tiles of American-Italian white marble two feet long and one foot wide, laid around a dot of one foot square of black marble equal to that of Glen’s Falls Quarry, N.Y. These figures are enclosed and parted by friezes of (about) one foot in width by eighteen inches in length, of gray Vermont marble, ... the intersections of these friezes are formed of red Vermont slate-tiles, (about) one foot square. All these tiles are to be one inch thick. ... The upper face of the concrete-base for the reception of the tile is leveled to about one and one half inches below the floor-line of the halls.”

Mortar was to be one part Portland cement to two parts sand; jointing mortar to be “equal parts of cement and sand.”

March 31, 1881 - Letter to Baird from Cluss re: misc. about tiling and advertising for bids. Mentions that “the encaustic tiling, of course, needs no advertisement…” (SI-AHHP, Box 12)

April 16, 1881 – Bids received and opened for floors at halls and Rotunda. Successful bidders are Emil Fritsh, of New York, for the marble tile, and United States Encaustic Tile Company of Indianapolis, for the encaustic tile. (AR 1881, Report of the Building Commission)

April 22, 1881 - Letter to Baird from Cluss (SI-AHHP, Box 12) re: tiling samples. Declares that the American Encaustic Tiling Company of NY does "not manufacture any decorative tile in any way acceptable."

May 28, 1881 - Letter to Cluss from Baird (SIA, RU 33, Vol. 111, #462) Baird suggests taking plaster off ceiling in southwest rooms as an experiment to remedy the falling plaster. "It is now proposed to substitute corrugated iron for the lathing..."

Summer 1881 – Plaster removed from all ceilings of the low flat roofs. (AR 1881, Report of the Building Commission)

July 19, 1881 - Letter to Baird from Cluss and attached clipping from Evening Star (SIA, RU 28, #14473) Plaster ceiling taken down as result of pieces continuing to fall. An investigation had revealed there “was not sufficient key to support the weight of the plaster.” Cluss was expecting 16,000 square feet of marble tile to arrive any day, with “Fritsch” [E. Fritsch Marble Works, New York] to lay it; iron ceiling also expected.
July 26, 1881 - Letter to Baird from Cluss (SI-AHHP, Box 12).
   “This morning... I found men tearing up the concrete in Rotunda [for fountain] and others cutting out for additional gaslight up the walls for usual height of 6 feet, up the side walls of rotunda.”

August 7, 1881 - Letter to Baird from Cluss (SI-AHHP, Box 12)
   description and estimates for building tunnel between the SIB and the AIB. Materials included: “brick in solid cement, bridgestones [bluestone], concrete floor, 2 moveable eyes for light, air...” [A scaled drawing dated July 1881 indicates the tunnel width 3'-6".]. [The tunnel would not be built until 1901]

August 10, 1881 - Detailed letter to Baird from G. Brown Goode concerning layout of museum display cases (SI-AHHP, Box 12);
   Drawings are no longer attached to the letter.

August 22, 1881 - Letter to Baird from Cluss (SI-AHHP, Box 12).
   Tiling of second hall and plastering above square halls is nearly completed; and “tile for the two other halls are underway on board of a schooner.”

September 2, 1881 - Letter to Cluss & Schulze from E. Fritsch (SI-AHHP, Box 12).
   Schooner containing tile has still not arrived; Fritsch writes: “I begin to believe that she has gone to the bottoms.”

September 7, 1881 - Letter to Baird from Cluss (SI-AHHP, Box 12).
   Regarding flooring: “... the first thing to do will be to pick up the concrete, lay the sleepers, fill in again with concrete, and after this is well set then to lay the flooring...”

The schooner finally turned up; “it will take about 18 days to lay the tile... Next Monday Crawford commences the cement borders outside the slate slabs and he will finish with the tile layers.”

September 19, 1881 - Assassination of President Garfield.

   Contains a floor plan and description of building (p.13.)

First floor of building was devoted to exhibit spaces.

   “Main Halls - These are the four arms of the cross, extending from the Rotunda to the four main entrances”

   “Courts - These are four square halls included between the Main Halls in the angles joining the Rotunda”

   “Ranges - These are the outer halls, eight in number”

   “The Rotunda is under the Central Dome” The “pavilions” are in the four corners of the building; the “towers” are at the building entrances.
October 5, 1881 - Memo from G. Brown Goode to Cluss regarding safety of occupants and missing iron stair railings. (SIA RU 112, Vol. L5, Reel 5) In a memo dated October 8, Cluss agrees to furnish this work.

November 5, 1881 - Letter to Baird from Cluss (SI-AHHP Box 12).

“The iron ceiling is finished + H. Horan should now see to the painting of it...”


Carpenters: Desks, bookcases, and other furniture will soon be completed.

Marble floor tiling: Begun July 22 and completed October 13 by E. Fritsch Marble Works, NY.

Encaustic tile flooring: The United States Encaustic Tile Company, Indianapolis, IN, laid encaustic tile in Rotunda and vestibules of south, east and west entrances, beginning September 10 and completed November 4th.

Fountain: Excavation for basin of fountain by Mr. Cowles. Cement bottom and sides done by Mr. Crawford; granite coping furnished and installed by Acker & Sons of Washington, DC.

Painting: After plaster ceilings in the outer halls were removed, painters painted ceilings with two coats of paint. Painters also “kept busy in painting the roof Varnishing & Oiling the woodwork furniture and in painting & decorating the ceilings & walls in the different office rooms throughout the building.”

North East Pavilion: Fitted for store rooms.

Fireplugs: “Sixteen in number in different sections of the building have been covered with neat walnut closets but as there are six without hoses I would suggest that there be got hoses for these...”

“... The Steam heating apparatus, Gas & Water Fixtures etc. are in good condition...”

Building now completed and ready for its final occupation by the various depts.

Detailed discussion of final work and adjustments.

* Extensive report by G. Brown Goode, Assistant Director of the National Museum.

* Description of installation of exhibits progress.

Under slab steam mains in the trenches are noted as covered with thick layers of hair felt, protected by asbestos in order to carry steam the great distances to the four corners of the building.

1881 - Report of Professor Baird (AR 1881, pp 10-12) notes that “a series of tunnels permeates the floors for the building in every direction, and in these are stretched the various wires, some 200 in number, by means of which any electrical services can be maintained...” These tunnels still exist today and are utilized for many purposes.
Early August 1881 - Octagonal fountain with sides of molded and polished granite and floor of Portland cement is constructed and finished.

Mid-September 1881 - The flooring of main halls with white-veined, red, black, and gray marble tiles laid in chaste patterns completed. Marble tiling surrounded by frieze of dark blue Pennsylvania slate of sufficient thickness to bridge ducts containing the team-pipes, wires, etc. and around the frieze a border of parti-colored Portland cement was extended.

October 01, 1881 - Completion of floor of Rotunda around fountain laid with encaustic tile to the designs of Cluss & Schulze. Four square halls (courts) floored with best Georgia yellow pine laid upon concrete base.

Platform in front of north main entrance is laid with floor of ornamental marble tile.

A new sewer line is constructed through Smithsonian grounds directly through main sewer along North B Street. Building now disconnected from over-charged branch sewers of the city.

The plumbing fixtures including: fireplugs, sinks, wash-basins, water-closets, and urinals, etc. are noted as connected.

Thirty-two of sash in lanterns of the main and square halls made movable in sections by simple mechanism worked from floors of halls.

Several partitions of a fire-proof concrete material constructed in the two eastern corner pavilions.

An interior cladding of corrugated iron ceiling hung in one of the outside ranges, separated by airspace from roof.

Additions were made to the sanitary fixtures of building and desirable to extend over whole building.

Slates are nailed to wood furring set in the small ‘L’ shaped pieces of iron.

On the underside of metal lath is hung from roofs iron purlins and coat of plaster is applied. In some locations, plaster is directly to slate with heavy coat of mortar.

Roofs and ceilings of lower halls formed by sheet metal laid upon plastered (composed of Plaster of Paris, and ashes) fireproof gratings.

Plasterer’s mortar could not hold to greasy fireproof composition and began to fall. Remove and cover above iron ceilings.

Approximately 3,600 square yards of plaster was removed from the ceilings and replaced with iron ceilings.

Removal or covering of the plaster continued in the halls during 1882.

north front platform paved in a “neat pattern” of marble tiles; encaustic tiles installed in the inner vestibules at the entrances; cement laid at the exterior vestibules.

Meigs’ scheme of “gratings of wood fastened between the iron girders and filled with mortar composed of Plaster of Paris and ashes” failed and was removed from all low, flat roofs.

Exposed surfaces were calcimined in subdued tints.

A supplementary corrugated iron ceiling insulating was installed in one of the ranges.

An octagonal fountain was installed in the Rotunda, reducing floor area and lessening expense for encaustic tile flooring.

The radiators now bronzed and steam-pipes insulated with asbestos.

Heating apparatus operates satisfactorily as to machinery and cost of fuel.

Building completed and turned over to SI, excess funding went to the U.S. Treasury.

1880-1881 was an exceptionally harsh winter.

East Tower: November 1881 to May 1882 - South section of East Tower becomes a cafe with a kitchen. A basement area is created for the kitchen, windows are added and hot and cold water are utilized. The first floor is employed for seating.

Windows: Wood windows were double glazed with a 1” air space. Ground glass was used in only one of the two panes. Clear glass used for both panes in office spaces.

January: A number of pivoting iron sashes in iron frames were added and inserted in windows in the side walls and lanterns.

Doors: Ninety-seven white pine hand oil finished and fourteen walnut hand oil finished doors installed in original construction.

Transoms placed above many doors in the towers.

Glass was plain double thick.

Most interior doors were framed with wood corner beads capped with an acorn detail. [Some of these acorns still exist today in the towers and pavilions.]

Painting: December 31, [Superintendent’s Report] painting and decorating the ceilings and walls in the different office rooms throughout the building was completed. Decorative Painting at Rotunda: Cluss & Schulze supervised the initial scheme, which contains Moorish influences.

The initial stenciling encompassed a larger area in the Rotunda than what exists today. Proposal includes decorative work at the upper portions of the Rotunda dome, portion of which is visible in photos dating from 1881.
1882

North Tower: Ornamental marble tile was laid on the existing platform.

East Tower: December 30, 1882, Gas fixtures are installed in basement.

Flooring: North front platform floored with marble tiles
Inner vestibules of four entrances floored with encaustic tile.

Outer vestibules were finished with concrete

* The SI requests $300,000 for additional museum building.

Much remains to be done in the construction of cases.

Cases built by outside contractors in Philadelphia and Baltimore.

Vaults for coal storage under west end of south front were more than doubled, and space gained in addition for a blacksmith’s shop and machine shop.

* Armory remodeled for Fish Commission.

Photographic laboratories were remodeled in the South East Pavilion. p. 7.

* SI received a vast increase in donations. The west side construction of the new building for offices, chemical etc. labs started.

* Bill introduced into Congress for building by Architect of the Capitol on south side of Smithsonian Institution for USGS.

* National Academy of Sciences and other organizations meet in new museum building.


“The rooms in the buildings and towers forming ornamental projections of the front are subdivided into offices, while the halls, which are merely separated by arched open doorways, are arranged for exhibition purposes. The dimensions of the halls are as follows:

Four main halls, each 117′ by 65′; four square halls, each 65′ by 65′; one dome, 65′ by 65′; four outer halls, each 91′ by 52′; four outer halls, each 65′ by 52′; one outer hall, 26′ by 26′; four three-story corner pavilions, each 38′ by 38′; three two story annexes to the latter, each 26′ by 26′; eight three-story towers, each 12′ by 12′; eight one-story rooms adjoining the main entrances, each 22′ by 11′. The height of the outer halls is 29′; of the square and main halls 40′, and of the dome 90′.”


“To facilitate the carrying of steam to the great distances required for heating the offices at the four corners of the building, the steam mains were covered with thick layers of hair felt, protected by asbestos... and a favorable result was obtained...

The main halls were floored with white-veined, red, black, and gray marble tiles, laid in chaste patterns. The marble tiling was surrounded by a frieze of dark-blue Pennsylvania slate.
of sufficient thickness to bridge the ducts containing the steam-pipes, wires, &c.; and around the frieze a border of parti-colored Portland cement pavement was extended.

This tiling covers about half an acre, and was obtained after public advertisement from the lowest bidder, Mr. E. Fritsch, of New York, who completed it satisfactorily about the middle of September.

An octagonal fountain, with sides of molded and polished granite, and floor of Portland cement, was constructed and finished in the early part of August. The floor of the rotunda around the fountain was laid with encaustic tile, according to our designs.

Proposals for these tiles were invited from all the manufacturers in this line in the country, as well as from the leading importers. The United States Encaustic Tile Company, of Indianapolis, Ind., was awarded the work as the lowest bidder, and completed it quite satisfactorily about the 1st of October. It is a creditable specimen of a branch of industry now being successfully introduced in the country.

The four square halls were floored with the best Georgia white pine, laid upon a concrete base, since this material was preferred for special reasons.

The spacious platform in front of the northern main entrance was laid with a floor of ornamental marble tile.

A sewer has been constructed along the Smithsonian grounds, directly to the sewer along North B street, and the building is now disconnected from the overcharged branch sewers of the city.

All the plumbing fixtures necessary or proper to be introduced in the building...fire-plugs, sinks, wash-basins, water-closets, and urinals, were provided for and constructed... with the present requirements of sanitary science.

A large number (thirty-two) of the sash-windows in the lanterns of the main and square halls have been made movable in sections by simply mechanism worked from the floors of the halls. This improvement has proved to be a valuable agent for summer ventilation during the hot spells peculiar to our climate.

An important improvement has been introduced in one of the outside halls by the construction and hanging of a comely iron ceiling underneath, and parted by an air space, from the roof. The double ceiling has added materially to the sanitary advantages of the building, and it is highly desirable to have it extended over the whole building.

The slates of the roofs are hung to iron purlins, and are plastered on their under side with a heavy coat of mortar. During rapid changes in temperature, moisture arising from the process of condensation of aerial vapor appears occasionally on this plastered surface which forms the ceiling of the principal halls; this will be obviated by the hung iron ceiling with air space between it and the plastered slates.
The roofs and ceilings of the lower halls are formed by sheet metal laid upon fire-proofed gratings, which are again plastered on the underside. The adherence of the plasterer’s mortar to the greasy fire-proof composition has proved to be insufficient, and it fell in a number of patches. The whole surface so covered, aggregating about 3,600 square yards, and costing about $720, was hence removed, and the proposed iron ceilings will incidentally serve to hide the unsightly surface of the exposed gratings.

The action of the rapid changes of the temperature during our summer months, in causing expansion and contraction of building material disposed in great lengths throughout this extensive structure, has occasionally baffled the provided safeguards. It has been carefully watched, and small imperfections have been remedied wherever and as soon as they appeared...


“An appropriation of $26,000 was made by Congress for covering the four halls with marble tiling and the rotunda with encaustic tiling. The introduction of a fountain basin, 20 feet in diameter in the rotunda, greatly reduced the amount of tiling to be done, and added much to the general effect. It is proposed to have a small fountain jet in this basin, and to have various ornamental plants growing in it...”


“Marble and encaustic tile flooring in the large halls for $26,000 and running the relieving sewer into the North B Street sewer instead of the 7th Street sewer for $900.

January 02, 1882 – The building was considered completed and ready for occupation. It was turned over to the Regents by the Building Commission.

January 7, 1882 - Letter to unknown “Sir” from Cluss (SIAHHP, Box 12).

Flooring in cellars was asphaltic pavement, laid by Jon. Taylor in 1880.


“The new building more than meets all expectations. The illumination is perfect, the amount of space available for exhibition purposes is undoubtedly the maximum for a building of the size, and the disposition of the exhibition halls in a single level directly upon
the surface of the earth, provides to be of great importance both to visitors and to those who have in hand the work of arranging the collections. Over two hundred exhibition cases have been constructed... all of mahogany, [with a 'rubbed hard oil finish'] finished in the natural color, and have been constructed in accordance with artistic plans furnished by Mr. W. Bruce Gray... all of one length, 8 feet 8 inches...

The public-comfort rooms for ladies and men, in the southeast pavilion of the new building, have been open since the time of the inauguration ball in March, 1881...

....electrical service...One-50 drop telephone switch-board, with 34 connections, 14 of which are in the National Museum... 11 outside.

There are 5 ordinary electric lamps, and 2 electric lamps for photographic purposes, with dynamo-electric machine and resistance-box. There is also a 100-drop annunciator, to which are connected 300 windows and 85 doors throughout the Museum building; 1 large watch-clock for recording on paper dials the time signals which the watchman turns in form the 12 clock stations throughout the building as he makes his patrol; and one alarm box of the district Telegraph Company...


“The trenches for steam pipes and Telephone wires emitted a very foul odor owing to a want of ventilation. I had placed in different sections of the building, in the floors and the trenches, ventilators and made an outlet through the foundation wall east of the North Entrance, thus obviating the evil...

The rules and regulations require that all canes and umbrellas shall be taken charge of by the Janitor at the door and checks given for same. To carry out these rules and regulations we needed a place to put such articles and it was decided to cut a doorway into the room on the east side of the North Entrance and the necessary fixtures placed for the reception of said articles so as they could be properly taken care of. The doorway has been cut, a walnut door put in place and in a short time the room will be ready for use.

During the first part of April there were placed awnings, thirty two in number, about the west front of museum building also curtains placed to the large windows on the balcony of West Entrance these improvements being necessary for the preservation of specimens by keeping the sunlight from them...

Excavating was begun April 20th for the coal vaults for [the] museum building and is now underway...

Before the building was enclosed by a roof the sparrows began to build their nests in every nook and corner they could possess themselves and when driven from one place they sought another within its walls and so continued to do so becoming a nuisance in many ways ... I have had placed at all the windows and openings, win screens, which
seems to have been the means of keeping them out, but those that were already in still have their habitation here finding enough to eat and drink to sustain them, but means shall be taken to destroy them, thus relieving the building of that nuisance.

It having been decided to have a restaurant or cafe attached to the museum building, the south tower of east entrance having a basement suitable for a kitchen, was selected for that purpose, the first and second floors to be used as dining rooms. Windows have been placed in the Basement, a range with all the requirements for cooking, hot and cold water, a refrigerator, dumb waiter, shelving, sinks and sewer connections and all requisite conveniences placed therein. The walls of the rooms on first floor have been nicely frescoed and fitted with all the necessary dining room furniture and are now ready for occupancy...

...regarding gas. A daily statement of the meters are taken and kept in my office consequently giving the daily consumption. The cafe is in good running order and the hungry, tired and heated ones can be refreshed with the delicacies of the season...

The brickwork for the coal vaults has been completed and the necessary plumbing and gas fitting done...

During the current month awnings have been placed at all the windows of the museum building exposed to the sun, with the exception of the third floors of each section."

1882-1883

Windows: During January, sash windows in the lanterns of the main and square halls were made moveable by mechanical means accessed from the floor.

April 32 - Awnings were placed on the west façade. Curtains placed on large windows on balcony of west entry.
May - Awnings added on all windows exposed to direct sunlight.
Precedent for stained wood shutters that exist today in the towers and pavilions is unknown. Existing shutters were installed as part of the 1980’s window restoration work.

Systemic work continues in reorganization and installation of collections.

The SI regards 1882 as the first year of occupation of new building and is planning the organization and regulations for the museum and collection.

Again, it is noted that the electrical service is being perfected.

Heavy attendance at lectures caused transfer of lecture room to West North Range. The mammals exhibit is located in the South Hall.

Information is provided on the disposition of all rooms.

1883

“This building continues to preserve the reputation it has acquired as representing the maximum of convenience and adaptation to its purposes with the minimum of original cost and expense for repairs.”
- Tinting walls.
- Mending broken glass.
- Slight repairs to plumbing.
- Downspouts froze.
- Burst causing damage to walls.

- Roof and site drainage problems are noted in the documents.
- Re-routed drainage north instead of to overtaxed B Street.
- Additional building urgently requested in the Annual Report.
- The Brush-Swan Electric Co dynamo is tested and used for power.
- Most of material unpacked,
- Only 3 of 17 halls now used for storage.

* Early as 1883, live animals including monkeys, pinces, marmosets, Mexican deer and snakes were displayed in this room along with tropical plants. Live fish were also kept in the basin of the fountain.

June 14, 1883 - Letter to Baird from Cluss (SI-AHHP Box 12).
Suggests methods to prevent future flooding in northwest corner of cellar such as a french or blind drain. Cluss’s sketch indicates main sewer line as it extends along west, south and east facades.

One hundred goldfish are added to those already in basin of fountain in Rotunda...
basements of North West and South West Pavilions were flooded during heavy rain.

Flooding in basement of cafe and South West Pavilion: Improvements in sewer and drainage
pipes were made. Received annual supply of coal (382 tons, 1030 lbs) on Sept. 21.

Both True’s report (June 30) and this report include building updates on both the SIB and the AIB. Both include exhaustive details of departments and museum displays. However, there is very little information regarding the physical plant.

December 1883 – Brush Company installs an exhibition of the Brush storage battery system. A battery was installed in the lecture room, connected with “forty of the Swan incandescent lights…The apparatus has been left in the lecture room for such additional use by the Institution as they might desire.” (AR 1883, p.44)

Report of Assistant Director Assignment of exhibition halls is described AR 1883, p 162. Carpenter shop moved from the southeast court to a wood frame building east of museum. Additional sewer lines were laid to B Street after water backed up in basement of café and South East Pavilion during severe rainstorms. P 170.

The building was lighted for the first time on February 26, while preparing fish exhibit to send to London International Fisheries Exhibition. It was recorded as very successful. The public was admitted on following days in February. P 173

Paint: Most exhibit hall walls were painted “maroon” to a height of about 12’ above the finished floor. (This color still exists behind service panels in many locations: end of corridor 1311 outside of South West Pavilion and Office 1276A)

1884

Annual Report of the Board of Regents of the Smithsonian Institution…for the year 1884, Part I, Washington: Government Printing Office, 1885. This is the third year of a systematic effort in arranging material and the progress is described. Congress directed SI to participate in industrial expositions at Cincinnati, Louisville, and New Orleans as they were the museum of record, of research, of education of the broadest type. Development of the museum idea explained. It was critiqued as an elitist attitude. P 7-15. There an initial discussion of the analysis of air quality in lecture room, pp 38-41.


“The building, commenced in April, 1879, and occupied in 1881, is in the form of a square, with sides of 327 feet extreme length and a central rotunda or dome. With its walls a net area of 102,200 square feet, or 235-100 acres, is covered by roofs. It contains underground basement rooms for a steam-heating apparatus, a steam-engine, coal vaults, & c.

On the main floor there are seventeen halls which freely communicate with one another by wide and lofty archways, furnishing 80,300 square feet of floor space. On the main floor and two upper stories there are 27,400 square feet of floor space divided into 135 rooms.
for offices, working rooms, photographer, restaurant, etc. There are also about 4,000 square feet floor space in the galleries.

The centre of the building is octagonal on the ground, surmounted by a 16-sided polygon of 67 feet diameter, containing large windows, surmounted by a slate roof and lantern crowned by a decorated finial. This dome is 77 feet high on the side walls, or 108 feet to the top of the finial.

Four naves, of 65 feet width, 117 feet length, radiate from the dome and extend to the outside walls of the building, forming a Greek cross, over the centre of which the dome rises, and part of the spaces in the exterior angles of the cross are fitted up with halls of 65 feet square and of the same height as the naves, the side walls of both being 42 feet high, while the height to the ridge of the slate roofs is 56 feet. The spaces between the high walls of the Greek cross and the exterior walls of the building are allotted to eight halls, each of 32 feet height.

The main entrances are in the centres of each facade between two towers 86 feet high which act as buttresses for the naves. Between the towers above, and receding from the door-ways, are large arched windows set with ornamental glass. Over the gable of the north nave is an inscription stone “National Museum, 1879” and an allegorical group of statuary designed by C. Buberl, of New York, representing “Columbia as the protectress of science and industry.”

March 1st, 1884 – Monitoring of the carbon dioxide in the lecture hall, because of reports that the air “became exceedingly oppressive during the progress of meetings.” (AR 1884, Part II, p. 38)

Early May 1, 1884 – The SI secretary transferred his office from his temporary quarters in the National Museum Building. (AR 1884, Part I, p. 13)

May 14, 1884 – Opening of the Fisheries section (AR 1884, Part II, p. 36)

June 30, 1884 – Letter/semi-annual report submitted to G. Brown Goode (SIA, RU 158, Box 22, USNM 1881-1964, Curators’ Annual Reports). “From settling, caused by frequent overflows, two of the Boilers in Boiler room gave way.... Commenced repairing brickwork of Boilers, which had given way... As a strong and offensive odor arises, from the alcoholic specimens in west Basement, impregnating the main hall, I have, for obviating the same, had a doorway placed in Tower N. of basement, which has remedied the evil to some extent but not altogether...

Awnings have been placed at all of the windows of lecture hall at a cost of $126.00... The old awnings have been repaired and put up over the windows around the building... Two awnings were put to windows of Public comfort room June 14th at a cost of $28.00...”

Pavilions are placed at the corners. In addition to the windows in the exterior walls, clerestory and dome, lofty lanterns have been provided above the centres of the naves and square halls so as to afford perfect light for this enormous space.
All the masonry above ground is of red brick of superior quality, built hollow, with air spaces for outside walls, ornamented and laid in black mortar for the facing of the exterior walls. To neutralize the monotony which would have been the effect of red-brick fronts of such extent, a number of buff and blue enameled bricks were introduced. A base course of Richmond granite extends around the building. The wrought work of the main entrance, window-sills, inscription plates, copings, etc., are of the Euclid, Ohio, freestone.

The floor beams, girders, and roofs are of iron, the floors are fireproofed by brick arches and concrete. There are no less than thirty-seven roofs, laid upon fire-proofed gratings, as suggested by Gen. Meigs. The slates are fastened to iron purlines. The sash are glazed with two glass for each pane having an intermediate air space.

The floors of the exhibition halls are of marble and tile, those of the offices and smaller halls are of Florida pine. The interior is plastered in sand finish, washed in tints.

The heating is by low-pressure steam on the system of direct radiation, the apparatus being furnished by Baker, Smith & Co. of New York..."}

Professor Goode, the Assistant Director, remarks:

The new building more than meets all expectations. The illumination is perfect, the amount of space available for exhibition purposes is undoubtedly the maximum for a building of the size, and the disposition of the exhibit halls in a single level directly upon the surface of the earth, proves to be of great importance...

It is a Museum of Record, which are preserved the material foundations of an enormous amount of scientific knowledge...

It is a Museum of Research, by the policy which aims to make its contents serve as fully as possible as a stimulus to and foundation for the studies of scientific investigators...

It is an Educational Museum of the broadest type...”

Collections include: antiquities, mammals, birds, reptiles, fishes, mollusks, insects, ores and metals, rocks and building stones, minerals, marine invertebrates, fossil invertebrates and plants.


“From settling, caused by frequent overflows, two of the Boilers in Boiler room gave way....

Commenced repairing brickwork of Boilers, which had given way...

As a strong and offensive odor arises, from the alcoholic specimens in west Basement, impregnating the main hall, I have, for obviating the same, had a doorway placed in Tower N. of basement, which has remedied the evil to some extent but not altogether...
Awnings have been placed at all of the windows of lecture hall at a cost of $126.00...
The old awnings have been repaired and put up over the windows around the building...
Two awnings were put to windows of Public comfort room June 14th at a cost of $28.00...

July 1884 – Ground broken for the erection of an annex building. Annex finished in August. (AR 1884, Part II, p. 36)

October 1884 – Fine tropical plans received from the Botanical Gardens and placed around Rotunda. (AR 1884, Part II, p. 36)

1885
* International Exposition at New Orleans.

AIB is noted as “apparently in excellent condition, and has required comparatively little in way of repairs.

A new concrete walk is installed along the south and east sides of building. p 5.

The appeal for the need for a new building is made again. P7

“Sept. 1: all of the windows in 3rd floor of S.W. Pavillon (Mr. Yeates’ office) were taken out, new sash made and windows changed so as to swing instead of hoist.

Sept.: The repair of the slate roof of Museum building was begun on the 12th --- completed the 17th

Sept. 15: On the approval of Prof. Baird, a Barber shop was located in Gentlemen’s retiring room...

Oct. 15: Received from Botanical Garden, four large Tropical plants, followed ... by others not so large. These were placed around the fountain in rotunda. Other smaller plants have been placed on the balconies ... adding much to the appearance...

Oct.: On the 22nd extra pipes were laid along East front of the building for the purpose of giving a larger supply of gas for use of the Chemical Laboratory of Go. Survey in North East Pavilion...

Dec. 19: ...water pipes in S. West pavilion were frozen and bursted...”

Jan. 2: “That portion of the flooring of South East Court, that was decayed and in a bad condition was removed, and replaced by new...

Jan. 13: ...The water pipes just outside the Annex, bursted the 13th...caused by the extreme cold weather...”

Jan. 22: ...the Incandescent light put in order in the Lecture Hall. But the Electrician reporting that it would be impossible to charge the
Storage Battery, for these lights sufficient to run them. The Arc lights were substituted. And all necessary connections made and completed...

Feb. 17: ...the South West Court having been cleared of all surplus material the floors were found to need repairs which were attended to...

March 3: ... The Sewer Pipes having bursted... about thirty-five feet of new Pipe was required to repair the damage.

April 14:... The Telegraph Office... was completed today.”

1886


Aug: “...The leaky condition of the skylight in the laboratory was repaired without any material cost. ..

Aug. 22: ...The old plank walk leading to the National Museum from the Natural History Laboratory Building... remove[d]... A new and substantial foot walk is very much needed at this point…”

Sept. 17: Many repairs have also been necessary to the roof of the National Museum Building, occupying much time of the tinner. ..

Nov. 2: ..received many plants....making shelving and placing same on the four balconies surrounding the Rotunda...

Nov. 27: ...A concrete walk was laid from the East entrance Smithsonian Institution to the N.W. entrance of the National Museum.

Dec. 2: The two dark rooms on west balcony have been made serviceable by placing skylights in each room. There was also a skylight placed in the dark room on south balcony...”

c. November 1886 - Letter from William Ludlow, Engineer Commissioner, to W.V. Cox, Chief Clerk Nat’l Museum (SI-AHHP, Box 4)

"The National Museum Building was originally drained by the sewer along the south side of B street south. Frequent flooding of the cellars caused abandonment of this connection on B street front in 1881, and the laying of the 12 inch sewer form the S.E. corner of the building to the north B street sewer. .."

Dec. 10, 1886 - East Tower: Wall cut through first floor cafe for new “building” and skylight is added.


AR 1887

“...The settees for Rotunda (8 in number) were completed in due time and placed in position... The wainscoting at North Entrance and at Rooms of Superintendent’s and Assistant Supts’, also adds greatly to that portion of the building, and the whole was done at a very nominal cost. The screens at West entrance have also been completed and answer that purpose they were intended for...”
The east balcony, which has been placed at disposal of Dept. of Fishes and Fisheries, has also received addition, in way of skylights, and unit cases for storage...

July 14: completed concreting the coal vaults, also some patching at East fronts...

July 26: ...Wainscoting for North front finished...

July 29: ...finished laying brick gutter and commenced cutting through South Hall to connect with excavations of steam trenches...

Aug. 4: ...work on tubs containing palm trees in Rotunda...

Aug. 5: ...painters touching up walls

Aug. 6: ...whitewashing of trenches has been discontinued...

Aug. 9: ...tinner putting strips around windows in NE Pavilion...[to keep out rain]; stone cutters commenced bricking up walls of excavation at South front for ventilation of steam trench.

Dec. 14: Skylight added to building at East front; work on tubs containing palm trees in Rotunda.

Dec. 10: Stone cutters began cutting through wall of Cafe to new building East front.”

The report again states the need for a new building due to greatly increasing collections.


Plaster model of the Statue of Liberty, on the dome of the U.S. Capitol, by French sculptor Auguste Bartholdi, given to U.S. National Museum to exhibit.

June 30, 1887 - Semi-Annual Report to G. Browne Goode, Esq. briefly describes the building of an annex or storage room at the east front of the museum at a cost of $550 (SIA, RU 158, Box 22, USNM 18811964, Curators' Annual Reports).

1887
- August 19, 1887 - Baird dies.
- Samuel Pierpont Langley becomes the new Secretary of the SI.

1887-1888


A history of SIB is provided. pp 4-5. It is noted that the 1876 Exposition was an event of great educational importance to people of U.S. and it led to building of museum building. Goode describes the years 1876-1881 as a period of quiet preparation and 1881-1888 as a period of growth and experiment. The young museum is now ready to begin a promising progress toward maturity. Progress of the work of
museum is discussed 1-7, p 5. The case is made for the necessity for a National Museum or group of museums - treasure houses of the nation, objects of national pride. p. 6

“Washington may be made seat of one of the greatest museums in the world. Exhibition of geology and natural history of America, and its natural resources, to the preservation of memorials of its aboriginal inhabitants, and the exposition of the arts and industries of America.” p. 7

In 1887 the museum had ten times number of specimens as five years before. The necessity for a new museum building is argued, pp. 10 - 17. The document includes a description of collections and the rearrangement of the locations, p 18. It includes a plan, p 26.

Minor repairs listed include: painting, storm door at north entrance, lecture hall fitted up for stereopticon exhibition in day-time with windows provided with screens so arranged as to be lowered or raised, the end of the narrative includes a note that the electricity was updated, pp. 54-55.

June 30, 1888 – AR 1887
July 1887: Preparing for Minneapolis Exposition commenced, ended August 31st, the opening day of the Exposition
August 1887: Removing the frame annex east of the museum building completed. Materials obtained used in the erection of work and storage sheds south of the SIB.

September 1887: A cast of a whale in the South Hall of the museum building removed from its base and suspended from ceiling.

November 1887: Double doors added to the secretary’s office
February 1888: East and West Hall were rearranged.

Storm door was constructed at the north entrance to the museum building.
A brick wall was built between the offices of the curator of fishes and of the curator of marine invertebrates.

April 1888: The lecture hall was fitted up for stereopticon exhibition in the day-time, the windows being provided with screens, so arranged as to be raised or lowered.

May 1888: The work of constructing feed and shelter houses and other enclosures for the collection of living animals occupied a considerable portion of the laborers’ time. The spouting on the various buildings was repaired. The awnings were repaired and placed on the windows.

June 2 & 7, 1888 - Letters to Senator Justin S. Morrill from S. P. Langley, Secretary of the Smithsonian Institution (SI-AHHP, Box 12) concerning the building of a new museum building.

"...The arrangement of the interior of the proposed new structure... as the result of the experience of seven years’ occupation of the present building... The lighting will be equally as good as in the present building, the ventilation will be much better, and in other important respects the sanitary arrangements will be far more satisfactory..."
June 12, 1888 - 50th Congress, 1st Session, S. 3134 (SI-AHHP, Box 4)

This bill appropriated $500,000 for the new National Museum (two stories and basement) on the south west portion of the Smithsonian grounds.

June 30, 1889 - Annual report to Professor G. B. Goode for period of July 1888 through June 1889 (SIA, RU 158, Box 22, USNM 1881-1964, Curators’ Annual Reports).

1888: painting windows and putting in glass; water tank for sprinkling; steps to basement (east entrance, south side); repair of floor in cafe; painting walls in lecture room; kalsomining walls in cafe; repair of wood floors at South East and North East Courts; skylight for carpenter’s shop; and making storm doors for north entrance.

1888-1889

Congress directs Architect of Capitol to investigate possibility of constructing basement under National Museum. It is noted that Congress has made no progress on erection of new museum building.

East Tower: Kalsomining of walls; repair of floor; flooding is problematic in the basement of the East Tower.

Annexes: 2nd floor of the South East Annex constructed of iron beams, brick and plaster was constructed.

June 30, 1889 - Semi-annual report (SIA, RU 158, Box 22, USNM 1881-1964, Curators’ Annual Reports).

AR 1889:

“[During the first half of the year ending June 30, 1889] Partitions were built in the third floors, Northwest pavilion and extra ceilings were put in; in the southeast pavilion a ceiling with flooring above was built, thus giving an additional room for the accommodation of the Entomological Dept. Much new shelving was put up in the different departments, the stationery room was re-arranged, new files and book-cases were built for the Dept. of the Library, and a large number of cases, bases, frames, pedestals, etc, was built and re-modeled.

In various places repairs have been found necessary in the flooring of the Museum, on account of the dry rot, which is becoming so extensive as to be a serious detriment. The bases of the cases standing directly upon the floor have also been found to be so much injured by the prevailing dry rot as to make it necessary to raise them upon blocks, pending the time when the bottoms of the cases can be repaired and strengthened, and, when practicable each article permanently raised upon casters. In order to prevent so far as possible any accumulation of dampness, which might cause this decay, the trenches below the building have been thoroughly cleaned, and have received several coats of whitewash, but the fact that the floors throughout the building were laid in the damp concrete renders this precaution of little avail. It has, however, been taken every year since the Museum has been occupied.
August 1888: The following work has also been completed; Putting new floor in the café; shellacking and painting wall cases; extending wall-cases and polishing specimen blocks for the department of comparative anatomy; repairing broken cases and making frames for the department of ethnology. For the executive clerk’s office there has been made one case of drawers with shelving, and once case for letter-books. The refitting of doors to cases in several departments has been continued from day to day.

September 1888: Several repairs in the different parts of the Museum building and in the Armory building were rendered necessary by the results of a severe storm which occurred on September 10. The cases formerly occupying the wall space at the south entrance of the Smithsonian building were removed to the northeast court of the Museum building. A great many blocks for specimens have been painted and ebonized for the various departments and the work of fitting shelves to cases has been continued.

The platform in the lecture room has been repaired, and a large book-case made for the Department of Buildings and Labor. Five pier upright cases have been remodeled for the Department of Ethnology, and several catalogue boxes have been made for the executive clerk’s office. Oak frames for transparencies have been made. The office of the engineer of property has been furnished with a brass wire screen. The extension and remodeling of the bird cases still continue.

November 1888: The tender belonging to the engine “John Bull” was brought over from the Armory and placed at the east entrance of the Museum building.

The carpenters completed remodeling pier cases for use in the Department of Arts and Industries. The following work was also accomplished: One book-case, with shelves, was made for the Department of Botany; changing doors in unit tables in the Department of Botany; making two oak book-cases for the Executive Department; constructing pigeon-holes for the Department of Building Stones; also counter, drawers and pigeon-holes for the office of the engineer of property; adjusting locks and doors in floor cases in the southwest hall. The painters have been engaged in covering and painting diaphragms, lettering screens, and varnishing picture frames; painting tubs for plants in the rotunda; painting the walls of the public comfort room; glazing windows in the Smithsonian and Museum buildings; painting walls over the stairway in the east pavilion; finishing in hard oil a large book-case for the executive clerk’s office; painting cases for the Department of Property and Supplies.

December 1888: Ash screens to be placed on the top of the cases in the southwest court have been made. The west hall has been re-arranged and the lecture hall put in order for the meetings of the American Historical Association. Eleven door screen cases have been furnished to the curator of birds. These will take the place of the old white cases in the center of the hall, which will be condemned as
soon as the specimens have been removed. The old storm door at the north entrance to the Museum building has been removed to the east entrance, and larger and more serviceable ones have been placed at the north entrance. The following work has also been accomplished: Construction of base for statues; painting trays; repairing Japanese clock; construction of card catalogue shelves for cases; putting strips in case for medals; painting bases; making two large walnut bases; setting glass in the antelope case, and finishing and shellacking pedestals; painting pedestals and putting locks on cases in the Department of Botany. The fence around a part of the Armory building has been repaired and the sash glazed and painted. The windows and screens in the lecture hall have been glazed and painted. For the Department of Ethnology a large oak frame for a map of Asia has been made. A Kensington case has been polished; frames for plaster casts have been made; a skeleton frame for the west hall has been constructed; four boxes have been made for the library; cases for the models of the Zoological Park have been made, and a card catalogue case was constructed for the office of the engineer of property. The work on the bird cases in the Smithsonian building still continues. The upright cases have been extended back as far as the wall.

Jan. 1889: Constructing a second floor above the ladies reception room in the SE Annex was begun in Dec. 1888 and completed by Feb. 1889 and consisted of iron beams, brickwork and plaster. Two skylights were also added in the roof.

The old storm doors have been placed at the east entrance.

February 1889: The removal of the office of the curator of naval architecture was removed from the second to the ground floor in the east tower. The removal and rearrangement of cases stored in the Armory building was completed. A wire fence to enclose the large mineral masses on the west side of the Museum building was constructed. Two skylights were placed in the roof over the entomological laboratory. Painting the walls and ceiling in the ladies’ retiring room was begun. The re-arrangement of the cases in the north and west halls has occupied a great deal of time. The skeletons of whales, one of which was returned from the Cincinnati Exposition, have been hung in the osteological hall.

March 1889: The interior of the long wall case in the south east range was painted, the wall case was glazed and label frames made. Locks were put on cases and doors for the Department of Ethnology. For the Department of Marine Invertebrates locks and keepers were put on a book case. The cases in the hallway of the northwest pavilion were painted. Locks were fitted to doors and cases in the Department of Metallurgy. Piers and frames were painted, and several cases glazed.

April 1889: Lining window ledges with tin to prevent entry of rain. Third floor of the northwest pavilion was fitted up for the offices of the executive clerk.
May 14, 1889: The northwest basement has been thoroughly cleaned, and several coats of whitewash have been put on the walls.

All the awnings have been replaced to the windows from which they were taken last Fall, a great amount of repairing was necessary... There has been but six new awnings bought for the Museum in several years, the old ones will hardly stand any more repairing, and it is more than likely that an entire new set will have to be purchased in a short time...

The skylights in the carpenter’s shop and leaks in the roof were repaired. Twelve label-frames were made and sectional covering put on steam-pipe in the exhibition hall of the Department of Comparative Anatomy.

June 1889: Basement rooms under the north entrance received a thorough cleaning, whitewashing and ventilating.

A window was cut in the wall in the third floor of the northwest pavilion. The east window in the second floor of the natural history laboratory was enlarged.

Repairs were made in the roof of the Museum building.

June 24, 1889: Owing to the narrow stairway and the inconvenience of getting large objects to the 3rd floor north west Pavilion, a large window has been cut in the wall leading to the Roof on the east side, where large objects can easily be hoisted to the Roof, and put through this opening, this affords more convenience and better ventilation.

The east window 2nd floor Natural History’s Laboratory has also been enlarged about double the original size, affording much better light to the Artists occupying the room."


Miscellaneous alterations and repairs including: July flooding of sewer in boiler room, basement of the cafe and North West Pavilion; placement of raised platforms in several areas for comfort; removal of hollow brick partition dividing room on 2nd floor in North West Pavilion; placement of partitions and ceilings on 3rd floor of North West Pavilion (June 1889); building large door frame and transom on west entrance (“the large Walnut doors at West Entrance have been moved back to the outside arch, thereby giving more room to the property Department who are occupying that Entrance for storage of stationery, & c.”); making wainscotting and kalsomining walls for hall and stairway of the North West Pavilion; “tinning 48 ledges over windows;” drinking font or barrel added to Rotunda; large mosaic (Progress of Science over Fire and Water; 937 tiles) installed at North Hall exit; and extra pipe run from basement to 3rd floor in North West Pavilion and radiator added.
1890

* 1890 Astrophysical Observatory established


Character and future of National Museum 19
Feb. 1890 Hon. Justin S. Morrill reported from Committee on Public Buildings and Grounds a bill (S. 2740) to provide for erection of an additional fireproof building for the National Museum. p. 18.

Feb. 28, 1890 / April 8, 1890
Letter from Edward Clark, Architect of the Capitol, February 28, 1890 and Senate Doc. 2740, 5pt Congress, 2nd Session, April 8, 1890.
Building had reached extremely overcrowded conditions: Edward Clark submitted a cost estimate of $57,675 for constructing a basement running around the other walls of the building constructed of brick arches supported by iron beams; added that it would be more cost effective to build a new fireproof building.
April bill for $500,000 was approved by the Senate to construct an “additional fire-proof building for the use of the National Museum.”

April 16, 1890 - Letter from Lester F. Ward, Dept. of the Int. U.S. Go. Survey to Prof. Goode (SIA, RU 198, Box 13)
Complained of crowded towers and balconies; requested curtains or shades to be furnished along the large south windows of the balconies to protect from sunlight.


Gas pipes were run along ceilings in the North West Range, South West Range and West South Range with “gass” fixtures attached. The four main halls, East North Range, East South Range and North West Court were lighted by electricity.

October 3, 1890 - Mr. Horan’s Two Reports for the Fiscal Year 1889-90.” (SIA, RU 158, Box 23)
Assessment of square footage and cost per square foot (Total 130,748 square foot) cubic contents of space enclosed under the roofs of the National Museum; consumption of coal for heat- 300 tons; for power - 80 tons.

1890-1891


G. Brown Goode, Asst. Secretary in charge of the National Museum provides a narrative on the history, organization and scope of National Museum.

January 9, 1891 bill providing for new building failed.
This report includes a discussion about the preparation for specific exhibits for participation in World’s Columbian Exposition. The discussion on the existing building includes notes on frequent repairs to large flat roof, floors patched in many places pending laying of a granolithic pavement, trenches beneath building cleaned and
5.3.3 – 49

Whitewashed and electric wire therein put in order, north balcony painted and walls calcimined, rooms adjacent to east entrance and in balcony and stairway above, walls calcimined and woodwork painted. Improvement of electric light plant and heating apparatus. Appropriation for removal of decayed wooden floors and substitution of granolithic or artificial stone pavement. P.71.

July 1891 - Curators’ letter/semi-annual report (August 1890 - March 1891) to Dr. G. Brown Goode (SIA, RU 158, USNM, 1881-1964, Curators’ Annual Reports, Box 23).

Aug. 6: New gas engine placed in engine room.

Sept/Oct: Moving of steam pipes in various locations.

Oct. 10th: Stepping stone removed to create more space for carriages.


Oct 14th: The original plaster cast of the Goddess of Liberty which had been stored in the basement of the Capitol for years having been presented to the Museum by the Capitol authorities... the work of erecting it in the rotunda was begun... completed November 28th.”

March 17th: “Two of the office rooms on West Balcony have been frescoed and painted.”

March 25th: Basement whitewashed again.

March 26th: “Work was begun... on four large windows to take the place of four of the old ones on either end of the Bird Hall, these windows are better adapted to ventilation, opening both at the top and bottom.”

1891-1900

Flooring: Old wood floors replaced with cement, granite, and granolithic and terrazzo pavement on ground floor exhibition halls (Rathbun, in AR 1903, p. 250)

Gold, yellow, and white terrazzo generally consisted of 2’- 0” squares with a contrasting border (red with a row of small white squares) which measured between 1’-0” to 2’-6” wide.

1892

Superintendent’s Report, Fiscal Year 1891-2 (SIA, RU 158, USNM, 1881-1964, Curators’ Annual Reports, Box 23).

Jackson Sarcophagus was removed from the West Hall of the museum on July 27th (1891) and placed on the parking lot- north front of the building; Slating trenches in West South Range; Crew tore up floors in West South and North West Ranges, North East Court, tank room and photographic department and laid “granolithic pavement.” “Artificial stone pavement” was laid in the South West Court.


G. Brown Goode, Asst. Secretary in charge of NM. 21 Jan. 1892 bill providing for new museum passed Senate 14 April, but failed for 3rd time in House. Participation in Madrid Columbian Historical Exposition. General repairs are noted to skylights, windows, painting, etc. Drainage to west side was corrected as a grading problem. National Academy of Sciences, Geographic Society, etc. used lecture hall. Oxyhydrogen lantern used for lectures. This type of fixture was patented
in 1889. Preparation for World’s Columbian Exposition continued. Detailed list of the work is contained on pp. 63-64.

The museum began experimenting with the removal of decayed wooden floors and replacement with artificial stone flooring. Three different contractors used by way of experiment to see which was best. A new steam heating apparatus was installed.

1893

World’s Columbian Exposition.

June 30, 1893 - Letter/annual report to Dr. G. Brown Goode from Henry Horan, Superintendent (SIA, RU 158, USNM, 1881-1964, Curators’ Annual Reports, Box 23).

July 5: Granolithic floors, to replace rotted original wood floors, were laid in “Gents retiring room.”

Sept. 10th: “disinfecting [sic] all the trenches, water-closets and sinks were flushed out and the basements are being cleaned, whitewashed, and put in a clean and sanitary condition.”

Jan. 23rd: Cotton screens placed between piers above the wall cases on both sides of the North Hall and moulding put at the top of the screens as a finish. (Busts were placed on top of cases and the cotton screens provided an excellent background.)

Feb. 3rd: Fire broke out in boiler room due to an explosion of alcohol vapor.

Feb. 13th: A sub-floor was put up over storage cases at south entrance in Mammal Department Laboratory for additional storage room. Accessible by a step ladder or movable stairway, iron rafters were placed across from wall to wall to support floor.

May 17th: “Two large skylights” were installed in Department of Insects in South East Pavilion that “adds greatly to the comfort of the persons at work there.”

1893-1894

Department of Buildings and Labor, Superintendents Report, 18934. (SIA, RU 158, Box 23)

Alterations included: cutting the doorway in the room at the south entrance; plastering the walls of rooms on 2nd floor of the North East Pavilion; cleaning of gas fixtures by Washington Gas Light Co.

April 13th: Fire noted again in the basement of the North West Pavilion due to the placement of a floor mop on one of the unprotected steam pipes.

1894


Exhibition halls of museum were partly dismantled for the exposition.
The secretary again presents the development of a new museum and a new museum idea centered on public education.

The Regents’ report contains a good detailed description of the greatly increased museum holdings.

Some of the purlins in the main halls began to buckle and were reinforced with angle iron.

1895


Work of museum greatly impaired by insufficient appropriations.

Cotton States and International Exposition is held in Atlanta, Georgia.

An $8,000 appropriation is sought for construction of galleries in South West Court and South East Range.

Galleries are provided for in original plans for building.

The galleries can be supported so as not to detract from appearance of the halls or to interfere with the present system of installation.

East Tower: A building floor plan indicating water and gas lines shows that the café.

Annex was “a total length of 77 feet” by this time.


Aug. 17th: Entrances to lecture hall and fisheries court have been changed to archway next to north side of building; partial new floor in lecture hall in front of library completed.

Oct. 8th: Fire in paint shop due to the boiling over of heated bucket of wax and oil; bent iron girder in the roof in the North Hall was “straightened and fastened in position with stay rods.”


Oct. 23rd: cutting out floors for ventilation pipes in the property clerk’s, superintendent’s and telephone rooms; replacement of telephones and wires

1896

* April 27, 1896 Goode died

April 14, 1896 – Senator Morrill introduces a fourth bill for construction of a new museum in 53rd Congress (Rathbun, USNM AR 1903, p. 283).

$8,000 appropriated by last Congress for galleries providing some temporary relief.

It is noted that the SI still needs a new building or the present museum will become a place for storage, not exhibition.

The galleries in South West Court and South East Range are added.

North Tower: New foundation and mosaic floor with swastika-type design is laid in both outer and inner entry vestibules.

East Tower: Water and gas pipes of the cafe are placed inside the walls.

August 29, 1896 - Letter/annual report for fiscal year ending June 30, 1896 to Dr. G. Brown Goode from Henry Horan, Superintendent (SIA, RU 158, USNM, 1881-1964, Curators’ Annual Reports, Box 23).

Sept. 12th: Painting and kalsomining cafe room; As “most of the wooden floors in the Museum” were in “very bad condition,” a workman took up and relaid with new material, the “worst of these places.”

Sept. 14th: “All the water and gas pipes in the rooms of the Cafe are being put in the walls.”

Oct. 23rd: “The C&O Telephone Company wires have been disconnected from the overhead cable, and connected to the underground cable recently put in.”

Dec. 4th: “One light of glass [has] been removed from the sash in several of the offices of the Museum. In their present condition (double lighted) the only way to clean the glass, was to remove one light. This always kept the glass in a dirty condition on the inside, and made the windows unsightly. By the change, they can be cleaned whenever necessary...”

Dec. 6th: Incandescent lights were put up in the library and power supplied by the dynamo.

March 17th: New fire hose 236” and 350” of 3/4” rubber hose purchased for the museum.

May: New foundation and granite floor put in Skeleton Hall.

June 15th: Floor in outer and inner vestibules of north entrance removed and replaced with new foundation and mosaic floor.

December 15, 1896 - Request for Proposals for “Erecting Iron Galleries, US National Museum, under direction of the Smithsonian Institution,” by S. P. Langley, Secretary (SI-AHHP) and Specifications. Proposals for “furnishing, delivering and erecting...the Steel and Cast-iron work for galleries in two or more halls” with specification calling for “galleries to be constructed of iron beams, supported by iron pillars, and protected by iron railings, and provided with iron staircases.”
1896-1902

Hornblower & Marshall gallery additions consisted of simple cast iron columns, terrazzo (typically 5'-0" square sections times the width of gallery) [George H. Tichenor & Co.] over concrete arches [Barber and Ross w/ Wilkins & Co.] and steel beams [Globe Iron Works, Chicago.]

Concrete arches finished with a rough plaster coat. Height of the galleries generally 16'-0" high and the width of those in the halls were 13'-6" to 14'-0" wide, the courts were 10'-3" wide, and the ranges were 12'-0" wide.

Railings were installed by Chas. White & Co. with a "Union Jack" design by Victor Mindeliff and all Cluss handrails were removed. Before some of the new railings were installed, temporary railings of one inch pipe were installed. Some of these temporary railings remained in the ranges and diagonal wire mesh was later installed.

Flooring: With the addition of galleries to the four halls by Hornblower & Marshall, the original cast iron stairs located in the towers were removed from the first to second floor gallery level with the exception of a set that still exists in the North Tower (1106) today. It is unknown why these stairs were permanently removed. Access to the second and third floor tower offices was then possible by new sets of stairs off the Rotunda.

Major renovation of building undertaken, designed by firm of Hornblower & Marshall (Drawings dated February 1896 indicate sections through new galleries and structural integrity.) Renovation included addition of second floor galleries to East, West and South Halls, all four courts and five ranges.

The width of the galleries is from 10’ to 14’ and their height is 16’ above the floor. “They are of very simple construction, consisting of plain iron pillars and girders, with brick archways and cement floors.” South East Range decked over to form a complete second floor. Skylights are placed in roof in four courts, South West, East South and South East Ranges to provide more natural illumination. (USNM AR 1903, plate 26.)

South Tower: Conversion of tower entrance into office with addition of windows and masonry infill in sandstone entry arch.

The South East Pavilion is noticeably changed on the exterior with the additions of skylights and large windows during the later renovation (1909) of the photography laboratory on the third floor.

West Tower: Conversion of tower entrance into office with addition of windows and masonry infill in sandstone entry arch.

A photograph indicates that a pair of doors was inserted in the infill to access the exterior.

Halls: The 1896-1902 mezzanine gallery installation by Hornblower & Marshall succeeded in fulfilling Cluss & Schulze’s original plan.
Courts: Skylights were added to the roof lanterns during 1896-1902 to bring more natural illumination into the rooms after the Hornblower & Marshall mezzanine galleries were added.

Ranges: Skylights were added after 1902 to bring more natural illumination into these rooms as light levels decreased substantially after the construction of the 1896-1902 mezzanine galleries.

Only five out of eight ranges received galleries during this time (East South, West South, South West, North West, and West North)

South East Range received a complete 2nd floor.

1896-1904

Considerable number of double-glazed windows became single-glazed when one of the double panes was permanently removed to assist in cleaning.

1897


Appropriation by Congress for the fiscal year ending June 30, 1897,

Gallery construction continued under direction of the superintendent of the Congressional Library. Appropriation became available at a time when cost of ironwork of all kinds was unusually low. Four galleries are now under construction.


Contract for iron work (24” I beams) of galleries awarded to Globe Iron Works of Chicago ($3,200) on February 24, 1897.

Contract for stairs and balustrades awarded to Chas. White & Co., Washington, DC ($1,780).


New terrazzo floor put in Osteological Hall and ceiling repainted.

Mosaic floor and woodwork put in north entrance, designed by Hornblower & Marshall, with “special designs with the swastika as a motive”. The entrance was heated by an “indirect radiator, with a large register opening on the west side.”

Gallery construction was helpful but the SI still needs a new building.

Proposal to replace old wood floors with terrazzo: lecture hall, North East, East North, South East, and South West Ranges.

“Latest improved” water closets, known as the “Niagara” installed in ladies’ and gentlemen’s comfort rooms.

Daguerre monument was moved to park east of building when decision was made to have “steps leading to galleries start in the rotunda.” Exterior of building was painted.

May 1, 1897 - Tennessee Centennial Exposition.
The SI sent exhibits from the National Museum to the event.

August 13, 1897 - Letter from Richard Rathbun, Acting Secretary, to Edward Clark, Architect of US Capitol (SI-AHHP, Box 1)
“...erection of galleries in the four courts ... has progressed as far as the appropriation available... the contractors for the archwork and the laying of “terrazzo” floor have submitted a bill... “

August 17, 1897 - Letter to Richard Rathbun, Acting Secretary from Edward Clark, Architect of US Capitol (SI-AHHP, Box 1)
Certified that construction of archwork and laying of terrazzo flooring was completed and approved.

1898


Four additional galleries were erected, three for exhibition spaces and one for the library totaling 6,650 sq. ft. p. 7.

The SI asks Congress for fireproof storage building to replace wooden sheds west of the National Museum and was denied.

$8,000 appropriated in 1897 and again in 1898 for galleries. Seven galleries were built.

An additional appropriation of $10,000 for railings, painting galleries, connecting them with those in adjoining hall, placing a skylight in each court, and providing a ventilator in one of the ranges was awarded. p. 21.


Addition of second floor galleries in three halls (East, West and South) and all four courts completed, increasing floor area by 17,000 square feet, 1/6 of former space. Ransome arches and terrazzo floors of galleries completed by Go. H. Tichenor & Co. Iron beams supplied by Barber & Ross with Wilkins & Co. contractors. Underside of concrete
arches of the galleries finished with a rough plaster coat.

Temporary railings were built of 1" pipe.

August 17, 1897: To test the strength of the galleries 16,465 lbs were placed before deflection of the 42’ long I beams.

Portable elevator purchased for hoisting heavy material in the future.

Also during year, wooden floors in North West and South West ranges were removed and replaced with concrete floors and the entrance to the southeast pavilion was "enlarged and subdivided" for an entrance to the women's restroom.

Extensive painting to height of gallery floors. Many exhibit changes were made during this time.

August 9, 1898 / August 6, 1901
Drawings by Hornblower & Marshall indicate changes to both the west and south entrances with the main doors removed and windows inserted to increase office space ("Prof. True Office at South Entrance," August 16, 1901, SI-AHHP, Box 6 - see p. 3-207 and "Alterations and Additions," August 8, 1898, (SIA Binder, Drawing Control No. SOI/I175, Neg. No. 89-12893)

1899

Report of Assistant Secretary, National Museum (SI-AHHP, Floor Plans)
Snowstorm of February 1899 “disclosed certain weak places in the roof... and caused the buckling of several of the large iron girders. The damaged parts have been repaired and strengthened so far as the appropriation permitted. Two of the old wooden floors have been replaced by terrazzo pavement. ..”


A total of ten galleries were added in past three years and added only 22,600 sq. ft. while collections have increased over 20 fold since 1881. p. 7

Of the ten galleries, four new galleries were designed for storage; two were for USGS collections, one in part for Division of Plants and 1 for overflow from the library.

Great storm of February 1899 caused failure of a number of the main iron girders of roof. The roof was built 20 years ago before extensive use of iron or steel in such constructions and when conditions of their use in buildings of so great a width were but imperfectly understood.
“Iron galleries have been erected in the West North Range, the West South Range, the East South Range, and the South East Range under the item of $10,000 appropriated for that purpose.” p. 53.

August 29, 1899 - Letter to Acting Executive Curator from J. S. Goldsmith (SI-AHHP, Box 4).
Submits cost for “replacing old wooden floors in East North and South East ranges with terrazzo flooring; also for putting new ornamental steel ceilings in the East South, North East and North West Ranges.” [It is unknown if “steel ceilings” were constructed.]
The work included putting a new concrete base under the 7,500 square feet of terrazzo.

1900


Two new high pressure (150-horsepower) steam boilers were installed in the basement of the South West Pavilion; and powered by coal and wood.
Radiators supplied heat in various rooms.
Many of the gallery spaces, such as the Hall of Health, did not contain radiators.

Progress has been made in the installation of electric arc lamps throughout the museum halls, and it is expected during the coming year to complete the work so that the building may be opened at night when occasion or order of Congress should require it.

Much needed improvements are being made in the heating system by the installation of new boilers in the museum and the connection by a tunnel with the SI.

The last of the old temporary wooden flooring in the museum halls has been entirely replaced by permanent terrazzo pavement.

Among the alterations and improvements made in the Museum building, the most noteworthy has been the fitting up of a new lecture hall in accordance with the provision of Congress, the room selected for the purpose being the East North Range, at one side of the main entrance.
The only changes made in the room itself have been to substitute a terrazzo floor for the old wooden one and to paint the walls and ceiling, which has been done in very tasteful and pleasing colors. The furnishings consist of the necessary platform, chairs, lantern, curtain, and stand, and adjustable screens at the windows.
It is expected that the facilities thus afforded will often be utilized for the delivery of scientific lectures bearing upon the rich and varied collections in the Museum.

Some years ago a number of electric arc lamps were temporarily installed in the Museum building, the only attempt that had been made up to the present time to light its exhibition halls. The sundry civil appropriation act for 1901 carried an item of $3,500 for beginning a permanent installation of wires for lighting the entire building.
The roof of the Museum building, never entirely satisfactory, and showing many weak points during recent years, has been repaired and strengthened to the extent that its character warranted, under the advice of a competent engineer.

The museum is now in crisis and they must have new building.

The gallery cases are arranged in an alcove style to afford more room.

SI prepares exhibits for the Pan American Exposition, Buffalo, May 1901.

Plan for changes in mammal exhibits p 31

A row of skylights is added in the roof of South East Range over second story.

The gallery in South East Range was extended to form a complete second story, adding much needed room for laboratory and storage purposes.

Skylights placed in roof above four courts and above West South, East South and, South East Ranges where lighting was poor due to construction of galleries.

Galleries in East, West and South halls and stairways leading to galleries from Rotunda furnished with iron railings and gallery in South East Range extended to form a complete second story, adding much needed room for laboratory and storage purposes.

Old wooden floor in main hall occupied by birds and mollusks replaced by terrazzo pavement.

Western portal is remodeled as office for head curator.

Adjoining rooms on north and south are fitted up as department laboratories and utilized largely for receiving and distributing collections.

Other offices are created at each side and above to provide interconnecting spaces for Anthropology staff.

A sectional library in is created in the office of head curator.

The Division of Ethnology has been partly engaged in installing collections in the gallery of the North West Court.

East side of gallery: installed cases containing typical exhibits of basketry from all parts of the world.

North side of gallery: Series of rail cases shows the types of California basketry, while in the wall cases a series of baskets is shown representing various tribes from British Columbia to Mexico.

South and west side of gallery: exhibits of ethnological materials of Latin America, beginning with Sonora on the north and ending with Tierra del Fuego on the south.
November 14, 1900 - Letter from Rathbun to S.P. Langley, Secretary, re: Lecture Hall in the East North Range. (SIA, RU 31, Box 56)

Utilized painting advice from Miss Temple; described building of platform with desk and lantern slide with curtain; the purchase of 500 chairs under Hornblower’s advice and $2,500 worth of curtains.

1901


It is noted that the last of the wooden floors have been finally given place to a more substantial character of pavement.

The South East Range, assigned to the exhibition of reptiles, amphibians, and fishes, has been entirely renovated, a terrazzo floor having been laid and the walls and ceiling appropriately painted. The installations, however, is not yet completed.

“For the National Museum a great new building is a prime necessity. The Museum has practically reached a point where it is physically impossible that it should grow under present conditions.” p. 151


Good history and enumeration of needs of National Museum.

Principal alterations and repairs included the fitting up lecture room, strengthening roof, substitution of terrazzo for the last of old wooden floors, beginning comprehensive system of electric wiring for the exhibition halls and offices.

The lecture room first in North West Range, then in West North Range is crowded out by collections, now moved to East North Range at east of main entrance.

Walls and ceilings painted shades of green. Windows provided with shutters to darken room for use of stereopticon.

Electric plant is now inadequate and the SI is now buying electricity. Electrical improvements planned as they began the comprehensive system upgrade of electric wiring for the exhibition halls and offices. Roof repaired and strengthened, a revision of heating system is planned. Pp. 15-16 South East Range repainted and new terrazzo floor.

Beginning in 1901, a permanent installation of wires for lighting the entire building was begun and completed shortly thereafter.

1901-1902

Annual Report of Superintendent, 1901-02 (SIA, RU 157, Buildings Management Department, 1881-1973, Box 1).

Repairs included: painting exterior woodwork and galvanized iron cornices (“A good deal of
The exterior woodwork had not been painted since erection of the building.

Conversion of "hallway leading to South Balcony and vestibule entrance into office rooms and remodeling 4 adjacent rooms" at south entrance; conversion of "hallway leading to East Balcony into a room for Cafe"; new wooden floor in first floor hallway, North West Pavilion; remodeling skylight at South West Pavilion; new cement floor in basement of North East Pavilion; finishing ceiling in cafe with compo-board after erection of new skylights other minor repairs.

East Tower: 1901-1902 -- New skylights and finishing of ceiling with compo-board.

1902


Galleries constructed in West North, North West, and South West Ranges for library, as labs for departments of anthropology and geology.

Original steam boilers replaced by pair of water-tube boilers of modern pattern with capacity for heating both buildings. There is an overhaul of entire heating plant and the old boilers retained for emergencies.

The installation of complete system of electric-light wiring and fixtures extending to all exhibition halls as well as to the offices, laboratories, and storerooms is finished.

The lunch room is slightly extended and improved.


Rathbun writes in his extensive 1903 report:

"In 1902, however, experiments were made looking to a change of color, with what is regarded as very satisfactory results. The colors used in the main halls and courts are a light red to a height of 15 feet, followed by a deep ivory, the ceilings followed by a lighter ivory. In the rotunda the colors range from olive below to ivory above, with stencil decorations as shown in the plates. This color scheme has not been extended to the ranges, which have been repainted from time to time in various colors."

August 25, 1902 - Letter to Miss Temple from W. Racceuil (sp?) (SI-AHHP, Box 15)

Grace Lincoln Temple designed decorative work and color scheme for stenciling Rotunda, South, East and West halls, Ranges, and Courts of the National Museum. It is unknown how much work was completed in the courts and the ranges.

Post-1902

Wood flooring was replaced when necessary throughout these spaces. Carpet, cork carpet, encaustic, and ceramic tile (third and first floors of South East Pavilion), vinyl tile, and linoleum.
were installed over the years. It is unknown how much of the original wood flooring may exist in the building. Many of these floors are covered with carpet today.

1902-1903

Annual Report of Superintendent, 1902-03 (SIA, RU 157, Building Management Department, 1881-1973, Box 1).

The east entrance served as the freight entrance since initial construction. Finally a portable walnut partition consisting of four heavy doors, hinged together with a lattice transom above, was erected to hide this activity from visitors.

July 1902: Painting of the building was started during this month. Elaborate scaffolding was constructed in the Rotunda.

Aug. 1902: “New paneled oak wainscoting was put up on the south wall in the inner vestibule at the North West Door...Old roof was replaced last year by a new peach bottom slate roof...” Where roof had leaked in “Archaeological Hall,” plaster cornice had become water soaked with “large chunks” fallen. It was replaced with galvanized iron cornice.

March 1903: Slate roofs over North and South Halls were pointed with slaters cement; half of tin and iron down spouts/necks were replaced with copper ones; new copper flashings installed; and repairs were made to tin roofs.

Buberl Statue: “The metal statue over the North entrance to the Museum building was repaired and reinforced with strap iron bolted to the back. The old dirt filling used to weight the statue caused the metal to crack open and the statue to raise from the metal base. The statue was beginning to get in a dangerous condition and the rain driving against the open cracks in the side and base soaked through the brick wall and caused the unsightly leak in the peak of the north wall in the North Hall. This leak has not appeared since the repairs were made. The dirt was removed and the space filled with cement grouting. Cost of labor and materials was $59.14.” [This is the first documented repair of the statue.]

May 1903: “Two new Rendle skylights, each 8-112 x 12 feet, were erected on roof over the gallery in the South West Range.”

“Two hallways leading to the tower rooms on the second floor on the north and south side of the east entrance were remodeled into office rooms. The old slate roofs were removed, the brick walls on the front built up to a height sufficient to insert two new windows and a fire proof roof constructed over them...”

Pre 1903

Decorative Painting at the Rotunda: Photographs show Rotunda walls repainted. Many photographs indicate that two tones highlighting the arches existed for a period of time before Temple’s design was painted.
1903

South Tower: Small storage building existed to the east of the South West Pavilion, adjacent to the West South Range on the exterior south wall and contained a few rooms at the basement level. It is unknown when this addition was removed.

Painting: Repainting of the Rotunda and four main halls (and later courts) was completed for the first time since the building’s construction.

Decorative Painting at the Rotunda: Grace Lincoln Temple designed the second decorative stenciling scheme that was applied to the walls of the Rotunda. (Historical photographs indicate that this scheme existed for some time. It’s unknown when stencils were covered, but they disappeared by at least 1956)

Tunnel to the SIB:
Cluss mentioned the idea of building a tunnel as early as August 7, 1881. However, the existing tunnel was not constructed until 1903 when the change in mechanical equipment affected both the AIB and the SIB. Rathbun notes that the tunnel was “70 feet long, 5 feet wide and 7 feet high” and was primarily constructed to run heating pipes and electrical conduits.


The slate roofs over main halls are noted in especially poor condition, but tin roofs are also noted to be in bad condition. Proposed to gradually replace the slate with a better material.

Painting to improve appearance of water damaged walls.

There are minor changes at east or freight entrance.

Vestibule closed off with screen doors, rooms above enlarged.

Plaster falling in archeological hall causes the area to be declared unsafe and closed from the public. pg 17

Rathbun briefly mentions roof ventilators over some of the ranges and courts in his 1903 report (Report of National Museum, 1903, p. 254,257), some of which still exist.


“... After not many years, however, certain weak points began to develop, and these have been the cause of much concern and have necessitated almost continuous repairs, though seldom at great expense. The walls are essentially substantial, but the roof was constructed at too little cost and is below
the standard of the brickwork. Its weakness and incompleteness is evident both in the supporting framework and in the covering. The framework has given way in places under heavy falls of snow, and the covering has developed numerous leaks, most commonly about the breaks in the roof... The constant attention of one mechanic has been insufficient to keep these leaks under control. While it is intended soon to renew the worst of this covering, it is now quite certain that a considerable part of the roof must be wholly rebuilt before many years...

The leaks from the roof have so constantly defaced the inside walls of the naves and courts that only recently has it been deemed advisable to repaint them, a work which was mainly accomplished during 1902 and 1903, and which has greatly improved the appearance of the exhibition halls.

The principal other changes in the interior of the building, in the nature of permanent improvements, have been the replacement of the wooden floors with cement, the building of galleries in nearly all the halls, and the addition of some skylights. The first has improved both the conditions and the appearance of the halls, and as the floors were without proper foundation the former wooden covering was inadequate to keep out the moisture or impurities from the soil. The galleries have materially increased the amount of space, and the new skylights were rendered necessary by their introduction...

... the amount named [$8,000] was appropriated in the sundry civil act for 1897, and other appropriations followed, namely $8,000 in 1898, $10,000 in 1899, and $5,000 in 1902, making a total of $31,000 for this purpose. From this amount galleries were erected in all halls, courts, and ranges, except the north hall and the northeast and east north ranges. In the southeast range, the galleries have been extended so as to form a complete second floor...

All the roofs are covered with slate except those of the ranges, which are of tin. The slates are nailed to small pieces of wood, fitted into small L-shaped pieces of iron, and the plaster of the ceiling is laid directly upon the rough inner surface so formed. Besides the lanterns before mentioned, a number of small skylights and ventilators have been built over some of the ranges and courts, especially where the recently constructed galleries have interfered with the lighting.

The entire framework, as well as the inner sheathing of the roofs, are exposed to view, this plan having been followed in the interest of economy. The roofs of the main halls, the rotunda, and the courts are supported by iron trusses of the Pratt pattern; those over the ranges by triangular girders of riveted angle iron. In 1894 some of the purlines in the main halls near the rotunda began to buckle and were reinforced with angle iron. By 1900 all of the iron work over the main halls had begun to show signs of weakness, caused by alternate expansion and contraction, thus producing many leaks in the slate covering, and the
entire framework was according braced and strengthened by means of angle steel. The woodwork about the lanterns was also replaced by iron, and other improvements were made.

The inner surface of all the roofs was originally covered with a thin coat of plaster. In the ranges the metal top was underlaid by fireproof gratings, to which the plaster was applied. As the keying proved insufficient or the plaster not strong enough, large pieces began to give way at the very beginning, and to eliminate this source of danger all the plaster was removed in the ranges, leaving the gratings uncovered. After being painted, however, the appearance of the ceiling proved not to be out of keeping with its surroundings. In one range the ceiling was at the same time covered with corrugated iron, leaving an air space between it and the tin roof above, and it was thought by the architects that this arrangement would tend to regulate the temperature of the halls. Nothing further, however, has been done in this direction...

All of the masonry of the exterior walls above ground, except as noted below, is of red black laid in black mortar, with numerous horizontal courses of black brick, and a considerable quantity of buff brick in courses and designs to relieve the monotony of color. A number of blue brick were originally employed in connection with the buff, but they were subsequently painted black. There is a base course of granite around the entire building, but the window sills, copings, etc. are of gray Ohio sandstone.

The interior walls are plastered in a sand finish, and were originally covered with a gray water-color paint, poorly adapted as a background for installation. The exhibition cases have been mainly constructed with mahogany frames, for which maroon was found to be a most harmonizing and effective surrounding, and since about 1883 most of the walls have been painted this color to a height of about 12 feet from the floor, the original color remaining for the most part above. The only decorations were stenciled figures on the walls of the rotunda and over the archways at the inner ends of the main halls. In 1902, however, experiments were made looking to a change of color, with what is regarded as very satisfactory results.

The colors used in the main halls and courts are a light red to a height of 15 feet, followed by a deep ivory, the ceilings being of a lighter ivory. In the rotunda the colors range from olive below to ivory above, with stencil decorations as shown in the plates. This color scheme has not been extended to the ranges, which have been repainted from time to time in various colors.

In connection with the original construction... a floor of encaustic tiles was laid in the rotunda, and floors of marble squares of various colors in the four large halls or naves. The marble tiling is surrounded by a frieze of dark-blue slate, or sufficient width to bridge the ducts containing the stream pipes, wires, etc., while around the frieze is a border of parti-colored Portland cement. The floors in all the other halls were constructed of yellow pine... These floors were laid upon a concrete base and began to decay after a very few years, requiring frequent and extensive repairs. In 1891 it became necessary to replace several of them with more substantial material, and
this continued down to 1898, when the last of the wooden floors disappeared... substitutes... cement, granite, and finally terrazzo... In the pavilions and towers the different stories are separated by arches of brick and concrete, supported by iron beams, the floor covering being of Florida pine. Thus the building has been rendered essentially fireproof in all parts of its construction.

... four main entrances.... only two of these are now used... that on the north side being for the public and that on the east side for the delivery of supplies and specimens. The entrances on the south and west have closed and, together with the adjacent space, converted into [offices]... There is also a small entrance on the south side of the northwest pavilion leading directly to the administrative offices...

Small cellars were built, however, under the southwest pavilion for the heating boilers and the supply of fuel and under the northwest and northeast pavilions for misc. storage. Advantage was taken of the changes in the heating plant in 1901 to construct an underground tunnel, leading from the northwest pavilion of the Museum building to the east wing of the Smithsonian building, primarily to convey the heating pipes, electrical conduits, etc... 70 feet long, 5 feet wide and 7 feet high...

The windows are practically all of the same general pattern, and in the beginning all were glazed with double panes of glass, the better to retain the heat in winter, but about half of these double panes in the towers and pavilions have been made single. Ventilation is provided for by means of movable panes of glass in the side windows and lanterns, many sashes being pivoted in iron frames for that purpose, and also in places by ventilators in the roof.

In 1881 the Museum was presented by the Brush Electrical Company with a number of storage cells and a dynamo suitable for operating between 30 and 40 incandescent and 16-candle power lamps in the lecture hall when evening meetings were held. In 1895 the basement of the south tower of the Smithsonian Institution was furnished with a gas engine and dynamo of sufficient power to maintain a small system of incandescent lamps... in both buildings.

This plant was totally inadequate for the requirements, however, and Congress appropriated $3,500 in 1901, and $5,000 in 1902, for a complete installation of electric wires and fixtures throughout the Museum building, which was practically finished in the latter year...

This installation extends to the public halls, offices, laboratories, storerooms, and workshops... The current for lighting is taken from the mains of one of the city companies at the southwest corner of the Museum building. On only a few occasions has the entire Museum building been lighted at night, and regular night opening for the public can not be undertaken without an additional appropriation to cover the extra expense of electric current and watchmen.
All of the cases in the exhibition halls... are supplied with electric burglar alarms. There is also a system of electric call boxes distributed through both buildings, which must be visited very hour during the night watches, any failure to perform this service being at once automatically announced at the office... in the city. For the prompt conduct of business... found necessary to make extensive use of the telephone system for communication between the offices in different parts of the building and with the city.

The heating of the Museum building was until 1901... four 60-horsepower steam boilers. In the latter year these were replaced by two 150-horsepower high-pressure tubular boilers, whose capacity is sufficient to heat both of the large buildings and the smaller adjacent buildings in the Mall....

.... east-north range... its fixtures for lecture purposes are more permanent in character than before. The walls and ceilings have been painted in several tints of green....

The preparation of this new lecture hall was accomplished in 1901, under a special Congressional appropriation.

The three floor rooms of the east tower south of the entrance, with a slight addition for kitchen purposes, were utilized for a lunch room until 1901. In that year, however, the addition... was extended southward to a total length of 77 feet....

1903-1904

1903-1904
Exterior: Repairs and painting (Prince's Metallic) of 16,265 sq. ft. tin roof around Rotunda; repair of tin roof and valley gutters over eight ranges; repairs to large triple windows in rotunda; repairs to Rotunda roof; copper utilized for extending roof over gutter, new hanging gutter and down spouts; covering slate over east hall with slag roofing (5,455 square feet); covering 389 square feet of slate roof over West Hall with Neuchatel mastic cement; “removing old marble tile platform at north entrance and replacing same with marble mosaic;” resetting of granite steps and coping at north entry and placing ventilator frames in lanterns in four halls and glazing same.
Interior: work included painting; erecting “two new Paradigm skylights” over West North and West South Ranges; stenciling of walls in Rotunda; covering of iron beams and other unsightly areas in exhibition halls with compo-board; removal of double glass from double-glazed windows; and elaborate scaffolding was reconstructed in the Rotunda for use in stenciling walls (June 1904).

1904

February 5, 1904 - Memo to Mr. Goldsmith regarding the number of additional electric lights installed since January 1, 1903. (SI-AHHP, Box 4)

18 March 1904 - Appropriation of $5,000 for preliminary plans for construction of a powerhouse with distributing mains for heat,
steam, and electric power to the existing
and projected government buildings on the
National Mall and in vicinity of White House
(Statutes, XXXIII, 142).

15 June 1904 – Ground broken for the new
museum building (AR 1904, p. 37)

August 1st, 1904 - Richard Rathbun, Assistant
Secretary in charge of the U.S. National Museum,
Report on The United States National Museum,
Appendix I in Annual Report of the Board of
Regents of the Smithsonian Institution...for the Year
Ending June 30, 1904, Washington: Government
Printing Office, 1905.

“The roofs on the Museum building, and
especially those covered with slate, have for
a long period been in a very unsatisfactory
condition, resulting mainly from the fact that
they were constructed too cheaply in the
beginning, and therefore not as substantially
as they should have been. Through the
contraction and expansion of the iron supports
by changes in temperature, the slate coverings
have never been kept tight, and in other parts
there has been greater or less trouble in regard
to leakage, which has caused a constant
defacement of the inner walls and some
injury to the contents of the building. It is now
realized that the only proper remedy would be
to substitute a new roof for the present one,
but as this can not be done at present, an effort
is being made to institute more substantial
repairs than heretofore, though at the best
they can only be considered as temporary.
The tin coverings, gutters, etc., do not present
serious difficulties, though requiring extensive
renovation. Experiments on the slate, however,

have led to the trial of a covering of asphalt,
burlap, and slag, which has thus far resulted so
favorably that it is now proposed to treat all the
slate roofs in this manner.” p. 37

The new high-pressure steam boilers installed
1901 are working well.

Louisiana Purchase Exposition, Lewis and
Clark Centennial Exposition. LXXII-LXXIX.

North Tower: Platform was replaced with a
mosaic pavement of large irregular marble
slabs and the steps and coping were reset.

Archeological Hall received extensive plaster
repair and repainting of the walls in green water
color and the ceiling in light tints of green to
ivory.

Museum is undermanned and understaffed.
The roofs are discussed at length.

Work on repair of roof of East Halls successful,
repeated this year on roofs of other main halls.

Roofs of Rotunda and South East pavilion also
covered with asphalt and burlap, no slag.

Slate roof over North East Pavilion renewed
with better quality slate.

Gearing is installed to allow opening of main
hall clerestory windows from floor.
Some additional skylights added over four of ranges and much of metal work and woodwork facing upon roof was painted.

Several worn-out floors replaced by cement, tiles or wood.

Men’s toilet room renovated.

Many wall surfaces defaced by leaks touched up or repainted.

Trenches under building renovated and wiring repaired.

North wall damp, proposed constructing cement platform or walk along this side.

Steam heating and telephones revamped. Fire alarm boxes are added. pp. 13-14.

1904-1905


Exterior: Slate roofs over Rotunda and South East Pavilion covered with burlap and two coats of “Bermudez asphalt”; slag roof put on slate roofs over North, South and West Halls; painting lanterns on courts, halls and Rotunda; painting of windows on SE, SW and NW corners, and skylights over South East Range.

Slate roof on North East Pavilion removed and “new Peach Bottom slate roof” installed.

Interior: Skylights installed “over gallery in West North Range”; “Over north end of North East Range”; “over east side of East South Range”; and “over west side of East South range.”

Installed “gearing attachments for opening and closing ventilating windows in lanterns of four main halls and four courts.”

Painting (oil paint) stairways (Rotunda), cafe, selected offices and galleries; water color paint was applied to the North East, South West, and West South Ranges.


“20 large windows in the archeological hall, which have for some time been in such a poor condition that a heavy storm might crush them in, were completely repaired, reglazed, and painted, a long and tedious work, since they are cut up into small panes set diamond shape. The workshops and storage sheds called for a small amount of repairs.

Trenches under the building, in which are located the steam pipes and electric wires, were thoroughly renovated, all dead wires being removed and the live ones placed in steel conduits. Those on the north side of the building were found to be exceedingly damp, caused by the seepage of water through the adjoining walls. This condition it has been arranged to correct by the construction of a cement platform or walk along the outside of the wall.” (p. 13)
“The heating capacity in the exhibition halls of the Museum was increased by installing two 100-foot Bundy radiators in the vestibule at the north entrance and four additional ones on the east and west sides of the north hall.” (p. 14)

Oil paint was applied to the stairways of the Rotunda, in the café, and selected offices and galleries.

1905-1906

*Annual Report of Superintendent of Construction & Labor, 1905-1906* (SIA, RU 157, Building Management Department, 1881-1973, Box 1). [See also 1912-1913 Report]

**Exterior:** Slate and slag roofs on “East Hall, North East and South East Courts” were replaced with tin. Constructing cement water table (178 2/3 LF, 6 feet wide and 1642/3 LF, 3 feet wide) against north wall of museum and raising of four cellar doors to level with table.

**Interior:** Men’s restroom in South East Pavilion of ground floor was remodeled including replacing wooden stalls with stalls raised on pipe legs, new oak and cement baseboards in outer room, graining all woodwork, new double-acting slat entrance door, replacing old concrete floors with new concrete base and white floor tile, new toilets, and lavatories (porcelain enameled); wainscoting removed in outer room and walls plastered. [Old closets were flushed by continuous flow of water, while new closets flushed only when used.]

Women’s restroom in South East Pavilion of ground floor was remodeled with new toilets and lavatories; new cement floor; 20 new window shades; woodwork remodeled; new wood stalls similar to Men’s room; oil paint throughout; “lining doors and transom with green demin [sic]; covering glass in main door with curtain material; lettering sign for outside of door” and bronzing “all radiators, gas fixtures and steam pipes and oiling floors.”

For fireproofing purposes, macite block partitions were constructed under arches throughout the building; doors were fireproofed by covering with iron or tin and one glass panel was replaced with wireglass.


“The roofs on the present Museum building remain in as serious a condition as ever, notwithstanding the extensive repairs made and the constant oversight to which they have been subjected. Every expedient thus far applied has failed to accomplish its purpose, and in all heavy rains the leaks still prevail to an alarming degree. Driven thus to drastic measures plans were drawn up and partial contracts entered upon before the close of the year, whereby all the present main roofs will be removed and replaced by metal roofs of the best quality, without the necessity of greatly disturbing the contents of the exhibition halls below. Under the current rate of appropriation for building repairs the work will have to be extended over two or three years, but in the end tin- covering of the building will be in even better condition than when it was first put on.” (p. 43)
“While the building ‘s constructed entirely of fireproof materials, yet its contents, now much crowded, are to a large extent combustible. The dividing walls between the different halls, courts, and ranges are, moreover, pierced with large openings reaching nearly to the roof, which makes of the building practically one large room over 2 acres in extent. Although every known precaution for the detection and extinguishing of a fire has been introduced, still it has been deemed prudent to isolate the several halls by filling in the openings with fireproof material, and some progress in this direction had been made before the end of the year.” (p. 43)

Doors fireproofed throughout museum with metal coverings and wire glass panels.


Arched piers of the halls were filled in with gypsum plaster block to create a more fireproof building.
Placement of Macite infill (preferred method: consisting of 3" gypsum block plastered on both sides between pier arches)

Proposal to give over museum to industrial arts after new museum completed and appropriate collections removed.

The SI finds that roofs can be replaced without moving the collections below.

Work began in over-crowded building to close great openings of inner halls to prevent spread of fire. p. 8

Exchange slate roofs for tin, start East Hall and courts, repair gutters and downspouts, paint, etc.

Work began in over-crowded building to close great openings of inner halls to prevent spread of fire.

Macite selected to fill large arched openings and guard against fire.

Story over South East Range, gallery in West North Range, Pueblo Court and west side of South Hall now completely isolated.

Other repairs included the renovation of toilet rooms, water table along north front, repainting of all exterior woodwork, survey of electric lighting system by Supervising Architect of the Treasury. Pp12-14

1906
- February 27, 1906 - Samuel Pierpont Langley dies (1834-1906); Secretary of SI (1887-1906)

1907
- Charles Doolittle Walcott becomes the new secretary of the SI.

1907-1908
1908

New building completed and exhibits transferred. Present museum building given over to Arts and Industries.
Slate roofs over the South Hall, South East and North West Courts are replaced with tin.

New tin valleys on south and east sides of North West Court and North and East Sides of South East Court.

Repairs in progress including renewal of roofs and isolation of several halls adapt building to collections bearing on arts and industries. p12

Rebuilding of roofs underway. Several large openings between piers on south side of South West Court filled in. pp18-19

Changes in electrical installation continued and completed. pp 18-19

1908-1909

Annual Report of Superintendent of Construction & Labor, 1908-09 (SIA, RU 157, Building Management Department, 1881-1973, Box 1).

Exterior: Old valley gutters and flashing were replaced with new on East North Range, South West Range, West South Range, West North Range, North West Range and North East Range. Painting of all galvanized iron cornices. Paving of walls outside east entry.

Repointing brickwork [first mention of joint repair] around ledges under windows on second floor.

Bronze folding gates at north entrance, designed by Hornblower & Marshall, were installed.

Interior: Six new windows were installed on third floor, South West Pavilion; double thick ground glass in 56 ventilating windows on main floor, exhibition halls, replaced with "plate glass, ground on one side."

"Removal of wooden floor in skylight room, third floor, SE Pavilion and replacing same with encaustic tile floor, of small maroon and buff tiles, as to prevent vibration in floor. Also constructing cement washboard 8" high and 1" thick around all sides of room and providing two solid cement slabs for covering steam pipes." Also new skylight and window.

Refinishing outside of oak door, 1st floor, North West Pavilion.

“The lecture hall room in the Museum building adjoining the main entrance...was entirely fireproofed and isolated from the rest of the building, but unfortunately it contains no skylights.

Electric lights have also been installed in a single row under metal reflectors along three sides, and in several clusters through the middle of the hall, and, as the windows are provided with shutters, these lights can be used in the day time as well as at night.

The walls are painted an olive color, dark below the picture line which is about 4 ½ feet from the floor, and thence light to a height of 21 feet, above which both the walls and ceiling are a light yellowish gray.

The hall was first opened to the public on November 24, 1906.”

1909-1910

Annual Report of Superintendent of Construction & Labor, 1909-10 (SIA, RU 157, Building Management Department, 1881-1973, Box 1).

- Exterior: Painting of tin roofs with “myrtle green paint (Lucas)”; painting of cement with “symentrex paint” (floors and window sills).

- Interior: Darkroom built in southeast corner of East South Range gallery including two sinks; macite partitions with applied plaster are added as necessary.

1910

- National Museum of Natural History (NMNH) opens
- New building still unfinished but removal of collections from older museum building began.
- Painting and construction of macite partitions continued.

1910-1911


- South East Pavilion slate replaced with Peach Bottom Slate; old wood framed skylight in North West Range (over library) is replaced with new metal framed skylight and glazed with wired glass.

1911-1912

Report of Superintendent of Construction & Labor, 1911-12 (SIA, RU 157, Building Management Department, 1881-1973, Box 1). [See also 1912-1913 Report]

- New Georgia pine floors laid in rooms 105, 106 and 107 (west side South Tower, ground
1912

The old National Museum Building and its exhibits now designated the Department of Arts and Industries. pp. 32-33.

1912-1913


Six triangular spaces next to Rotunda in ceilings of East, West and South Halls (6,000 square feet) and main ceiling in North West range (2,600 square feet) were covered with “#29 gauge beaded sheet steel” and painted to match existing sheet steel “to prevent the plaster between the wood strips which support the tin roof, from falling on visitors and exhibition cases.”

Painting with two coats lead and oil all exterior metal work: cornices, pinnacles, ornaments, skylights etc.

Cafe was cleaned; new gas stove replaced coal stove; and new three-light ceiling fixture with reflector replaced a single lamp fixture.

Bids solicited for renovations of men’s and women’s restrooms in South East Pavilion in May 1912 and work was begun in July 1912. [Last remodeled during the summer of 1905.]

Work included 7/8” thick marble work for stalls, 1 1/4” thick wainscot, window sills etc.

Floors in men’s outer room was of white tile and in good condition, but floor in “two women’s rooms” were “of dark cement and ... both unsightly and insanitary.” A new terrazzo floor was to be laid in the entrance vestibule and a tile floor in the inner and outer rooms of the women’s room. A 2” white hexagonal white tile floor was added to the men’s inner room. Marble wainscot was 7’ high with marble window sills. “Light cloud Vermont marble”,

floor) and 153 and 154 (south side West Tower, ground floor). East entrance: Cement floor in inner vestibule and tile floor in outer vestibule were removed and granolithic floor was added and painted with “symantrex” and walls and ceiling were also painted. A new walnut door and transom were installed in entrance to cafe.

Window frames, sash and iron grilles on 258 windows were repaired and painted with lead based oil (one or two coats.) Four outer walnut doors at east entrance were repaired including removal of iron grilles, woodwork repaired, doors lowered to meet stone sills and woodwork revarnished. New Peach Bottom Slate roof over North entrance.

When new paracentric door cylinders were installed to replace flat-key cylinders throughout building, doors throughout were renumbered, “beginning with 1 to 24 in the North Tower and going toward the east after leaving the North Tower. So that the rooms in the Northeast Pavilion are from 25 to 49, those in the East Tower 50 to 74, in the Southeast Pavilion 75 to 99, South Tower 100 to 124, Southwest Pavilion 125 to 149, West Tower 150 to 174, and Northwest Pavilion 175 to 200.” [A list of rooms and occupants followed.]

Doors: numbered throughout (many of these plates still exist on the face of the head of frames today) (pg 2-6, Summary Description and History of Building Construction)
furnished by Vermont Marble Company, was used for partitions, stall facings, urinal stalls and wainscot. A marble shelf was added on one of the partition walls in each women’s WC. Fourteen paneled “red oak doors” were ordered for the marble stalls.

Hardware, including soap dispensers, toilet paper fixtures, towel racks, and coat and hat hooks, was “heavily nickel plated... of special manufacture.” Tile in men’s room was 2” white hexagonal; similar tile was installed in the women’s room with a 6” marble base. A terrazzo floor was laid in the vestibule entrance. A new light fixture with “Alba” glass reflectors and 100 watt tungsten lamp, was suspended from the ceiling in each room by brass chains. New “wemple transparent shades mounted on Hartshorn rollers” replaced old window shades. Two mirrors in the women’s room were placed in new flat oak frames.

Includes detailed description of fixtures, new piping and location.

All fixtures manufactured by IL. Mott Iron Works. Water and vent pipes hidden behind marble. Hot and cold supply connections were furnished at this time, although only cold water was piped for some time.

Interior painting with “2 coats sizing and 2 coats water color.”

1912-1915
Sheet metal attached to underside of triangular areas of East, West, South Halls, four courts and over entrances to court galleries to prevent the falling of old plaster

1913
Ceilings “consist mainly of wooden lathing attached to the underside of the roofs and filled in with plaster which has gradually disintegrated and from time to time has fallen in such quantities as to menace the collections.” Ceilings in the four halls are covered with thin sheet steel to correct. Some walls also painted and pointed. Renovation of toilet rooms completed.

Heating is in good working order.

Lighting and water services are improved. p 37-38.

Improvements in exhibits of Arts and Industries, p. 80-87.

1913-1914

Exterior: July 30, 1913 storm necessitated replacement of broken window glass

Interior: lead and oil and water color painting, new macite partitions, Tileine Composition flooring installed in hall and offices.

1914
Old National Museum Building now entirely given over to Arts and Industries and American history.

Allocation of spaces for exhibits is defined.

pp. 35-37."
1914-1915

Extensive repairs to halls and Rotunda floors
735 pieces of new terra cotta tile in Rotunda
265 pieces of replacement slate and marble in halls.


Exterior: Replacement of old cement water table on the west side around North West door and adjoining North West Range w/ granolithic water table 8" thick; North West Range 11'-6" wide by 76' long reinforced with iron rods for heavy specimens. Painting of tin roofs.

Experiments were made to cut away blue enamel face on exterior bricks (8,000) because “these spots of high color in the walls have been very distasteful to the Museum authorities.” An “electric magnetic hammer” was employed for tests at 8,010 brick of the east entrance. The test was so satisfactory that a hammer was ordered and the work was planned for fiscal year 1915-16. Fortunately, the removal was not done.

Interior: Brief discussion concerning fire protection: fire extinguishers inspected; fireplugs cleaned and tested; and electrical fire alarm system inspected.

Eight triangular spaces (4,000 square feet) in ceilings of four courts, next to Rotunda and over entrances to court galleries covered with "No.29 gauge beaded sheet steel of design like the sheet steel covering on the main hall ceilings" and painted.

1915

Approximately 735 pieces of new terra cotta tile replaced worn and broken tile in Rotunda and approximately 265 pieces of “white, black and Champlain marble” replaced worn and broken tiles in the four main halls.

Three bricked-up arched openings in southwest basement, which had separated locker room from heating plant, were re-opened.

Fireproof plaster block partitions built in various locations including four arched openings on Rotunda and against east wall in East North Range. East North Range was abandoned as a lecture hall some years ago.

More roof repairs.

4,000 square feet of unprotected ceiling, mainly in courts, covered with a beaded sheet metal.

Terra cotta and marble floors in Rotunda and main halls extensively repaired.

Much pointing up and painting of walls and ceilings, various tin roofs treated with flexible metallic paint.

Old cement water table along west side replaced with granolithic pavement for half its length.

Steam and electric maintenance and repairs.

Sanitary fountains are installed and the use of drinking cups was discontinued. Pp18-20
There is further discussion of exhibits.

East Tower: The original Cluss iron entry gates were removed by 1915.

1915-1916


*Exterior:* Repair of galvanized iron cornice at north entry; repair of stone steps at NW entry; South West Pavilion slate roof replaced.

*Interior:* Fireproof block partitions built in five openings between South West Court and West South Range.

Old wooden floors replaced with new Georgia pine, edge grain floors in anteroom and corner room, second floor and corner room on ground floor in northeast pavilion.


“The principal exterior repairs to the older Museum building consisted in replacing the slate on one of the corner pavilions, in repairing the slate roofs on the towers at the middle of each façade, and in repairing and painting all woodwork above the cornice.

The repair work in the interior of this building was mainly restricted to extending certain fireproof protecting walls, repairing, pointing up and painting defaced walls, and replacing worn out floors.

In September the temporary partition dividing the south-east range in the older building was removed, and the entire space, assigned to the division of mechanical technology, is being utilized for relieving the congestion in other halls.

The floor space is occupied by models illustrating the occurrence and mining of coal.”

1916

Replace slate on one of corner pavilions, repair slate roofs on towers, repair and paint all woodwork above cornice.

*Interior:* More fireproof walls, repairing, re-pointing and painting defaced walls. Electrical improvements.

1916-1917


*Exterior:* South Pavilion receives new No. 1 Peach Bottom slate and other minor roof and skylight repairs including painting.

*Interior:* Painting; Wooden floor on east end of gallery in East Hall removed and terrazzo floor laid to match floor on north and south sides of gallery.

1917

In AIB certain old floors replaced with terrazzo and walls in several halls, laboratories and offices pointed up and painted.

Exterior woodwork of most windows and tin roofs over ranges and around Rotunda painted. Brick smokestack on the South West Pavilion is repaired, and entire slate roof re-covered. P 13
1917-1918


“In the Arts and Industries building the chief items consisted in the painting of walls and ceilings in several halls and ranges, the replacing of brick floors in blacksmith shop with concrete, making certain necessary alterations and improvements in the photographic gallery, and the painting with flexible compound and metallic paint the roofs over the four courts. The skylights on the roofs were also overhauled and repaired and a number of old gutter pipes replaced with new copper.”

1918

War work including experimental work in aviation in connection with Signal Corps

Exhibits divided among three buildings (1) Arts and industries collection in what is known as old Museum building, (2) Natural history collections and National Gallery of Art in large new building, and (3) Graphic arts and National Herbarium in original SIB.

New building given over in part to War Risk Insurance Bureau.

Construction of Freer building progressing.

* Rathbun dies.

1918-1919


Exterior: miscellaneous repairs to roof and an awning was placed “on metal pipe frame over Library skylight.”

Interior: Wooden floor in “two smaller inner rooms” on second floor, North West Pavilion replaced with new Georgia pine floor.

On ground and second floor of South West Pavilion, upper solid wooden door panels in eight doors were replaced with one light of ground plate glass.

Old wooden floor replaced with terrazzo floor at west end of gallery in West Hall.


“In the Arts and Industries Building special attention was paid to the roofs, skylights, and windows which involved the repainting of the roofs over the four courts, four main halls and the rotunda, the reputting of all skylights, and reinforcing the irons on the sixteen large triple windows around the rotunda. A new Georgia pine floor was laid in one of the administrative offices in the northwest pavilion, and the old wooden floor at the west end of the gallery in west hall removed and a terrazzo flood laid, so that this section of the gallery might be used for exhibition purposes. Room 80 in the southeast pavilion was repainted and fitted up for the use
of the States Relations Service, Department of Agriculture, in cooperation with the Museum for home demonstration work, canning, etc. A new dark room was provided in the photographic laboratory, and a number of the halls, offices, and laboratories repainted.”

1919-1920

AIB roofs over four courts, four main halls and Rotunda are repainted.

All skylights re-glazed.

Reinforcing irons placed on the 16 large triple windows around Rotunda.

A new wooden floor in one of administrative offices in North West Pavilion, wooden floor at west end of gallery in West Hall removed and terrazzo floor laid.

A new darkroom is installed.

Various rooms repainted. P 15.

Need new building for American history. P 52

Several floor plans showing current use.


“In the Arts and Industries Building the exterior woodwork of the windows in the eight ranges, four pavilions, four towers, and rotunda were painted.

An additional dark room was constructed in the photographic gallery, and the lunch room was scraped, pointed up, and painted. A number of the walls in the exhibition halls, office rooms, and laboratories were also repainted.

In the south shed, which is occupied as a laboratory and workshop, an improved system of ventilation was installed in the macerating room and minor repairs of various kinds were made in skylights, windows, and doors.”

WWI exhibits overflowing AIB and continued in NMNH.

Lack of space and lack of curators due to small appropriation handicap SI museums. pp 29

Painting exterior woodwork and a number of walls in exhibition halls, offices, and laboratories.

An additional darkroom is added in the photo lab.

Maintenance on power plant that was installed 1909. pp 52-53

Needs are stated as additional space and increase of scientific and technical staff.

Need new building for National Gallery of Art.

AIB was overcrowded by 1917 owing to development of various Divisions in Arts and Industries, particularly textiles and mineral technology.
Notes, Bibliography, and Appendices

Division of History greatly increased by material for War Museum. pp 129-130.

AIB was subject to only minor repairs and painting.

1920-1921

Exterior: awning placed on pipe frame over skylight above cafe.

Interior: Pine floors replaced with new Georgia pine edge grain floors in three rooms, North East Pavilion, first floor and Rooms 56 and 57, East Tower. Fireproof doors and jambs replaced with wooden jambs and glazed doors in doorway leading to East North Range to North East Pavilion.

1921
April 31, 1921 - Freer building completed.

1921-1922

Erection of solid wood partition covered with compo-board on one side at west half of South East Range Gallery and placed from gallery floor to roof in Southeast Range Gallery. Wood flooring replaced with composition floor laid on concrete base in ground floor room, library, North West Pavilion. Linoleum in North West Pavilion, inner room, ground floor, is replaced with green cork floor cemented to the wooden floor.

1922
Conversion of second story South East Range into two exhibition halls by removal of one partition and construction of another.

Minor painting and repairs.

1922-1923

Interior: After portions of original 1879-1881 plaster fell from the Rotunda ceiling, G. A. Fuller Co., who had constructed the Freer, was selected to do the following work: erect 72’ high x 63’ wide scaffolding and cover the ceiling and the side walls of the lantern with 250 sheets of beaded 2’-8”, #26 gauge sheet iron attached to the existing wooden laths with headed nails every 3”, similar to that applied to main halls and courts.

Chemical analysis of the fallen plaster ["The plaster consists of two coat work which had been calcosined. The rough coat is approx. a 1:4 mixture of high calcium lime and sand, while the top coat was a slightly richer mix, being a 1:3.5 sanded mortar..."] determined that the rough coat of plaster had been over-sanded and would have fallen sooner if not for “a liberal mixture of hair in it.” Expansion and contraction of the wood laths due to humidity was thought to be the reason for the initial cracking of the plaster. In addition, wood laths were partly decayed in areas where the original slate roof had leaked. Cost $4,165.55
of which half was for scaffolding. Concerning the work of the Rotunda lantern: “...side walls... composed of plaster, cinder chips and hair (1 1/4” thick). All was removed leaving the steel framing and metal outer covering of the lantern. Beaded sheet iron was installed and attached to new 3” x 4” pine scantling that was attached to the existing steel framing with iron clips. All inner glass lights were removed and rebedded to make tight.”

Concerning painting of the Rotunda: Repainting of the walls in 1902 colors for a distance of about 25' down from the ceiling with “one coat of sizing and one coat of water color” and the new metal ceiling with “two coats of lead and oil paint.” The 240 inner lights of the triple circular head windows were removed and reputtied.

Lead and oil paint for window frames.

Varnishing of exterior and interior surfaces of walnut doors and glazing of triangular openings with ribbed glass at the east entrance and exterior walnut woodwork at the north entrance.

Library wood floor was removed and replaced with concrete base and sanitary compo floor.

Remodeled umbrella check room at east side of north entrance.

Wood floor was removed and replaced with terrazzo by National Mosaic Company; slate baseboard and metal conduit installed to replace wooden molding which contained wiring; ceiling light installed; radiator relocated; and a “solid wooden partition was built in the opening between the north room and the check room.” Three portable umbrella stands replaced the “old circular revolving racks and the open shelves.” Public telephone booth was relocated to one corner of the room. Installation of electric light in inner vestibule and removal of gas electric combo wall fixtures.

Fire Protection: system of water piping with 2” outlet for linen hose (approved by F. Underwriters); fireplugs had been installed some years after buildings were constructed; entry includes listing of where public fire alarm systems are located.

“Plaster rosettes over electric light fixtures under galleries in all halls” were removed and “bowl and chain fixtures, using present bowls with 200 watt lamp in place of four 60 watt lamps” installed.

Overhaul of cafe remodeled 20 or more years ago: repainting, cleaning, and general repair.

1923
* Freer Gallery Opens

1923-1924

1924-1925
Interior: New Georgia pine floors installed in editor’s office, in east room at east side of north entrance (Loeb Collection), and in Room 155 (undermined by white ants).

1925-1926

Exterior: New wrought iron snow guards were installed on roofs of “four halls and four courts;” new copper downspouts leading from upper to lower roofs were installed; and wooden window “sash and frames below roofs of eight ranges, 4 pavilions and eight towers” were repaired and repainted; and repair of metal cornices.

Interior: Wooden floor on south end of South Hall gallery removed and replaced with terrazzo floor to match adjoining floor on east and west sides of gallery.

Last of the obsolete gas light fixtures were removed from the building. They had been hanging in the Rotunda.

1927-1928
Report to Mr. W. deC. Ravenel from Superintendent of Buildings and Labor For Fiscal Year Ending June 30, 1928 (SIA, RU 157, Building Management Department, 1881-1973, Box 5).

West South Range gallery converted to exhibit space from storage. Arches in gallery were filled with fireproof plaster block; a 40” high pipe handrail with two horizontal 1-1/2” pipes and 1-1/2” diamond shaped wire mesh panels in space between pipes was installed along edge; and corrugated sheet metal ceiling repainted with two coats of lead and oil paint for a total cost of $1,399.89 excluding labor.

New Georgia pine floor laid on cement base in small storage room adjoining curator’s office, Division of History.

Reading room composition floor in library, North West Pavilion was covered with green cork carpet.

1928
* Charles Greeley Abbot becomes the new Secretary of the SI (Secretary between 1928-1944).

1928-1929
Report to Mr. W. deC. Ravenel from superintendent of Buildings and Labor For Fiscal Year Ending June 30, 1929 (SIA, RU 157, Building Management Department, 1881-1973, Box 5).

Last major renewal effort of cafe occurred during 1901 enlargement (1886 prior to that.) Cafe dining room renovations included removal of skylight and replacement with tin roof over insulated sheathing with three “Star” type ventilators and replacement of wood floor with a concrete floor covered with tan cork carpet, which was cemented to the floor and treated with Valspar varnish.

East Tower: Removal of skylights; new tin roof with three “star” ventilators; new concrete floor with tan cork carpet installed.

East entrance was modified so that it appeared formal to visitors.
Misc. storage was removed and the inner vestibule was repainted.

Wood floor in room north of east entrance was removed, floor was lowered, and a concrete surface laid with cast iron trench plates to access piping.

1929-1930
Report to Mr. W. deC. Ravenel from Superintendent of Buildings and Labor For Fiscal Year Ending June 30, 1930 (SIA, RU 157, Building Management Department, 1881-1973, Box 5).

*Exterior:* Revolving walnut door is installed at north entry.

*Interior:* $3,500 is appropriated from Congress to enlarge women's restroom (See 1930-31 for description.) After two separate incidents of women falling into the fountain in July and August of 1929, the fountain was completely removed and the Statue of Freedom reset on a concrete base.

Installation of Phillips Douglas china drinking fountain at north entrance.

South West Range Gallery opened to public in February 1930; East South Range Gallery, used for storage; only gallery not open to public.

1930-1931
Report to Mr. W. deC. Ravenel from Superintendent of Buildings and Labor For Fiscal Year Ending June 30, 1931 (SIA, RU 157, Building Management Department, 1881-1973, Box 5).

Due to overcrowding, women's restroom was enlarged by the incorporation of Room 80 as a "Rest Room". The brick wall between the original stall room and old restroom was removed to create a larger "Comfort Room," which added five additional stalls.

National Mosaic Company supplied five new marble wash basins, five new stalls (for a total of ten) and repaired hexagon tile floor where necessary. Oak doors were used for the stalls with walnut veneer. In Room 80, walls were replastered (The old plaster had "been marked off to imitate blocks" of stone and was in bad condition.); a new walnut door installed to replace an old pine paneled door; a drinking fountain was installed on the south wall and cork carpet set on the concrete floor. Walls were painted dark green (five coats of lead and oil); in the stall room, walls were painted light gray (two coats lead and oil.)

West North and North West Ranges: Replastering portions of walls, repainted with kalsomine paint, plaster blocks were used to fill openings between certain spaces.

East South and South East Ranges: Various repainting, replacement of obsolete electric lights, installation of Sturetvant Unit Heaters (one of the few times that spot heating is mentioned).

Plaster block partitions and installation of new fly-screens in women's and other office rooms.
1931-1932
Report to Mr. W. deC. Ravenel from Superintendent of Buildings and Labor For Fiscal Year Ending June 30, 1932 (SIA, RU 157, Building Management Department, 1881-1973, Box 6).

“Space between the two piers midway on the west side of the North Hall was opened from the floor to the under side of the gallery by removing the partition in this space and thus providing a doorway between the North Wall and the Northwest Court.”

On the exterior at the north entrance, two pieces of granite were set on granite blocks to cover spaces where old lamp posts formerly stood. The walnut woodwork of the entry was refinished.

North Tower: Two pieces of granite set on existing granite blocks where lampposts once stood.
East Tower: Masonite installed to cover ceiling and side walls

1932-1933
Report to Mr. J. E. Graff from Superintendent of Buildings and Labor For Fiscal Year Ending June 30, 1933 (SIA, RU 157, Building Management Department, 1881-1973, Box 6).

“Improvements” were made to the East South Range gallery including: filling in window openings at east end with plaster block; removing “small dark room with wood partitions;” filling three open arches on north and west sides of gallery with plaster block; erecting plaster block partitions and metal covered doors between East South Range gallery and South Hall gallery and east end of East South Range gallery and Room 90 to replace old wooden partitions and wooden doors; and filling open arches on west side and windows and a door on the east side of Room 90 with plaster block.

Fireproofing of the building was continually being done. Steel shelving was installed in the spring of 1932 to replace the old wood shelves in the library.

Dining room of cafe was renovated including covering plaster side walls and ceiling with Masonite “a pressed wood composition board.” “The joints of the sheets of Masonite were covered with narrow pine strips so that the surfaces of the walls and sloping ceiling were formed into panels. The ceiling of the lantern had been covered with Celotex board, laid in panels, some years ago... The narrow pine strips were stained to match the shade of the Masonite and all ... were painted with dull varnish.” The old style ceiling lights” were replaced with “fixtures of modern type,” and two similar fixtures were installed in the two outer rooms.

Larger corner room and small room to east, second floor, North West Pavilion were remodeled including: removing and blocking up mantles and fireplaces; moving door from northeast to southeast corner; replacing wooden partition enclosing stairs to third floor with plaster block; laying new pine floor in inner room and wash room; re-plastering; and installing electric ceiling outlets.

Wood partition and pine door from North Hall to north balcony was replaced with plaster
block partition and walnut door, similar to door on west side of north entrance. Many plaster block partitions were installed throughout and repainting was done.

1933-1934


“Repainting the southwest, east-south, and northeast (boat hall) ranges and the outside metal and wood work of the 8 towers and 8 pavilions of the Arts and Industries Building, and the north vestibule …constitute the chief repairs to Museum building(s) during the year, other than many of a routine nature.” (p. 12)

“In the Arts and Industries Building considerable electric wiring in wooden conduits was replaced by metal cable to eliminate a fire hazard of long standing. Another measure in this direction was to close with plaster block three arch openings in the Arts and Industries Building.” (p. 13)

1934-1935


*Exterior:* Repair of “metal statuary group over north entrance, including building a metal brace at back of figures to strengthen same” (1903 was last repair) New wooden doors were installed at basement level, west side of North Pavilion.

*Interior:* Repainting ceiling, walls and woodwork of North East Range (Boat Hall); room had not been painted in many years because of the hanging boats. Repainting of East South, South West, North East Ranges and stair halls of South East and South West Pavilions.

Fire Protection: Several windows were closed with plaster block including two on north wall of room on ground floor in East Pavilion and two in south wall of south room, second floor, North East Pavilion.

Three arch openings in gallery between East Hall and North East Range were closed with plaster block (easternmost arch had been closed previously).

Open space in third floor library was filled in with steel and concrete.

Wooden partition and door was constructed across east end of East South Range gallery.

Pipe railing with diagonal wire mesh panels were erected around gallery in the South West Range, similar to railing in the West South Range.
glass in existing skylights over galleries open to the public.

This work continues throughout the next fiscal year.

**Interior:** At the South West Pavilion an opening 3'-4" wide was made in brick wall between South West Range gallery and Room 137. Wooden partition on west side of laboratory on third floor was taken down and rebuilt 2'-0" east of old partition. Remodeling of all windows in lantern and repainting.

North East Pavilion: Renovation cost is significant: $4,336.04: Rooms 3741 on second floor were renovated including new pine flooring; new solid door between 38 and 40; solid panels in doors to 37-39; new skylight in 39; and filling four window openings with plaster block (two in west wall of 39 and two in stair hall).

Cork carpet on all third floor corridors was refinished with spar varnish.

Pipe and wire screen rail was installed around gallery of South West Range, similar to West South Range gallery. (Also mentioned 1933-34.)

Rotunda: repainting spaces on walls under stenciled portion and walls and ceilings in the four stairways leading from Rotunda to galleries with green color. New color to conform with color in adjacent halls (one coat shellac, two coats lead and oil and two coats flat wall paint.)

**1935-1936**

  - Two water tube steam boilers, installed c. 1900 to supplant the original 1880 boilers but no longer in use, were dismantled and removed from building. Steam is supplied by the Central Heating Plant.

- Door #90 at east end of East South Range gallery was closed and door installed in adjoining arch as part of remodeling above gallery for exhibition purposes. (Completed May 1, 1937.)

- Three doorways in East North Range were remodeled.

- Several window openings were filled in with plaster block: two in southwest corner of East South Range; and two each in Rooms 53 and 54 in East Tower. Also two doors in Room 53 were filled in with plaster block.

- Iron pipe railings with wire panels were installed on East South Range gallery.

- New Georgia Pine edge grain floor on old floor in hallway on 2nd floor of North East Pavilion. Ventilator operators installed on windows above galleries in North, East, and West Halls similar to the ones recently installed in South Hall. Forty fire extinguishers (soda and acid type) were distributed.
1936-1937

*Exterior:* Attached sheet metal studded with sharp nails on ledges near roofs of pavilions for bird proofing.

*Interior:* Wood and concrete floor removed and replaced with new concrete floor in northeast corner, West South Range.

Installation of wood balusters and newel post on wooden steps at south east corner of South Hall. Painting of walls and ceilings in Women’s Restroom.

1937-1938

*Interior:* South West Pavilion: A toilet and locker room for laborers was constructed in southwest basement in area where old boilers were removed.

Installing electric drinking water cooling apparatus in basement room under office of the lieutenant of the guard; installing drinking fountain in the northeast corer of North Hall in addition to fountain in northwest corner of same hall and connecting both fountains to electric apparatus in basement.

*Exterior:* Waterproofing exterior surface of west wall, underground, SW Pavilion, where heating pipes between AIB and Aircraft Building enter.

Laying new section of concrete sidewalk at SW corner of South West Pavilion and laying new section of concrete water table along west wall of South West Pavilion.

1938-1939
Annual Report, 1938-1939, Division of Buildings and Labor (SIA, RU 157, Building Management Department, 1881-1973, Box 7).

*Interior:* Souvenir Room was added to the suite of rooms at the north entrance. The Guard Room was relocated to the two rooms on the east side (1937) and the new souvenir stand was placed in the south portion of the room west of the north entry. A reinforced concrete floor with terrazzo was constructed to be level with the floor in the North Hall and replaced the old wooden floor. A partition was added to separate this new space from the officers’ locker room to the north.

*Exterior:* Removal of large oval bed of roses in roadway opposite the north entrance due to traffic congestion. Japanese yews were planted on either side of the entry platform and three benches were placed on either side of the platform.

Old gas lamp posts were removed, new electric cable was laid, and new electric lamp posts were installed around the AIB and the SI Installation of iron pipe railing along walk at northeast corner of the AIB. Repairing and painting the tall stone arches at all entrances and all window sills.
1940-1941
Annual Report, 1940-1941, Division of Buildings and Labor (SIA, RU 157, Building Management Department, 1881-1973, Box 7).

Interior: Long, narrow strip of black concrete was laid on south side of West Hall to replace slate slabs.

1941-1942
Annual Report, 1941-1942, Division of Buildings and Labor (SIA, RU 157, Building Management Department, 1881-1973, Box 7).

Interior: Waxing and polishing linoleum floor covering in Rooms 56 and 57 (Medicine and Public Health)

Exterior: Building of wooden walkway with hand rails for platform at North entrance for use during winter. 430’ of 12” water main is laid along the east side of AIB so that the section of very old water main under the east side of this building could be abandoned.

1942-1943
Annual Report, 1942-1943, Division of Buildings and Labor (SIA, RU 157, Building Management Department, 1881-1973, Box 7).

Exterior: Repairing and painting of exterior wood window frames and sash throughout museum, replacing broken glass, and painting of all tin roofs.

1943-1944
Much of the then plain glass was replaced with ground glass.

1944
Alexander Wetmore becomes the new Secretary of the SI

1944-1945
Annual Report, 1944-1945, Division of Buildings and Labor (SIA, RU 157, Building Management Department, 1881-1973, Box 7).

Interior: “The four light fixtures suspended from the extreme top, inside the Rotunda, and the four light fixtures suspended from the four piers, above the balconies, were removed in the interest of public safety. The top fixtures were not arranged for use and had not been used for years, while those on piers were not suitable for the purpose intended.” Painting in many office and workrooms including walls, ceilings and floors. Hollow tile and gypsum blocks are still being used to block door openings and create partitions.
Exterior: “Renewal of gutters around the roof and painting of all windows around the Rotunda has been completed. To this work it was necessary to completely scaffold entirely around the exterior of the Rotunda, above the regular roof level. The guttering was in very bad condition and beyond any question was responsible for the bad leaks which have damaged the interior walls.”

1945-1946

Interior: The original wiring for electricity was run through wooden molding. All obsolete wiring and molding are in the process of being replaced. Large, electric light fixtures are lowered in all of the exhibition halls for lighting efficiency. New sockets are added and reinforcing of all brass shade holders.

Exterior: Original (1879) 1 W’ gas line running from southwest corner to northeast corner is replaced with 1” line.

1946
* Smithsonian Tropical Research Institute becomes part of SI

1951
Al 51-1 (AI 551C)
This project thoroughly details the construction of the vent shaft, elevator, and stairs in the South West Court. New concrete columns are added to support the insertion of a new concrete mezzanine level between the existing gallery floor and the first floor. A new concrete “top deck” is installed for today’s existing third floor. (ODC)

1952
AI 52-1
Drawings indicate existing conditions for men’s and women’s restrooms on the ground floor, South East Pavilion. It appears that some minor cosmetic changes may have occurred at this time. (ODC)

1953
* Leonard Carmichael becomes the new secretary of the SI.

1954
AI-54C
“First Ladies Hall.” Drawings indicate existing conditions of the ground floor of the West North Range with its terrazzo (described as 2’-0” blocks with contrasting border) laid over concrete slab, 3” gypsum block partitions plastered on both sides along room perimeter, and 1896-1902 gallery. Working drawings illustrate layout of hall with extensive layout of wood stud and wallboard partitions for many exhibit rooms. (ODC)

1955
AI 552C
“SI Modernization of Exhibits.” This set of drawings reflects 1955 existing conditions of the old Lecture Hall in the East North Range. At this time, a second floor (concrete with a cement topping) was added and curved
partitions were added to the ground floor for the new “Power Hall” exhibit. (ODC)

New stainless steel doors at the north entrance.

**1955-1976**

Air conditioning was localized in offices by “semi-packaged equipment” or window units.

**1956**

* The American Association of Museums moves out of the AIB and donates 30,000 books, periodicals, and pamphlets to the SI Library (AR 1955, p. 193)

**Al 561C**

“SI Modernization of Exhibits.” Drawings indicate existing 1956 conditions and new work in the South East Court or Hall of Health. The second floor was filled in (although the Hornblower & Marshall gallery remained) and acoustical tile ceilings were installed on both floors. The infill gallery construction received 12” x 12” asphalt tile floor and curved walls defined the space. Black terrazzo with zinc dividing strips was added at the entrance (today, near South East Rotunda gallery stairs.) (ODC)

**1957**

**Al 57**

“SI Modernization of Exhibits.” Drawings indicate existing 1957 conditions in the South Hall or Textile Hall. (ODC)

The encaustic tile at the Rotunda is removed.

**1958**

**Al 57-1 and 57-2**

“Doors and Hydraulic Lift.” Drawing reflects lift at east entrance. (ODC)

**Al 582A**

“SI Modernization of Exhibits.” Drawings indicate existing 1958 conditions and new work in the South Hall or Textile Hall and the East South Range or Agricultural Hall. A general note on Dwg. 3-41 mentions the replacement of existing double glazed glass with “hammered 1/8 thick Cathedral glass with back sides sandblasted.” (ODC)

**1959**

**Al 59**

“SI Modernization of Exhibits.” Drawings indicate existing conditions and new work for the Medical and Dental History Hall on the mezzanine gallery (East Hall today.) A 6” black rubber base was added completely around the gallery. The ground floor housed the Land and Transport Exhibit. (ODC)

**Al 591C**

“SI Modernization of Exhibits.” Drawings indicate existing conditions and new work for the Numismatics (Coins) Hall or North West Range. Vinyl asbestos tile floor is installed over the existing scored concrete pavement. (ODC)

**1960**

**Al601C**

“SI Modernization of Exhibits.” Drawings indicate existing conditions and new work for the Petroleum Hall or South West Range.
Alternate bid for latex terrazzo floor is installed over the existing scored concrete pavement. The terrazzo floor exists today in the corridor and portions of the Discovery Theater. (ODC)

1962

Al621C
“Roof Rehabilitation and Replacement.” (ODC)

1964

- National Museum of American History opens
- Sidney Dillon Ripley becomes the new Secretary of the SI.

1965

- Smithsonian Environmental Research Center opens

1965-1976

“Restoration Program 1965-76”
This document summarizing the restoration and renovation program was found in ODC’s project files and in SIA, RV 630, Box 3. The following information is significant:

“In 1965 a committee for the Restoration and Renovation of the building was formed by the Secretary of the Institution and aesthetic requirements were established to restore the building and provide a realistic and acceptable method for renovation during occupancy by the Museum staff, exhibits and the public. Exterior: The exterior of the building had not been cleaned since 1881 and this was done in 1969 by the William Watts Co., Philadelphia, PA... (description of masonry)... A light acid cleaning, rinsing and retinting the black bricks with the overall silicone waterproof treatment restored the exterior of the building masonry to its original condition.

The fenestration in the Exhibit Areas received mylar treatment to filter the V.V. Light, windows were caulked and sealed and replaced where needed. The frames and Gray Ohio Freestone sills were painted an ochre color to enhance the Romanesque appearance of the building and to articulate, by skylights and clerestories, the octagonal Rotunda dome.

The barn-red metal roof was repaired with bituminous treatments and restored to the original slate coloring. The tower, lantern and rotunda finials received a gold finish. A concealed system for lighting protection was provided.

Interior: ...It was decided that the features that existed at the period 1897-98, would provide a basis for the restoration design. The renovation requirements explored as the needs for Air Conditioning, Electrical Services, Heating and Ventilating, test borings for soil bearing capacity for these additional structures and equipment and an overall scheme developed to house all of these systems...

Since the building had a modular geometric pattern, the four court spaces were selected as cores to contain these services [environmental systems] and extending there from, concealed under the floor or in furred ceilings, to each of the adjoining Exhibit Halls, Ranges, Towers and Pavilions. The Northwest court had been selected to contain the new 1350 ton air conditioning substation equipment for the building with soundproof isolation from the adjacent Exhibit space.
A contract for $2,945,000 was awarded to the Grunley Walsh Construction Co., Inc., Rockville, Md., for the general contract work in the building.

In the Exhibit Halls, in lieu of exposed duct work, the arched niches between the piers were maintained with a furred plenum to provide supply and return conditioned air. Diffusers were masked as circular openings in the geometric center of the arches of the niches...

Return air grilles were disguised by the baseboard in the wall niches.

Sprinkler piping for fire suppression, located under the roof, blended with the structure of the spider trusses and disappeared. Bulky fluorescent and incandescent lighting fixtures were removed and replaced by unobtrusive lighting tracks, which were to be used by the exhibit lighting units and period fixtures in these locations. New restrooms were provided for visitors on the first floor and S.1. staff on the second floor in spaces adjacent to the Exhibit Halls.

Consistent with the request for improvement to the North Hall of the building, two new galleries were provided, one each on the East and West sides of the Hall. These galleries are of the same depth as those on the other three Halls and extend sixty-five feet from the Rotunda stair to terminate at the North Ranges, thus completing Cluss’ original design intent.

A colonnade and wall with arched niches were designed to match those of the other galleries and resulted in an arcade with a barrel vaulted ceiling and terrazzo floor, making it possible for museum visitors to view the exhibits located in the North Hall for the first time from this level. The matching union jack cast iron railing was salvaged from demolition and used for these galleries and the restored gallery at the North end of the building.

The stainless steel doors were removed from the North entrance and were replaced with wood paneled doors, transoms and frames in walnut and oak in natural finish. Millwork details were obtained from original interior doors, frames and trim and were developed by dividers using photographs of original external doors. The masonry was removed from the exterior of the first floor of the West and South towers to open the building and provide similar entrances as had existed at the turn of the century. Included in this restoration were the replacement of two interior windows on either side of the entrances and alcoves... All door openings in the Exhibit Halls were restored with wood paneled doors in arched frames and period trim.

Natural finished baseboard was provided on both the ground level and the gallery levels of the building.

A design was developed by the S.1. staff and a contract was awarded to the Paintrite Co., Arlington, VA, to paint the interior of the building. All interior color selections were made by Hugh H. Jacobsen, a Washington, D.C. Architect who acted as consultant for the project on finishes and entry doors. All newly plastered walls in exhibit spaces received a
sand finish in random density to match the adjacent existing plaster and wainscot moulds were restored. The imitation stone joints appearing in the finished plaster were to be accentuated by stripes and the Interior of the Exhibit Halls and Rotunda were restored with their former Victorian flavor.

A study was made by the S.I. design staff of the photographs taken in 1895 of the interior decorations and selections of each wall stencil were enlarged to a 3 foot square photo positive. These were transposed to a producible tracing, the definition of the figures were developed as to shape and proportion and full scale patterns were made for application of these stencils to the walls of the exhibit space. A contract was awarded to the Myers Christianson Co., Kensington, Md., to perform this art work for the stencil forms, for which the Washington Building Congress presented an award to the artist.

The Northeast Court was designed for a Museum sales shop complete with vaulted ceiling containing electrical plug-in track and linear diffusers recessed in the ribs and sprinkler heads concealed in the vaults. All millwork and finishes were designed to match those in the restored areas. The contract work was performed by Construction Services, Inc., Washington, D.C.

Rotunda area was measured, photographs studied and the floor probed for evidence of past finishes in the space. A probe was made in the Rotunda slab to find the basin of the original fountain, which was removed in 1929. It was discovered, filled with earth, broken floor tiles, etc. A new design was developed for the fountain superstructure and granite coping stone. The geometric pattern of floor tiles was established and with reference made to samples of original pavers (which were salvaged by senior museum staff members) a monochromatic and polychromatic encaustic tile floor design was developed to replace that which was removed in 1957.

The statue of freedom was not placed in the fountain basin, rather the Foley fountain, which was borrowed from Philadelphia, was placed in the center and horticultural specimens occupied the surrounding space. The restoration and renovation project was completed and the building opened on May 10, 1976 with the Bicentennial exhibition for the public.”

1966

AI 66-4A

“Renovation of SW Range, 3rd Floor for Information Systems Division.” Drawings do not reflect existing (1999) conditions with the exception of the elevator and duct shafts and access stair. (ODC)

October 27, 1966 - Letter to Mr. James Bradley, Acting Secretary, SI from L.A. Ziemicki, Assistant Commissioner for Construction (SI-AHHP, Box 7)

Writes that the total estimated costs for renovating the AIB will be $3,490,000, of which $3,124,000 is construction costs. Exterior work was not considered for this contract. A list of interior work included: 19,000 square feet of new second story decks over
various ranges for offices, removal of existing flooring in exhibition areas and the installation of new terrazzo, general plaster repairs, general painting, rehabilitation of both west and south entrances, provide combination elevator (passenger and freight), provide new HVAC system capable of servicing 179,500 square feet, provide additional restroom accommodations, provide new electrical distribution system including service, and 50 new telephone outlets.

November 10, 1966 - Letter to L.A. Ziemicki, Assistant Commissioner for Construction from Mr. James Bradley, Acting Secretary, SI (SI-AHHP, Box 7) Response to above letter of October 27. Indicates that only funds totaling $133,000 have been appropriated that year for drawings and specifications and the AIE fees are estimated at $212,000. Suggests that it be necessary to reduce the scope of work and indicates that the following areas are most important: providing HVAC system, electrical service, and providing new second floor decks for offices.

1967
* First Folklife Festival and Anacostia Museum opens

AI 677A
“Restoration of Building Exterior.” Drawings indicate cleaning, painting, and repair work of the exterior of the building. William Watts Co., Philadelphia, began cleaning the stone on August 11, 1969. According to an undated short written summary by James Murphy: “A light acid cleaning, rinsing and retinting the black bricks with overall silicone treatment restored the exterior of the building masonry to its original condition.” (SIA RU 640, Box 3 and ODC)

AI 679A
Drawings indicate HVAC improvements throughout building. Sheet 1 of 25 indicates “temporary layout 1350 ton refrig. and substation.” This sheet most likely reflects the North East Court. Sheet 20 of 25 indicates existing cast iron radiators and fin tube radiation to be removed throughout the building. (ODC)

Heat was generated by steam piped from a central plant through the underground trench system to cast iron radiators. Air handling units did exist in some spaces and provided localized air conditioning and heat through coils installed within.

November 13, 1967 - “Feasibility Study of Air Conditioning and Additional Electric Power for the SI A&I Building, Washington, DC.” Includes description of existing (1967) heating and “partial cooling” systems: Heat was generated at that time by steam piped from a central plant through the underground trench system to cast iron radiators. Air handling units did exist in some spaces and provided localized air conditioning and heat through coils installed within.

Existing conditions during this time noted that air conditioning was localized in offices by “semi-packaged equipment” or window units. (ODC; Kluckhuhn and McDavid Co., Engineering Consultants)
April 18, 1968 - “Renovation of Original Smithsonian Institution Building.”
Drawing (#5-17) indicates modifications (new concrete slabs, steel columns and concrete footings etc.) to existing mechanical rooms in the North West Court. (ODC; Chatelain, Gauger and Nolan)

1968
* National Portrait Gallery Opens
* Cooper Hewitt, National Design Museum becomes a part of the SI

AI 689A
“New Mezzanine Floor, North East Range.” Drawings indicate the future toilet rooms that exist today on the second floor, North East Range. Structural drawings indicate dimensions for new concrete and steel mezzanine floor. (ODC)

1969
North, South, and West Towers: Exterior masonry restoration.

1971
AI 711A
“Restoration Of NW Pavilion, First Floor.” Drawings indicate minor changes to this suite of offices. Transom window design is included as part of drawing set. (ODC)

AI 713A
“Northwest Range, New Mezzanine Addition.” Drawings indicate existing columns are to be replaced with new structural columns and footings. New steel deck is installed for mezzanine floor. The configuration of partitions does not resemble existing (1999) conditions. (ODC)

1972
* Renwick Gallery opens
* Hirshhorn Museum and Sculpture Garden open

AI 722A
Specs and shop drawings indicate that “steel and concrete mezzanine level structural floor system” was installed in the East South and West South Ranges. Gypsum wallboard partitions and acoustical tile ceilings were also constructed for new offices. (ODC)

AI 723A
“West North Range New Mezzanine Filler Panel.” New partitions on both ground and mezzanine level. This work, if constructed, does not exist at all today. (ODC)

AI 7215B
“Floodlighting.” Plans indicate lighting for grounds immediately around building and roof. (ODC; Kenneth W. Cobb, Consulting Engineers)

AI 7216A
“Restoration and Renovation of the Arts and Industries Museum.” Existing drawings include both bid and as-built drawings. Project planning had actually started in the early 1960s
when program requirements were established. Design work began in 1966 and was headed by the Smithsonian’s Office of Facilities Planning under Chief James M. Murphy and architect William L. Thomas. (See 1965-1976 entry above.)

Interior: This renovation mainly focused on the overhaul of the existing environmental systems (especially HVAC and electrical) and the insertion of new systems into the existing building, i.e. chases in floors, walls, and ceilings to accommodate ducts and subsequent repair. Quite a bit of cosmetic work is performed on the four main halls and walls are furred out or newly constructed (i.e. North East and North West Courts) to make chases for ducts.

Major structural work included: Concrete and steel decks added for new second and third floors in North East Court and modifications are made on the first floor for new fire stairs and elevator.

The Hornblower & Marshall gallery is completely removed at this time. (Dwg. S-1 and S-2) New steel beams and metal grating were installed on the mezzanine level in the South West Court and spanned across the open space between the Hornblower and Marshall gallery. (Dwg. S-3) Steel beams, partial concrete floor and soundproof walls were added for second floor to accommodate new air conditioning plant, steam service entry and electrical substation equipment in the North West Court.

The Hornblower & Marshall gallery is completely removed in this space with the exception of a very small portion at the north wall. (S-4 and S-5)

Minor modifications included the plastering of arches and insertion of new wood/metal doors or “special period doors” throughout the museum. The west and south entry vestibules were restored to allow for outside egress. The North Hall received new galleries on the east and west walls via space from the North East and North West Courts.

Decorative painting was completed in the Rotunda and a portion of the four main halls. The Rotunda fountain and encaustic tile floor were completely reconstructed.

Renovation of individual office suites was not part of this building renovation. Many office alterations were completed post-1976.

Exterior: Alternate A: Drawings A-25, A-26, and A-27 indicate typical elevations of existing windows, repair and/or replacement of windows. Many of the sash, glass (clear insulated or UV filter), and wood sills were scheduled to be replaced and louvers were to be inserted in several windows. All of the Rotunda windows were to be completely replaced. Most 4th floor windows were to receive double glazing. All windows were to be sealed permanently unless they were located in offices in the towers or pavilions. It is unknown how much of this work was completed during the 1976 renovation.
OPP Projects #8233101 or 8333103 probably included the work depicted in these drawings. Change proposals (70+) found during archival research contain few drawings: CP# 5 South Entry Lobby renovation - Hugh N. Jacobsen; CP# 18 Wrought iron screens; CP# 28 Tile at entrances - Hugh N. Jacobsen; CP# 31 West Entry Lobby renovation; CP# 40 East Tower entrance doors and details; CP# 65 New steps for North and West alcoves; and CP# 68 Rotunda fountain.

1973

AI 732A

“New Rest Rooms, 1st and 2nd Floors, SW Pavilion Annex.” All existing partitions, plaster from east and west walls, and other finishes were removed to create toilet rooms (1358, 1359, 2368 and 2369) that still exist in 1999. (SIA, RU 637, Box 2)

1974

AI 745A

“Rotunda Floor-Tile Layout.” Shop drawings indicate the pattern in the rotunda to include black, blue, ochre, terra cotta and white. Jacobsen indicates that drawings were “developed by inspection of photographs of original conditions and measurements of available existing floor tiles…” (ODC; Grunley-Walsh Const.; Standard Art Marble & Tile Co., Inc.; Hugh Newell Jacobsen, FAIA Architect)

AI 746A

“Stenciling Major Exhibit Halls and Rotunda.” Drawings indicate the colors used were yellow ochre, red ochre, red lead, maroon, green, and white. The following note appears on the drawings: “Line work and related proportions of designs on these drawings are possibly incorrect because of the method of reproduction from photographs which resulted in the construction of these drawings.” (ODC; Hugh Newell Jacobsen)

AI 747A

“South Entrance.” Drawings indicate new entry and vestibule doors, new office entry doors and wood steps into existing rooms 1302 and 1308, new windows looking into existing rooms 1304 and 1306, repair of damaged plaster and new wood wall base in vestibule, and removal of plaster and paint to expose brick on outside entry walls. [This entrance had been closed since the Hornblower & Marshall renovations.] (ODC; Hugh Newell Jacobsen)

1975

Specifications (SIA, RU 637, Box 2) describing installation of new archives offices and storage on the second floor of the North East Court, North East Range and East North Range.

AI 752A

“West South Range Survey w/ South West Pavilion.” (ODC)

AI 753A

“Interior Painting of Building.” Drawings indicate repair of plaster and paint color (acrylic latex or enamel [metals]) for selected areas of the Rotunda and four halls. It seems as though the stenciling was not included in this contract. (ODC)
AI 7511A (33-75101)
“Roof Renovation, Phase 1.” Bid set drawings indicate extent of work to include new 160z lead coated copper standing seam roof, underlyment, sheathing, and rigid insulation on part of the four halls and courts. Other existing copper roof on Rotunda and part of the flat standing seam roof next to the rotunda is to be coated and painted. Details are included for the lantern windows (over four halls), skylights (over courts), and clerestory windows. (ODC)

7533243
“East and Sensory Gardens;” correspondence. (ODC)

Pre-1976
Doors: Wood doors replaced and altered throughout history of building. (Very few original doors survive in towers and pavilions)

Decorative Painting at the Rotunda: (Photographs show that) all traces of the decorative stenciling were concealed by a neutral paint.

1976
National Air and Space Museum opens

North Tower:
The existing exterior and interior vestibule pavement was constructed during the 1976 renovation.

South and West Towers: Full restoration of both exterior and interior vestibules and entrance doors.

Rotunda:
The 1976 renovation reconstructed the fountain and the encaustic tile flooring.

Doors:
Many of the stained wood “period” doors and frames were installed during this renovation.

Paint:
“Several wall and ceiling surfaces were exposed to reveal the original paint colors and these were reproduced as closely as possible. All newly plastered walls in exhibit spaces received a sand finish in random density to match... The imitation stone joints appearing in the finished plaster were accentuated by stripes... A study was made of the photographs taken in 1895 of the interior decorations and selection of each wall stencil were enlarged to a 3 foot square negative... full scale patterns were made for application of these stencils to the walls of the buildings...” [James M. Murphy, undated summary, 6. (SIA RU 630, Box 3)]

Decorative Painting:
Done in the Rotunda and over the archways and at the flat panels at the inner ends of the main halls.

- Hugh N. Jacobsen used historic photographs to reconstruct the decorative painting scheme that exists today in the Rotunda.

Heat:
During the 1976 renovation, an air-water system consisting of 450 ton chillers, air handling units, fan coil units etc. were added to cool, heat and regulate humidity. Fan coil
units exist today in most rooms. Supply air and return diffusers supply additional air in most of the ACT ceilings.

Air Conditioning:
The North West Court became the central equipment room for the cooling systems for both the AIB and SIB. An air-water system consisting of 450 ton chillers, air handling units, fan coil units etc. were added to cool, heat and regulate humidity.

7633210
“Renovation of Spaces for Sites, Public Affairs, Computer Services and Projection. Misc. HVAC, door and hardware replacement and other work in basement (North East Pavilion), 1st floor (North West Pavilion), and 2nd floor (North East Range and Court, West North Range, North West Range, South West Court.) (ODC)

7633217
“Renovation 2nd Floor South West Court for Computer Services.” Some of the partitions shown on the floor plan exist today. (ODC)

763325
“East Garden and Sensory Garden.” Dwg set includes 15 sheets; cover indicates overall planting plan for areas north and east of the AIB. It is unknown how much of this work was completed. (ODC; Hugh Newell Jacobsen)

763338
“Office of Public Affairs.” Partition layout in North West Range resembles portions that exist today. (ODC)

7633365
“Roof Renovation, Phase 2: As-Builts.” Drawings indicate as-built conditions with clear indications of conditions for clerestory windows: metal louvers, operable windows, vent units etc. (ODC; Robert E. Ridgley, Consulting Architect)

May 10, 1976 - The Arts & Industries Building reopens to the public.

December 3, 1976 - Draft letter from James M. Murphy (Chief, Smithsonian Office of Facilities Planning and Engineering) to Mildred F. Schmertz, Architectural Record (SI-AHHP, Box 6)

“I have read your article in the November 1976 issue of the Architectural Record, and having been deeply involved in the Restoration project of the Arts and Industries Museum... from its conception in 1965 to its completion in 1976...

In 1965, a committee... was formed by the Secretary of the Institution and the aesthetic requirements were established to restore the building...

It was decided that the features that existed in 1898 would provide a basis for the Restoration design...

The Smithsonian design staff... began cleaning and restoring the exterior, constructing interior structural additions to provide space for personnel and new service equipment...
The prime project documents (91 drawings, 30 detail supplements and 1,000+ pages of specifications) were completed in September 1973, when the work was advertised for bid.
By September 1974 a design was completed to paint the interior of the building, repair wall surfaces and line the imitation sand joints in the sand finish plaster.

... February 1975 the Construction contract work was half finished and Mr. [Hugh] Jacobsen had received a contract to provide architectural services...

1) choice of door and baseboard moldings;
2) color scheme for the interior including walls, rails, sashes and stencils;
3) North entrance access design;
4) color scheme for the Rotunda floor tile;
5) review of lighting and redesign of special exhibit fixtures;
6) study fenestration and glazing and
7) develop an exterior color scheme for sashes and trim including main entrances.

Items 5 & 6 were not pursued except fenestration, which was included in a roof repair contract in 1976 by the Smithsonian Institution.

It is unfortunate that some of the context and, particularly the heroics described in the article were not passed through the Smithsonian for comment before being published for they are somewhat...irresponsible...

1977

January 17, 1977 - “The Arts and Industries Building, Roof Renovation: Phase 2, a review presentation by OFPES and Robert E. Ridgley, consulting architect” (SI-AHHP, Box 7)
cooling or humidity control. From 1955 to 1976, window fans, and window and package air-conditioning units were installed in the office areas. The present system was installed in 1976. It consists of three 450 ton chillers, steam-to-hot water conversion, pumps and power distribution in the central mechanical room which supplied chilled and hot water to four area mechanical rooms with air handling units, heating and cooling coils, fresh air intakes, filters and associated control systems. These areas provided heating, cooling and humidity throughout the various parts of the building using a system of ducts that contain local steam humidifiers.

We next examined the requirements for heating, cooling and humidity. As a national goal, President Carter has recommended 68°F winter and 80°F summer.

On the other hand, most museum authorities and the American Society of Heating, Refrigeration and Air-conditioning Engineers recommend that museums be maintained at 70 to 72°F and 50 to 55% RH, with rare books at 70 to 72°F and 45% RH. From an engineering point of view the maintaining of close temperature and humidity control is possible and practical in well designed structures and HVAC systems. However, these high standards are difficult and expensive to achieve in some facilities, such as the A&I Building, without extensive modification the HVAC systems and structures.

In conclusion, we recommend that... No major changes in the A&I HVAC system be made until the A&I roofing project and Freer HVAC study are completed...”

Fall 1977 – the Discovery Theater opens.

1977

7733114
New shutters in existing office 2209 in East Tower. (ODC)

7733435
“Renovation of South West Pavilion, West South and East South Ranges and South Tower for S.1. Magazine.” Some of these modifications still exist today: Minor changes in South West Pavilion on the 1st and 2nd floors; and the 3rd floor partition layout is true to existing 1999 conditions. Minor modifications constructed at East South Range, 1st floor. Some of the partitions in the southernmost offices at the West South Range, 1st floor, were created at this time. (ODC)
Building Floor Plans indicate existing or proposed conditions after renovation. Several areas are different than the 1976 renovation construction document set. (ODC)

1978

* National Museum of African Art established

7833109

“Puppet Theatre for the Smithsonian Institution.” Installation of theater with ticket booth and support spaces into existing South West Range. All of this work exists today. (ODC; Salditt Lipp & Helbing Architects Engineers)

7833113, 7833115

New entry doors from East Hall to existing corridor 1218 and from West Hall to existing corridor 1317 respectively. (ODC)

7833118

New shutters in existing offices 1101, 1103, 1107 and 1109 in North Tower. (ODC)

1979

7933106

“S.1. Magazine Installation of New Partitions.” Minor modifications to South West Pavilion, second floor. (ODC)

February 1, 1979 - Letter to John Yellin from James M. Goode, Curator of the Smithsonian Building. Letter to Margot Gayle from James M. Goode (August 17, 1979) (SI-AHHP, Box 2)

Both letters discuss the restoration process for the original decorative wrought iron gates (attributed to Cluss & Schulze) that were restored by Criss Brothers, Inc. and installed on the west entrance. The entire cost of restoration was $26,000.

1970s-80s

North, South Towers: Complete window and masonry renovation.
West Tower: Window and masonry renovation
Towers: Interior renovation of original office spaces were significantly altered by furring of walls and added bulkheads to accommodate new environmental systems.

1981

8133101

“Exterior Restoration; Remedial/Emergency Roof Repairs.” Roof repair to the both ranges in the northwest quadrant. (ODC; McGaughy, Marshall & McMillan)

8233103

“Exterior Restoration; Phase 1 - Quadrant I and II.” Portions of roof replaced, stone and window conservation and renovation of portions of the environmental systems. Drawings (A86 through A-88) also indicate the scope of the only interior modifications which were made on the third floor of the North West Pavilion. (ODC; McGaughy, Marshall & McMillan)

Pre-1983

Demolition of annex and repair of east facade. Evidence of old door openings appear on the middle bay and end of the East Tower where the children’s play area exists today.
<table>
<thead>
<tr>
<th>Year</th>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1983</td>
<td>8333103</td>
<td>“Exterior Restoration; Phase 2 - Quadrant III and IV.” Portions of roof and skylights replaced, stone and window conservation and renovation of portions of the environmental systems. (ODC; McGaughey, Marshall &amp; McMillan)</td>
</tr>
<tr>
<td>1983</td>
<td>8333106</td>
<td>“OPS Office Mods.” Drawings indicate new partitions for second floor of West North Range. Some of these partitions still exist in 1999. It is unknown if this work was completed according to the drawings or if modifications were made subsequent to this set. (ODC)</td>
</tr>
<tr>
<td>1983</td>
<td>8333107</td>
<td>“S.L Magazine Space Plan.” Drawings indicate new office partitions and finishes for first floor South West Pavilion (Room #1360-1367), West South Range (Room #1315A-1315E), South Tower (Room #1306-1308) and East South Range (Room #1276). (ODC)</td>
</tr>
<tr>
<td>1984</td>
<td></td>
<td>Robert McCormick Adams Jr. becomes the new secretary of the SI.</td>
</tr>
<tr>
<td>1984</td>
<td>8433101</td>
<td>“Exterior Restoration; Phase 3 - Including East Towers and Entry Portico (South Towers and Entry Alternate 1.” Portions of roof and framing replaced; stone, window, entry door, portico paving, and gate conservation; and renovation of portions of the environmental systems. (ODC; McGaughey, Marshall &amp; McMillan)</td>
</tr>
<tr>
<td>1985</td>
<td>8533101</td>
<td>The construction documents for this project are not accessible. (ODC)</td>
</tr>
<tr>
<td>1985</td>
<td>8533115</td>
<td>“Renovation 3rd Floor of South East Pavilion.” The construction documents for this project are not accessible. (ODC)</td>
</tr>
<tr>
<td>1986</td>
<td>8633101</td>
<td>“Exterior Rehabilitation, Phase 5.” Construction Documents for this project are not accessible. (ODC)</td>
</tr>
<tr>
<td>1986</td>
<td>8633133, 903315</td>
<td>Memo re: “Accessibility Access, Arts and Industries Building, North Entrance” “...this access ramp was installed in 1986 as a temporary measure until funding was found to develop a design solution which was sensitive to the historic properties... The new ramp was constructed between January-March 1993. Precast concrete pavers with exposed aggregate slip-resistant finish and granite aggregate pavers were chosen to match the adjacent stone of the base of the building. A painted wrought-iron handrail surmounted a wrought-iron picket fence... also installed automatic door openers on the north doors... activated by a push plate... also be activated by rubber floor treads.” (SI-AHHP, Box 2 and Drawings at ODC)</td>
</tr>
<tr>
<td>1987</td>
<td></td>
<td>Sackler Gallery opens</td>
</tr>
</tbody>
</table>
8733106
"National Science Resources Center - East Tower Offices 1201-1204." Repair of plaster, new wall base, and painting. New door to match existing in South Tower between rooms 1302 and 1301. (ODC)

8733107
"1987 S.L Magazine Renovation." New partitions, doors and/or relocated doors, and new finishes of first floor, East South Range (existing room #1277-1282B.) (ODC)

8733109
'Joseph Henry Papers Phase 2." Drawings indicate the existing 1999 layout of the North East Range on the second floor and most of the contemporary finishes that exist in this space today. (ODC)

Discovery Theater temporarily relocated during renovations.

1988
883310
"Delegated Examining Unit." Drawings indicate minor office modifications on first floor, North West Range (existing room #1430, 1431 and 1432.) (ODC)

883314B
"NDL OMP OESE NSRC." Drawings indicate new office partitions and finishes for first floor, East North Range (existing room #1112-1131.) (ODC)

883314C
"Modifications to Office of Membership and Development." Drawings indicate new partitions, doors, HVAC and electrical changes for first floor, West North Range (existing room #1470-1488.) (ODC)

883314D
"Infant Care Center and Misc. Improvements." Drawings illustrate new partitions, doors, finishes, HVAC and electrical changes for first floor, East Tower, South East Range, South East Annex, and South East Pavilion (existing rooms #1206-1269.) Misc. Improvements include new finishes for toilet rooms. Only old marble stalls (1912?) were salvaged and reused. Minor work in corridors (existing room #1218 and 1270.) Minor work on second floor (existing room #2207, 2209) and on third floor (existing room #3209.) (ODC)

883314H
"Misc. Space Mods - Public Corridors." Drawings illustrate new “period-style” doors and frames, vinyl tile (mauve, black, and white pattern), wood base, acoustical tile ceilings, lights and misc. modifications. (ODC)

883317
"OMP Space Modifications." Demolition drawing indicates removal of partitions for existing library in South East Court, second floor (Room 2239). (ODC)

883318
"Arch Restoration, Arts and Industries Building”
"Since May 1991 work has been ongoing to restore the archways, trimmed in Ohio sandstone, to their original condition. A survey to determine the condition of the stone was conducted in 1982. All four archways showed indications of spalling. The east archway was in particularly bad shape. Used as a loading
dock, it suffered great damage from trucks... Subsequent removal of gray paint, applied over a twenty-to-forty year period... The Smithsonian repaired the existing stone to its natural state through a series of restoration treatments using the Hahn [sic] M-70 Stone Restoration Mortar patching system... This was followed by chemical cleaning using a combination of SureKlean Limestone Pre-Wash, SureKlean Heavy-Duty Paint Stripper and SureKlean Heavy Duty Restoration Cleaner...” Drawings by Quinn-Evans Architects depict repair notes for North and South entry arches. (SI-AHHP, Box 2 and ODC)

1989

* National Museum of the American Indian established

893304

“East Tower, 2nd and 3rd Floors.” Drawings illustrate work in existing room #2201,2203,2205,2207,3201, and 3209: mechanical (service fan coil units) and electrical modifications, replacement of light fixtures, locating leaks, patching of plaster, painting, and new carpeting. (ODC)

893305

“Painting Exterior of Windows.” Drawings indicate windows to be painted. (ODC, Richter Cornbrooks Gribble Inc.)

1990

* National Postal Museum established

903301

“Relocation of the Office of Architectural History and Historic Preservation.” Drawings illustrate interior renovation (new partitions, doors, lighting, and millwork) on second floor (existing room #2261-2267A) of South East Pavilion. (ODC; Sorg & Associates)

903303

“Modifications to 1st Floor, North West Range.” Drawings indicate new work that reflects existing 1999 configuration. (ODC)

903309

Renovation of North East Pavilion; drawings indicate existing (1999) layout. (ODC)

903314

Renovation of East South Range; drawing indicates second floor plan and reflected ceiling plan and reflects existing 1999 conditions. (ODC)

903321

Repainting of Halls and Rotunda Walls. It is unknown how much of this work was done or if 923311 completed this project.

Drawings indicate that no paint was to be applied to the stenciled areas and plaster was to be repaired at the head of most arches, below the clerestory windows, and on the shafts of the piers. (ODC)
Notes, Bibliography, and Appendices

Building Chronologies 5.3.3

1991

910005
“Smithsonian Institution Wide Accessibility Project, Phase II, Accessibility Study Implementation Plan;” prepared by Heery International, Inc with consultants. (ODC)

913311
“Control Room Renovation and Security Systems Division.”
Minor modifications in North Tower (1101-1104). Work partially exists today in 1102. (ODC)

913317
“Window Repainting of Arts and Industries Building” (ODC)

913322
“Facade Statuary Repair, A&I Building;”
Drawings indicate stabilization of original 1881 Buberl! statue at North entrance. (Sorg & Associates, ODC)

1992

923311
Painting of Halls and Rotunda Ceilings; asbestos removal. (ODC)

1993

933303
“Roof Skylight and Window Repairs.” (ODC)

1994

* Ira Michael Heyman becomes the new secretary of SI.

943302A
OSEC Office Modifications in the East South Range; reflects existing (1999) partition layout for the most part. (ODC)

943302C
OPMB Office Modifications in the West North and North West Ranges; reflects existing (1999) partition layout for the most part. (ODC)

943307
“Miscellaneous Projects, Phase 2.” Five drawings indicate work at the north and east entrances; work in 1161, 1200 (Corridor, South East Pavilion), 1310C, 1406, 1473 (Women’s Restroom), and 2167. (ODC)

1997

973305
“AIB Roof Repair Study.” (ODC)

973312
OPS Office Modifications in the West North Range. (ODC)

973315
“North Entry Marble Repair.” (ODC)

973316
“AIB Master Plan Renovations.” Goals include a new central chilled water plant for SI museums on the south side of the Mall; the “Vision Statement” which will attempt to restore the 19th century exhibition character
to the building while still providing office and support spaces for staff; and the renovation of major building systems including mechanical, electrical, plumbing, fire protection, security, and accessibility. (Polshek, Tobey + Davis Architects and consultants.)

1998
983305
“AIB Paint/Repair Exterior Windows.” (ODC)

1999
993303
“AIB Roof Repairs and Modifications.” (ODC)

2000
* Lawrence M. Small becomes the new Secretary of the SI.

2004
* AIB Museum closes to the public.

2006
* National Museum of the American Indian opens
* Offices move out of the AIB. Building remains vacant.

2007
* Cristián Samper becomes the new Secretary of the SI.

2008
* G. Wayne Clough becomes the new Secretary of the SI.
The following chronology is taken from the *Preservation Plan for the Arts and Industries Building*, prepared by Oehrlein & Associates for the Polshek Tobey + Davis Master Plan Renovations, and is organized by building component.
Construction History of Individual Spaces and Recommendations for Treatment

This section provides a summary of the construction history for individual spaces within the building. The text includes description of the original construction, subsequent alterations, missing significant historic material, condition and recommendations for the preservation.

The information is based on the following sources: Polshek Tobey + Davis Architects existing condition drawings prepared during 1998-1999, Oehlein & Associates Architects field survey conducted in May 1999, historic documents including correspondence, reports, government papers, photographs, and construction drawings and specifications.

Cluss & Schulze’s original construction (1879-1881) and Hornblower and Marshall’s 1896-1903 alterations, specifically the galleries, railings and flooring are considered significant historic material. The majority of materials added to the building after these time periods should be regarded as non-historic material which can be removed or altered, except for the restoration quality materials which replicate the original construction configuration or materials.

The building has been maintained continuously since its original construction resulting in much patching of plaster and repairs to the roofs, windows, doors and floors, painting etc. The general repairs which are recorded in historic documents have not been noted in the following unless the work materially changed the appearance of the building. The 1970s renovation resulted in the removal or concealment of a significant amount of historic material as new environmental systems were installed. The construction documents from this project (AI7216A) provide information concerning the extent of the demolition and the new construction and finishes. This has been verified as much as possible without demolition of existing finishes.

Exterior

The four facades of the exterior of the building are equal in significance and are generally in good repair. Historically and today, the north entrance which faces the Mall is the main visitor entrance. The east entrance has always been used as a service entrance. The west and south entrances were open to the public when the building was first constructed but were closed off for many years and used for offices and storage. Both entrances were reopened during the 1970s renovation.
The late 1970-1980s multi-phased construction was the first major campaign to clean and restore the exterior of the building since its initial construction in 1879-1881. The current exterior appearance of the building is the product of the extensive roof replacement, window repair and replacement and the masonry restoration undertaken during this time.

**1881:** The halls, courts, pavilions, towers and rotunda are covered with blue slate from Ore Banks, VA accentuated with red and green slate from Vermont. The slate was hung on iron purlins which in turn were supported by iron trusses. Decorative iron finials capped the towers, pavilions, courts and rotunda. Each slate tile was 24" wide with 10" exposed to the elements and "double cover and 4" lap". The range roofs were covered with tin over roofing felt supported by 2 layers of fire-proofed wood "gratings". The wood gratings were fire-proofed with a plaster mixture. Similar plaster was installed at the underside of the slate roofs. (Report of the Architects, Cluss & Schulze, January 1, 1880, SI-AHHP, Box 12).

**1894:** The purlins in main halls near rotunda were reinforced with angle iron when buckling occurred ("The United States National Museum, An Account of the Buildings Occupied by the National Collection," from the Report of the United States National Museum for 1903, by Richard Rathbun, p. 254 -- hereinafter referred to as USNM Annual Report, 1903).

**1901:** The roof trusses of the main halls were repaired and braced with angel iron (USNM Annual Report, 1903, p. 254).

**1903:** According to Rathbun's report, all roofs are covered with slate, except those of the ranges which are covered with tin (USNM Annual Report, 1903, p. 254).

**1904:** North, south and west hall roofs are covered with slag, the rotunda and southeast pavilion slate are covered with burlap and asphalt and the northeast pavilion slate was replaced with Peach Bottom slate. Gearing attachments were installed for operating the ventilating windows of the hall and court lanterns and serral skylights were added to the roofs. (Annual Report of Superintendent of Construction & Labor, 1904-1905, SIA, RU 157, Box 1).

**1905:** Slate in Northwest Pavilion is replaced (Report of Assistant Secretary, USNM Annual Report, 1905, p. 13).

**1905-1906:** Slag and slate roofs of the east hall and north east and the northeast and southeast courts are replaced with tin. (Annual Report of Superintendent of Construction & Labor, 1905-1906, SIA, RU 157, Box 1).

**1908:** Rotunda roof is replaced with tin and fastened with screws instead of nails and the seams were locked by hand. (USNM Annual Report, 1909, p. 23; see also SI-ODC, Building #33, Drawing #A1908, "Roof Plan and Structural Details for New Tin Roof", 1908).

**1908-1976:** Repair and painting of the tin roofs (combination of batten seam and soldered or flat seam roofs) with metallic paint occurred periodically over the years.

**1910-11:** Southeast Pavilion slate is replaced with new Peach Bottom slate (Report of Superintendent of Construction & Labor, 1910-1911, SIA, RU 157, Box 1).

**1911-12:** New Peach Bottom slate roof was installed at the North Tower (Report of Superintendent of Construction & Labor, 1911-1912, SIA, RU 157, Box 1).

**1915-1917:** Roofs at the south pavilions are replaced with Peach Bottom slate. (Report of Superintendent of Construction & Labor, 1915-1916 and 1916-1917, SIA, RU 157, Box 1 & 3).

**1975-76:** Roof renovation over exhibition halls and rotunda; halls and courts "receiving temp coating (5 ply flexible coating - elastomeric roofing membrane) which would last no more than 3 years." 8 lanterns and skylights and portions of rotunda received lead coated copper standing seam roof; lack of funds and need to open building limited amount of work conducted (ODC, Building #33, OPP Project #A17511A, Phase I Roof Renovation, summer of 1976).

January 17, 1977: OFPES presentation materials indicate the new lead coated copper roof would be a combination of standing and flat seams over a new deck of plywood with thermal insulation. Vapor barriers would be installed and the existing inner metal deck would be rehabilitated and retained ("Arts and Industries Building, Roof Renovation: Phase 2, review presentation by OFPES and Robert E. Ridgley, consulting architect, January 17, 1977, SI-AHHP, Box 7). 

1976: Roof renovation Phase 2: "start at finial of rotunda...permanent repairs to the upper roofs over the halls with the ranges bid as alternate. It is doubtful that the towers or pavilions will receive any work this phase..." (from undated document, ODC 33100). This document also revealed reasons for much of the deterioration of the roofs and commented that many of the skylights and equipment that were added to the roof over the years...
caused quite a bit of leakage. (SI-ODC, Building #33, Project #7633365,
Roof Renovation Phase II: As Bulks, Sheets 1-7, December 1976).

1981-84: Exterior restoration of the roof including replacement with terne
coated stainless steel battens and standing seam and slate roofs. These roofs
remain today (SI-ODC, Building #33, OPP Project #s 8133101, 8233103,
8333103 and 8433101).

Windows: 1881: The original windows were wood, double glazed with a 1" air space.
Ground (translucent) glass was used in only one of the two panes (Letter to
Messrs. Seamon, Bache & Co., New York from Cluss & Schulze, October
25, 1879, SIA, RU 71, Box 10). Ornamental purple, yellow and translucent
glass was installed in the end wall windows of the halls above the entrances
With the exception the ornamental glass remaining at the hall no early glass
exists today. In the center of the original hall end elevation windows, a
single letter was located, dictating the cardinal direction that the hall pointed
to, i.e., N = north, with the word North, South, etc applied to glass pane
immediately below. The lettering is visible in historic photographs.

Iron sashes pivoted in iron frames were added in the side walls and lanterns
for ventilation (Report of the Architects for 1881, SI-AHHP, Box 2).

1882: As early as this year in April, 32 awnings were placed on the west
elevation and curtains placed on the large windows on the balcony of the
west entry. By May, more awnings were added on all windows exposed to
direct sunlight (Letter/semi-annual report to R. Brown Goode from Henry
Horan, Superintendent, May 31, 1882, SI-AHHP, Box 16).

1890: Sills of the windows were covered with sheet tin (Semi-Annual
Report of Superintendent of Buildings and Labor, July 1 - December 31,
1889, SIA, RU 158, Box 22).

1896-1902: Skylights added to courts ("Report of the Acting Assistant
Secretary," USNM Annual Report, 1898, SIA).

1896, 1903-04 and later: Various alterations: one layer of glazing was
permanently removed from many of the windows that were double glazed;
replacement of glass occurred frequently especially in the skylights;
portions of windows are made movable for ventilation; skylights were
added in the ranges and courts. Wood frame skylights were later replaced
with metal and glazing was replaced with wire glass for safety.
(Letter/annual report for fiscal year ending June 30, 1896 to Dr. G. Brown
Goode from Henry Horan, Superintendent, SIA, RU 158, Box 23 and
Annual Report of Superintendent of Construction & Labor, 1903-1904,
SIA, RU 158, Box 1).

1903: Removal of "wine colored" glass in circular sash in triple frames and
restenceling of glass (Annual Report of Superintendent of Construction &
Labor, 1903-1904, SIA, RU 157, Box 1).

1908-09: "Double thick ground glass in 56 ventilating windows was
replaced with plate glass, ground on one side" (Annual Report of
Superintendent of Construction & Labor, 1908-1909, SIA, RU 157, Box 1).

1911-12: Annual report notes that 258 windows (frames, sashes, and iron
grilles) were repaired and painted with lead based paint (Report of
Superintendent of Construction & Labor, 1911-1912, SIA, RU 157, Box 1).

1934-35: Extensive campaign to replace all broken and plain ribbed glass
in gallery skylights (Report to Mr. J. E. Graf from Superintendent of
Buildings and Labor for Fiscal Year Ending June 30, 1935, SIA, RU 157,
Box 6).

1943-44: Replacement of plain glass in rooms over north entrance with
ground glass (Annual Report, 1943-1944, Division of Buildings and Labor,
SIA, RU 157, Box 7).

1950s: Construction documents for exhibition renovations indicated the
replacement of double glazed glass with "hammered 1/8 inch thick
Cathedral glass with back sides sandblasted" (ODC, Building 33, OPP

1970s: Undated document summarized renovation project and noted the
following about the windows:

"The fenestration in the Exhibit Areas received mylar treatment to
filter the U.V. Light, windows were caulked and sealed and replaced
where needed. The frames and Gray Ohio Freestone sills were
painted an ochre color to enhance the Romanesque appearance of the
building and to articulate, by skylights and clerestories, the
octagonal Rotunda dome." (SIA, RU 630, Box 3)

OPP Project A17216A construction document drawings A-25, A-26, and
A-27 indicate typical elevations of existing windows, repair and/or
replacement of windows. Quite a lot of sash, glass (clear insulated or translucent with UV filters), and wood sills were scheduled to be replaced and louvers were to be inserted in several windows. All of the Rotunda windows were to be completely replaced. Most fourth floor windows were to receive double glazing. All windows were to be sealed permanently unless they were located in offices in the towers or pavilions. It is unknown how much of this work was completed during the 1976 renovation.

An undated memo located in ODC 33100 records reveals: "The windows which had either clear (transparent) or white (milk) glazing should be restored to their original configuration. Pictorial evidence dating back to a period when the slate roof was intact indicates all windows with exception to those located in the towers, pavilions and the great windows located in the end walls of the four great halls were milk glass. All other windows were either clear or stained glass. Phase I began a program of window replacement. The white glass was achieved with a mylar U/V filter material applied to the glazing. It is planned to continue this system with some modifications."

1982-84: New wood windows with either clear insulated or translucent (treated with mylar UV light filter) glass were installed at most openings. According to OPP Project #8233101 and 8333103, most of the decorative colored glass is original and was utilized to make one of the layers of the insulated laminated glass that exists today (ODC, Building #33).

Exterior Doors: 1881: The four entrances were filled white pine doors with solid walnut and oak panels with transoms (12" x 15" high, 4 doors across). Photographs indicate that a stenciled pattern appeared on the glass of the main entrance doors. See discussion of individual vestibule in Chapter 6 for descriptions of alterations to the exterior doors.

1990: Existing handicap ramp at the North entrance was installed in January-March of 1993 (ODC, Building #33, OPP Project #903315). (Precast concrete and granite pavers with slip resistant finish and painted wrought iron handrail and fence.)

Metalwork: 1881: Decorative iron window grilles were added to the first floor windows as early as February 1881 when Baird remarked to Cluss about stolen items through open windows (Memo from Baird to Cluss, February 5, 1881, SI-AHHP, Box 12). Painted iron finials were added to the roof along with galvanized iron cornices during initial construction (Report of the Architects, by Cluss & Schulze, January 1, 1880, SI-AHHP, Box 12 and memo from W. W. Kerr to Prof. Baird, no date, c. March 1880, SI-AHHP, Box 2). Entrance gates with wrought iron frames and cast iron ornaments were closed at the end of each day (Report of the Superintending Architects for Fire-Proof Building for National Museum, 1880, SI-AHHP, Box 12). Gates which exist today replicate the original design.

1979: One pair of the decorative iron entry gates were restored and installed at the west entrance (Letters to John Yellin and Margot Gayle from James M. Goode, August 17, 1979, SI-AHHP, Box 2).

1982-1984: Original window grilles were replicated and installed at the first floor windows where missing or needed. (ODC, Building #33, Project #8233103, Sheets A-71 and A-79, January 11, 1982 and Project #8333101, Sheet A-71, March 1, 1983). Ornamental gates matching the original design were fabricated and installed at the north and south entrances.

Statuary: The painted metal sculpture installed above the North entrance in 1881, named Columbus, protectress of science and industry, was designed by Casper Buberl. The first major repair of this statue was performed in 1903 (Annual Report of Superintendent, 1902-1903. SIA, RU 157, Building Management Department, 1881-1973, Box 1). Minor repairs were made during 1933-34 (Report to Mr. J. E. Graf from Superintendent of Buildings and Labor for Year Ending June 30, 1934, SIA, RU 157, Building Management Department, 1881-1973, Box 6) and stabilization was planned in the early 1990s (ODC, Building #33, Project #913322, Facade Statuary Repair, 1991). It is unknown if the 1990s work was completed.

Sandstone: 1881: Euclid, Ohio grey sandstone was used at window sills and decorative entrance arches, inscription plates, coping, medallions between arches and other small areas of ornament (Contract between Cluss & Schulze and Richard Rothwell and Richard H. Lloyd for $7,446.21, April 26, 1879, SI-AHHP, Box 2).

1982-1984: Construction documents indicate the replacement of some window sills and repair of others. Decorative entry archways condition was surveyed. (ODC, Building #33, Project #8233103, Sheets A-71 and A-79, January 11, 1982 and Project #8333101, Sheet A-71, March 1, 1983.)
Most of the sandstone of the building was eventually painted grey and then later ochre (1938-39 Annual Report, Division of Buildings and Labor, SIA RU157, Box 7; "Restoration Program 1965-1976, SIA RU630, Box 3.)

1991: The stone was repaired and the paint removed. ("Arch Restoration, A&I Building," date unknown, SI-AHHP., Box 2 and ODC, Building #33, OPP Project #883318).

Brick: 1881: The exterior brick is a combination of red (Washington Brick Machine Company; see miscellaneous receipts for payment, signed by Cluss & Schulze, October 1879, SIA, RU 71, Box 1), black, buff (from Peerless Brick Company; see miscellaneous receipts for payment, signed by Cluss & Schulze, October 1879, SIA, RU 71, Box 1), and blue glazed enamel (from Enameled Brick Company, Letter to S. F. Baird from Cluss, May 20, 1879, SIA, RU 71, Box 10). The face brick was set in black mortar ("pulp mortar black" by L. Martin & Company; see miscellaneous receipts for payment, signed by Cluss & Schulze, October 1879, SIA, RU 71, Box 1) with flat joints. A 2" air space was provided in the exterior wall construction. The original brickwork laid by Gleeson & Himmer and was originally "oiled and pencilled" (Report of the Architects, Cluss & Schulze, January 1, 1880, SI-AHHP, Box 12).

1908-09: Repointing of brick under window sills is the first noted brickwork repair (Annual Report of Superintendent of Construction & Labor, 1908-1909, SIA, RU 157, Box 1).

1969: Cleaning, repair and replacement of damaged areas of the exterior masonry done by the William Watts Co. of Philadelphia, PA (SIA, RU 640, Box 3 and ODC). It is unknown how many of the blue glazed bricks are original. It appears that during the 1969 renovation many of the original blue brick were replaced with glazed brick of a lighter blue color that does not match the original. Extra, unused bricks exist in storage in the southwest pavilion basement.


Slate: 1881: A layer of 14" x 24" slate was installed between the stone and brick as "isolating course" (Letter Cluss to Baird, SI-AHHP, Box 12).


Concrete: 1881: Foundation footings are hydraulic cement concrete (Report of the Architects, Cluss & Schulze, January 1, 1880, SI-AHHP, Box 12). The gneiss rubble stone wall were laid from the concrete base to grade.

Lighting: Each outer entrance vestibule is currently lit by a single glass globed fixture. Photographs indicate that these fixtures are not original to these spaces and were probably added during the 1970s renovation.

Missing Elements/Recommendations:
The existing exterior elements are either original to the construction of the building or are replicas of the original materials.

Existing exterior elements of the masonry, windows, ornamental metal and slate roofing should all be retained and preserved.

The exterior doors replicate the original pattern, but do not replicate the original materials. When replacement of the entrance doors is needed in the future, the original wood and glass materials should be replicated.

When sheet metal roof is replaced the sheet and seam pattern should be matched to the original tin flat seam detailing.
Interior

The following spaces are described using the current room numbering system which begins numerically with the Rotunda and increases in value in a clockwise direction from the North Tower to the West North Range. The original space configuration of the four towers, four pavilions and their annexes and the original seventeen exhibition halls (rotunda, four halls, four courts and eight ranges) is described below, followed by a discussion of the current space configuration which usually contains two or more floors and various office suites. Discussion of circulation spaces (i.e., stairs and corridors) are described with the spaces in which they exist.

The following text indicates materials that exist today and the date of installation, if known. If an entry notes initial construction only, then the existing is the original (1879-1881). Repair work is indicated only where it was visible or confirmed by historical documentation.

The areas above the existing acoustical tiled ceilings was visually inspected where possible. Many environmental systems run above the ceiling tile and visual confirmation of existing conditions was not always possible. The condition and materials of the floors that are covered with carpeting or other modern finishes was not investigated.

Original construction has been dated as 1881 indicating the year the building was completed; Hornblower and Marshall renovations are dated according to the approximate year that work was completed (1896-1902 and later years); and the 1970's renovation work will all be dated 1976 when the museum reopened to the public.

The preservation priority or zone assigned to each space is noted in the following for reference. All spaces and details identified as Priority One and Two are considered significant, character defining spaces and details and should be preserved.

Rotunda

The Rotunda has remained one large, domed space since its completion in 1881. The stencilling has changed design and color at least twice since the original painting: 1903 and 1976. The current decorative paint scheme dates from the 1976 restoration which is intended to replicated the pattern of the original. (See photographs in Chapter 3, pp. 3-115 - 3-124.)

Ceiling: 1881: Painted plaster applied to the underside of the iron and slate roof.
1922-1923: Failure of the plaster necessitated the building of scaffolding and complete removal of plaster. No. 26 gauge beaded sheet iron was installed to cover the spaces between the ceiling beams. Sheet metal was also added to the side walls of the lantern (Report of the Superintendent of Buildings and Labor for the Fiscal Year 1922-1923, SIA, RU 157, Building Management Department, Box 3).

1992: Repainting of the ceiling and asbestos removal. (ODC, Building #33, OPP Project 923311).

Stringcourses: 1881: Painted plaster; plain molded projecting below the tripartite windows and again just above the eight pendentives.

Walls: 1881: Painted plaster; eight walls support a sixteen sided dome with lantern above. The walls and ceiling were painted with Cluss & Schulze’s decorative stenciling in a Moorish style, imitation stone joints, and painted arched corbel tables with carved string courses below laid in a triangular pattern. Plain molded plaster string courses project below the tripartite windows and again just above the eight walls. Doric pilasters fill the wall area between the tripartite windows.

April 20, 1880: Proposal from H. Mattill, fresco painter; accepted by Cluss & Schulze and Spencer F. Baird (SI-AHHP, Box 2). "Proposal for decorations on dome "according to the designs and full size details of Messrs. Cluss & Schulze, Archt. and in such colors as will be directed by them - 1) Frieze and spandrels over the 16 windows of the dome; 2) Panels under the sills of the 16 windows of the dome; 3) Twenty four niches on sidewalls of dome; 4) Continuous frieze underneath those niches; 5) Spandrels over the eight doorways of dome; 6) Twelve large sized segmental panels over the doorways in Main Halls which lead into the do-." ($1150). Another agreement was also made for "lining up the ceiling of dome into panels." ($20). In May 1880, decorative gold leaf was mentioned but it is unknown where it was applied (Payment voucher to George Ryneal, Jr. from Cluss & Schulze and Spencer F. Baird, May 1880, SI-AHHP, Box 2).

1902-03: Decorative stencils designed by Grace Lincoln Temple, artist (Letter to Miss Temple from W. Racceuil, August 25, 1902, SI-AHHP, Box 15). Temple’s ornamental design appeared as a simple geometric design. Stencils had been painted over as late as 1956 according to South Hall photograph (see page 3-198) dated at that time. It is unknown when this decorative painting was covered.

1924-35: Green paint was applied below the stenciled areas and in the four stairways (Report to Mr. J. E. Graf from Superintendent of Buildings and Labor for Fiscal Year Ending June 30, 1935, SIA, RU 157, Box 6).

1976: New stenciling and wall painting was applied by Myers Christianson Co. using colors and patterns developed by Hugh N. Jacobsen (ODC, Building 33, Project #746A, "Stenciling Major Exhibit Halls and Rotunda."). The three painted plaster arched niches above each of the four main openings to the halls are treated with decorative painting to match 1881 photographs.

1990-1992: According to OPP Projects #903321 and 923311, the rotunda and hall were repainted at the head of arches, below clerestory windows, and the shafts of pier arches. It is unknown how much of this work was completed. (ODC, Building #33)

Windows: 1881: There are eight circular openings in metal roof and sixteen masonry openings for clerestory tripartite configuration.

1922-1923: Rebedding of circular window glass is done during the ceiling renovation (Report of the Superintendent of Buildings and Labor for the Fiscal Year 1922-1923, SIA, RU 157, Box 3).

1982-84: Window units are replaced and translucent glass is installed (ODC, Building 33, Project #s 8233103, 8333103 and 8433101).

Light Fixtures: 1881: The original lighting consisted of eight two arm gas wall sconces mounted at the base of the piers. See photo on page 3-118. An electric light fixture was installed for the Garfield inauguration in 1881. See photos on page 3-115 and 3-126. The fixtures remained in the rotunda at least through the 1920's. See photo, page 3-117.

1900: Light standards were installed at the balcony railings as part of the Hornblower and Marshall railing design. See photo page 3-117. Also visible in these photos are hanging lights mounted on projecting poles above the rotunda arches.
1976: Hanging decorative lights were installed replicating the 1881 fixtures. See photo on page 3-127 (North Hall) for indication of the historic model used for fabrication.

Flooring: 1881: Wood floors were laid on wood joists over the exposed soil as a temporary installation for the Garfield Inaugural Ball and can be seen in photographs from that time. See photos page 3-115.

November 1881: Encaustic tile installed by United States Encaustic Tile Co. (Letter/semi-annual report to J. Brown Good from Henry Horan, May 1 to December 31, 1881, SI-AHHP, Box 16)

1957: Original encaustic tile is removed ("Arts and Industries Building, Restoration and Renovation," J. M. Murphy, date unknown - c. 1976, SIA, RU 640, Box 3).

1976: New encaustic tile is installed by Standard Art Marble & Tile Co. to replicate the original tile. (ODC, Building #33, Project #A745A, "Rotunda Floor-Tile Layout.")

Fountain & Furnishings: 1881: Portland cement basin with polished granite coping (by Acker & Sons, Washington, DC) (Letter/semi-annual report to J. Brown Good to Henry Horan, May 1 - December 31, 1881, SI-AHHP, Box 16); Statue of America is placed in middle of fountain.

Date?: Statue of America is removed.

?-1887: Whale cast resides in rotunda for a time before being relocated to the South Hall (Semi-Annual Report of the Superintendent of Buildings, USNM, December 31, 1887, SI-AHHP, Box 2).

December 1886: Eight settees completed and placed in center of rotunda floor; work on tubs containing palm trees (Letter/semi-annual report submitted to G. Brown Goode, December 31, 1886, SIA, RU 158, Box 22).

1890: Original 1863 plaster cast of Statue of Liberty (Goddess of Liberty or Freedom Statue) is installed. (This statue was commissioned for the dome of the US Capitol and sculpted by Auguste Bartholdi.) (Curator's letter/semi-annual report, August 1890-March 1891 to Dr. G. Brown Goode, SIA, RU 158, Box 23).

1890: Drinking barrel or font is added for visitors' refreshment. (Semi-Annual Report of Superintendent of Buildings and Labor, July 1 - December 31, 1889, SIA, RU 1587, Box 22.)

1929: Original granite fountain is removed from the Rotunda after minor accidents but Statue of Liberty (Freedom) remains (Report to Mr. W. deC. Ravenel from Superintendent of Buildings and Labor for Fiscal Year Ending June 30, 1930, SIA, RU 157, Box 5).

1967: Plaster cast of Statue of Liberty (Freedom) is removed (see p. 3-119).

1976: Reconstructed octagonal fountain (concrete and granite) on foundations of original. The white marble Foley Fountain which once stood in the center of the Horticultural Hall at the Philadelphia Centennial is placed in center of the Rotunda. ("Arts and Industries Building, Restoration and Renovation," J. M. Murphy, date unknown, c. 1976, SIA, RU 640, Box 3).

Balcony Stairs: 1881: Class & Schulze cast iron spiral stairs.


Balcony railings: 1881: Class & Schulze "bronzed" metal railings; design similar to Class designed Patent Office Building railings. See photo page 3-116.


Missing Elements: Original 1881 Class railings.

Damaged Areas: Balcony railing caps have been removed in several corners. There appears to be very slight deflection on the balconies and the molding in this area may have been damaged and later repaired.
**North Hall**

**PRIORITY ONE ZONE**

The North Hall has always existed as one large, open hall with exposed roof trusses. The space has been altered by the filling of the arched openings between the hall and adjacent spaces at times in the history of the building. (See photos in Chapter 3, pp. 3-125 - 3-140.)

- **Ceiling:**
  - 1992: Metal ceiling painted; asbestos removed (ODC, Building #33, OPP Project #923311).

- **Walls:**
  - 1881: Painted plaster with imitation stone joints (Program for Inauguration Ball for President Garfield, March 4, 1881, SI-AHHP, Box 5); pilasters on the pier arches were painted with a contrasting color; some decorative painting at the south wall adjacent to the Rotunda.
  - 1900: Plaster block infill is added between the pier arches for fireproofing purposes.
  - 1976: New plenum wall is inserted within the arches of the 4-5 bays closest to rotunda (ODC, Building #33, Project #AI7216A).
  - 1990-1992: OPP Projects #903321 and 923311 (ODC, Building #33), the rotunda and hall were repainted in the following locations: at the head of arches, below clerestory windows, and the shafts of pier arches. It is unknown how much of this work was completed.

- **Pilasters:**
  - 1881: Painted plaster with imitation stone joints and molded capitals; shaft is painted with an accent color.

- **Windows:**
  - 1881: Decorative "Cathedral" colored and stenciled glass in the north windows; double glazed glass in clerestory and lantern windows (Letter to Cluss & Schulze from L. E. Gannon, December 23, 1879, SI-AHHP, Box 2).
  - 1976: Two pairs of arched 1881 Cluss windows were restored on either side of the entrance doors. The double glazing, wood frames, sash and trim
Adjacent to 1106 (inner vestibule) may be original (ODC, Building #33, Project #AI7216A).

1982-1984: Decorative colored glass was laminated; window frame, sash, trim and glass was replaced as necessary; clerestory windows received new glass with UV filters, frames, trim and sash (ODC, Building #33, Project #8233103, 8333103 and 8433101).

Doors: See North Tower vestibule and individual offices. No original doors exist in this space. All wood stained "period" doors have been installed during or since the 1970s renovation.

Light Fixtures: 1881: None.
c.1896-1902: Simple glass globe and metal pendants hang throughout hall (see photos pages 3-130 - 3-131).
1976: Existing chandeliers were installed (ODC, Building #33, Project #AI7216A).

HVAC: 1976: Plenum walls supply and return air (ODC, Building #33, Project #AI7216A).

Wall Base: 1881: ?
1976: Stained wood (ODC, Building #33, Project #AI7216A).

Flooring: March 1881: Temporary wood floor installed for inaugural celebration.
Late 1881: Slate and marble floor 1" thick; 12" x 24" "American-Italian" white veined marble, 18" x 12" grey Vermont slate, 12" square red Vermont slate and black slate tile. Installed by E. Fritsch of NYC (Report of the Architects of the National Museum Building for 1881, SI-AHHP, Box 2). Parti-colored Portland cement (mostly red) and 1 1/8" thick dark blue Pennsylvania slate around perimeter. (Request for "Proposals for Marble and Slate Tilling and for Slate Floor Slabs," March 31, 1881, SIA, RU 7081, Box 28 and Report of the Architects of the National Museum for 1881, January 1, 1882, SI-AHHP, Box 2).
1999: Carpet covers large portion of floor.

Other: 1976: Sprinklers were installed at the along ceiling. (ODC, Building #33, Project #AI7216A).

2100A Balcony North
In 1972 masonry, wood and stud partitions' existed along the line of the current balcony railing. Photographs indicate that a large, mosaic painting had been installed in the middle section of the balcony in 1890 (see p. 3-130). These items were removed during the 1970s renovation and the balcony and railing was restored.

Flooring: 1881: Wood
1976: Carpet with stained wood base, vinyl base around storage room (ODC, Building #33, Project #AI7216A).

Cast Iron: 1881: Decorative Cluss cast iron railing
1896-1902: Hornblower and Marshall replacement railing
1976: Balusters and painted wood handrail to match existing Hornblower and Marshall railings (ODC, Building #33, Project #AI7216A).

2105:
This storage room was constructed after the 1970s renovation and includes contemporary temporary gypsum wallboard partitions, wood? door and frame, carpet and vinyl base.

Stair N1
Cast Iron: 1881: Spiral stair with iron balusters and railing.
1903: Floor plans indicate that portion of the stair may have been removed at this time. Configuration shown on these floor plans is what exists today. ("Plan of Gallery and Second Floor," USNM Annual Report, 1903, Plate 26 - see p. 3-33.)

Stair N2
Cast Iron: 1881: It appears that this spiral stair is the only one in the building that remains in its original configuration from the first floor to the third floor. See Cluss and Schulze floor plans (October 1879, SI-AHHP, Box 3, Neg. No. 97-1601 -- see p. 3-25).
1976: Rubber treads with metal nosings added (ODC, Building #33, Project #A17216A).

**Missing Elements:**
The open pier arches overlooking the courts and ranges. One missing pier at northwest end of hall.

**Damaged Areas:**
Extensive rust exists on the triangular portions of the metal ceiling near the Rotunda. Extensive staining and missing paint at ridge beam, lantern and other portions of the ceiling. Tarps hang throughout this hall signifying roof problems.

Paint on walls and pier arches is peeling and cracking throughout hall.

Slate and marble floor appears to be damaged in some places. Condition is difficult to assess as carpet covers large area of hall.

**Recommendations:**
Retain all of the original construction features including the exposed metal ceilings, decorative pier arches, Hornblower and Marshall galleries, and the slate and marble floor.

Ceiling: Clean, repair and repaint metal gratings and trusses. Repair roof and remove tarp.

Plaster Pier Arches and Walls: Remove 1976 plenum walls and other infill that exists between the 1881 pier arches and restore the design intent of open, flowing gallery space between the halls and the courts. Repair plaster pier arches and paint room (especially decorative pilasters) with historically accurate 1881 colors. Restore imitation stone joints throughout the hall.

Flooring and Base: Clean and polish existing slate and marble floor. Replace mismatched slate and marble floor tiles with new tiles that more closely match the 1881 floor materials.

Lighting: Reproduction the light standards mounted on Hornblower and Marshall gallery railings as indicated in historic photographs. Do not mount new fixtures on decorative plaster walls.

Mechanical, Electrical and Plumbing: Install new systems at concealed concealing in existing voids. Locate piping and conduit concealed in existing chases in walls.

Electrical, Security, Access Control and Fire Safety Devices: Install new systems in concealed spaces in existing chases behind the walls, ceilings and floors.

---

**North Tower**

**PRIORITY ONE ZONE**

Since completion of construction in 1881, the rooms in the North Tower have accommodated offices and the North entrance vestibule. For the most part, the 1881 configuration remains in many of the spaces. Entry to both first floor office suites was originally from the North Hall and was accessed by a set of stairs. The existing balcony labeled Gallery North 2100/A on current floor plans is original (1881) to the construction of this building as are the cast iron staircases that access the second and third floor offices. (See 3-67 and 3-68)

**Basement**

This space is only accessible through an exterior sidewalk hatch and a floor door inside. It is a space with very low head room (5'-5'-6") opening to one of the trenches on the south side. It is very probable that these spaces existed since initial construction as one of the Curator’s Semi-Annual Reports (June 30, 1889) indicates these rooms received “a through cleaning, whitewashing and ventilating...”

**First Floor**

1101 - 1103.
The original configuration of these offices changed in 1976 when Vestibule 1104 was created (ODC, Building #33, Project #A17216A). Minor modifications were made in 1991 (ODC, Building #33, OPP Project #913311).

**Ceiling:**

1881: Painted plaster shallow scalloped ceiling vaults

1976: Acoustical tile ceiling and grid throughout; very likely that 1881 ceiling exists above (ODC, Building #33, Project #A17216A).

**Walls:**

1881: Painted corner beads between 1101 and 1102 denote original wall opening; painted plaster exterior walls.

1976: Exterior walls furred out to accommodate HVAC (1101) (ODC, Building #33, Project #A17216A).

**Windows:**

1881: Wood frames and sash

1982-84: ‘New’ window units and shutters installed (ODC, Building #33, OPP Project #7833118).
Doors: 1881: Painted wood frame with transom between 1101 and 1103.

1976: All existing doors installed (ODC, Building #33, Project #AI7216A)

Wall Base: 1881: Painted stone

1976: Vinyl installed over 1881 wall base (ODC, Building #33, Project #AI7216A)

Flooring: 1881: White pine

1976: Carpet throughout suite (ODC, Building #33, Project #AI7216A)

Missing Elements:
Pair of Churr arched windows in 1102 overlooking range, original 1881 flooring; doors, windows, north hall office entrance, ceiling (may exist).

1104 - 1106 Vestibule
The North entry vestibule has always remained a functioning entrance. 1104 and 1106 were originally offices in 1881 and were made into their current ‘open’ configuration during the 1970s renovation (see p. 3-142).

According to historic construction photographs, the inner vestibule 1105 contained decorative plastered brick niches. As early as 1882, documentation indicates that a doorway was cut into one of the niches on the east wall of the inner vestibule and a "walnut door" was added for a check room (Letter and semi-annual report to G. Brown Goode from Henry Horan, May 31, 1882, SI-AHHP, Box 16).

Ceiling: 1976: Painted plaster ceiling

Walls: 1881: Painted plaster walls

1886: Wainscoting added to 1105; documentation does not describe this but it was probably wood paneled (Letter and semi-annual report to G. Browne Goode, December 31, 1886, SIA, RU 158, Box 22).

1976: Original niches were opened to connect 1105 and the adjacent vestibules 1104 and 1106 (ODC, Building #33, Project #AI7216A).

Doors
Vestibule 1105:

1881: A pair of double fold paneled doors with arched transoms; etched glass design on all four main glass door panels (design is clearly visible in historic photographs). Decorative Churr iron gates are very noticeable in photos.

1889: Storm doors constructed (Annual report to G. B. Goode for July 1888 through June 1889, June 30, 1889, SIA, RU 158, Box 22). Iron gates are removed and second set of entry doors are installed flush with sandstone entry arch. Simple wood paneled doors with glass lights and transoms above.

1890: Large mosaic of 937 tiles was installed over exit doors in interior of North Hall ("Progress of Science over Fire and Water") (Semi-Annual Report of Superintendent of Buildings and Labor for July 1 - December 31, 1889, report dated January 1, 1890, SIA, RU 158, Box 23).

1896-1902: Two sets of double black walnut paneled doors with heavy plate glass installed flush with the sandstone entry arch; large exterior arched space above filled in with walnut lattice work set with glass. Historic drawings indicate work of Hornblower and Marshall. (Photographs indicate that interior vestibule transom was composed of color plate glass.)

1908-09: Bronze folding gates by Hornblower and Marshall were added (Annual Report of Supt. of Construction & Labor, 1908-09, SIA, RU 157, Box 1).

1929-30: Revolving walnut door is installed at entry (Report to Mr. W. deC. Ravenel from Supt. of Buildings and Labor for Fiscal Year Ending June 30, 1930, SIA, RU 157, Box 5).

Pre-1976: Steel door frames and glass entry doors; installation date is unknown.

1976: Replica oak frames and oak and walnut paneled doors with transoms are installed (ODC, Building #33, Project #AI7216A).

Doors
Vestibule 1104 and 1106:


Stairs: Pre-1976: Terrazzo ‘stoop’ and existing stair to office suites
1976: White oak entry stairs (ODC, Building #33, Project #AI7216A).

Wall Base: 1881: Unknown
1976: Painted high wood base (ODC, Building #33, Project #AI7216A).

Flooring: 1881: Encaustic tile installed in outer vestibule to match that which still exists in West and South Towers in outer vestibules today.
1923-24: Terrazzo installed in vestibule 1106 when the check room was remodeled (Report of the Superintendent of Buildings and Labor for the Fiscal Year 1923-1924, SIA, RU 157, Box 4).
1976: Stone floor in inner and outer vestibules arranged in a geometric pattern with large slabs; rubber mats with brass strips (Hugh N. Jacobsen, change proposal #28, SIA, RU 637; see p. 3-142).
1997: Marble repaired (ODC, Building #33, OPP Project #973315, "North Entry Marble Repair").

Missing Elements:
1881 Flooring (1104-1106), doors, frames, and configuration of inner and outer vestibules with plastered brick arches.

1107 - 1109
Ceiling: 1881: Painted plaster shallow scalloped ceiling vaults
1976: Acoustical tile ceiling and grid throughout; very likely that 1881 ceiling exists above (ODC, Building #33, Project #AI7216A).

Walls: 1881: Painted sand finish plaster
1976: Exterior walls furred out to accommodate HVAC (1107 and 1109); sand plaster finish is particularly heavy and pronounced in 1108 and was probably refinished at this time (ODC, Building #33, Project #AI7216A).

Windows: 1881: Wood frames and sash
1982-84: New windows and shutters installed (OPP Project #7833118, ODC).

Doors: 1881: Painted wood frame with transom between 1107 and 1109.

1976: All existing are new.

Stairs: 1881: Painted cast iron; configuration is original construction.

Wall Base: 1881: Stone base exists in 1108
1976: Vinyl installed over 1881 wall base (ODC, Building #33, Project #AI7216A).

Flooring: 1881: White pine
1976: Carpet throughout suite (ODC, Building #33, Project #AI7216A).

Missing Elements:
Pair of Cluss arched windows in 1108 overlooking range.

Second Floor
2101, 2103, 2107, 2109
Ceiling: 1881: Painted plaster shallow scalloped vaults.
1976: Bulkheads surround room 2109 (ODC, Building #33, Project #AI7216A).

Picture Rail: 1881: Thin piece of molding exists on south wall.

Walls: 1881: Painted plaster with sand finish; some original finish still survives.
197?: Painted wood bookcase unit added to south wall of 2109.

Windows: 1881: Masonry openings; appears that window in 2107 looking out to North Hall may be original (sash, corner beads, glazing and hardware).
1982-84: New stained wood window units in 2109 (sash, trim and sills) with stained wood shutters (ODC, Building #33, Project #s 8233103, 8333103, 8433101).
Doors: 1881: Original door openings with corner beads; entry door appears to be original with thick layers of paint with yellow pine frame and is in poor condition.

Light Fixtures: No historic fixtures present in these offices.

Wall Base: 1881: Unknown.

1999: None present.

Flooring: 1881: White pine

Post-1990: Fairly recent carpeting

**Missing Elements:**
Original 1881 wood flooring, wall base and windows.

**Third Floor**

3101, 3109

**Ceiling:** 1881: Painted plaster shallow scalloped vaults


**Walls:** 1881: Painted plaster with sand finish; some finish appears to still exist.

**Windows:** 1982-84: Stained wood window units installed (ODC, Building #33, Project #s 8233103, 8333103, 8433101, Exterior Restoration); crisp condition.

**Doors:** 1881: Door opening with wood threshold and stone step; entry door is original

1976: Entry door receives graining (ODC, Building #33, Project #A17216A)

**Light Fixtures:** No historic fixtures remain.

**Wall Base:** 1881: Stone (5'-6" high)

**Flooring:** 1881: White pine

1977: Carpet over wood flooring; wood flooring is in poor condition

**Missing Elements:**
Original 1881 flooring and windows are missing.

**Damaged Areas:**
The wood frame and entry door are in poor condition. Paint is peeling from the ceiling.

Water damage under the North and East windows with bubbling of the existing plaster.

**Recommendations:**
Restore the original space configuration of the offices, vestibules and the North Hall entrances to their 1881 design by removing temporary partitions and reopening old entrances. Offices 1104 and 1106 should become offices once again and the walls of 1105 should reflect their original plastered brick niches. Reconstruct encaustic tile pavement in exterior vestibule to match West and South Halls.

Restore pairs of Class arched windows in 1102 and 1108 overlooking ranges.

Restore wood flooring to match original.

Remove acoustic tile ceilings.

Mechanical Electrical and Plumbing Systems: Install new systems concealed behind walls and in any existing voids. Locate piping and conduit concealed in existing chases in walls.

Security, Access Control and Fire Safety Devices: Install new systems in concealed spaces in existing chases behind the walls, ceilings and floors.
East North Range

The original 1881 configuration of this range was one large lofty space with high arched piers and exposed trusses. It did not receive a gallery in the Hornblower and Marshall 1896-1902 renovations, but remained open until 1955, when a second floor (concrete with cement topping) was added (ODC, Building #33, Project #A1552C, "SI Modernization of Exhibits"). Early photographs indicate that the typical treatment of the range walls that were shared with the pavilions and annexes consisted of sets of paired arched windows and arched doorways providing access and ventilation between the range and adjacent spaces (see photo on p. 3-143). (See pp. 3-143 - 3-149.)

The floor plans from the turn of the century and archival documentation indicate that the East North Range served as the Lecture Hall for a number of years and was renovated by Hornblower and Marshall in 1901 under special appropriation from Congress. Early photographs indicate the finishes were painted walls and ceiling "in several tints of green" (USNM Annual Report, 1903, p. 258). Oak furniture including moveable armchairs, large speaker's platform, lantern screen and other room screens were added (see photo on p. 3-143). The 1958 drawings of the "Power Hall" the second floor of this range that had been added in 1955 (ODC, Building #33, Project #A1552C; see pp. 3-146 and 3-147.) The 1967 and 1976 drawings indicate that the first floor served as the Power Hall with partitions that included curved portions, and the second floor was subdivided into a number of offices along the exterior wall (First and second floor plans, June 27, 1967, Neg. Nos. 96-2896 and 96-2895 – see pp. 3-48 and 3-49; and ground and second floor plans, December 2, 1977, Project #A17216A, Sheets A-2 and A-3 – see pp. 3-54 and 3-55). The current configuration of this range dates from 1988 (ODC, Building #33, Project #883314B).

First Floor
The present configuration of this floor dates from OPP Project #883314B with minor modifications during #933304. Corridors 1117A and 1120B-C were renovated during #883314H. (See discussion below.) (ODC, Building #33).

1111, 1117B Lab
All historic material has been removed or concealed in this space. ‘New’ finishes include gypsum wallboard partitions, ‘period’ wood door and frame, vinyl composition tile with vinyl base and acoustical ceiling tile ceilings.

1112, 1113, 1114-1132 Offices
Ceiling: 1881: None on this level; exposed trusses and metal grating of roof structure.
1955: Suspended plaster and concrete ceiling (ODC, Building #33, Project #AI552C).

1988: Present acoustical ceiling tiles with supply and return diffusers and fluorescent light fixtures.

Walls: 1881: Painted plaster

1955: Interior partitions (especially curved show up on future plans) added for Power Hall exhibit (ODC, Building #33, Project AI552C, "SI Modernization of Exhibits;" see drawings on pp. 3-146 and 3-147).

1999: Some decorative imitation stone joints still exist along the exterior north wall.

Columns: 1881: Original piers are concealed in this space today by gypsum wallboard.

Windows: 1881: Masonry openings exist; early photograph indicates typical arrangement of masonry openings along east wall was sets of windows in pavilion and annex.

1982-84: Opaque glass installed with new window units (sash, frame and sills) (ODC, Building #33, Project #8233103, 8333103 and 8433101).

Doors: 1881: None (doors to NE Annex and Pavilion may have existed; design unknown)

1901: Photographs indicate door frames with decorative molding (see photos on pp. 3-143 and 3-145).

1976: 'Period' stained wood double entry door and frame (to north hall) (ODC, Building #33, Project #A17216A).

Pre-1988 and 1988 Hornblower and Marshall frames and doors exist throughout suite; new suite entry door installed at end of Corridor 1117A.

Wall Base: 1881: Unknown.

1955: Six inch rubber base (ODC, Building #33, Project #AI552C).

1988: Vinyl

Flooring: 1881: Wood

1901: Terrazzo installed for new lecture hall (Proposal submitted to Acting Executive Curator from J. S. Goldsmith, August 29, 1899, SI-AHHP, Box 4); 2'-0" squares with 2'-6" contrasting border; existed in 1955 when some new terrazzo borders were added and repairs were made (ODC, Building #33, Project #AI552C).


1117A, 1120A Corridor
This corridor displays the typical contemporary white, black and red patterned vinyl composition tile floor and stained wood base that can be seen in other corridors of the first floor. The acoustical tile ceiling and gypsum wallboard walls conceal any historic material that may still exist.

Missing Elements:
As with the other ranges that have been subdivided into office space, the 1881 configuration of one large room has been completely removed. Original 1881 flooring, base, doors, and windows are missing.

Second Floor

2110
This room was created in 1955 (ODC, Building #33, Project #AI552C) and became one large open space post-1976. The ‘As-Built’ drawings from the 1970s renovation indicate that the space was previously subdivided into offices along the exterior wall (ODC, Building #33, Project #A17216A). Specifications from 1975 (SIA, RU 637, Box 2) and photographs from 1987 indicate the creation of today’s large Archives storage room (SIA-AHHP; see p. 3-149).

Ceiling: 1881: Trusses and metal grating of roof structure are exposed; painted plaster until failure and then just exposed metal above.

1988: The present space contains an exposed ceiling full of mechanical ductwork, open steel web joists and beams, and 'new' metal decking. (Note: The present ceiling is painted black which makes it difficult to assess condition.) Original trusses can still be seen.

Walls: 1881: Painted plaster with sand finish; decorative imitation stone joints accentuate the pier arches.
1999: Very little of the decorative work is apparent today. Extensive water damage caused by roof drainage piping in corners has occurred at both the northeast and northwest corners of the space. The existing plaster shows patching and general repair to the point where few of the original pier arched openings are readily seen. Some general cracking and peeling of paint. Ghosting of piers, arches and jointing is visible on all perimeter walls.

Windows: 1881: Masonry openings

1982-84: Translucent glass is installed in new window units (sash, frame, trim and sills) (ODC, Building #33, Project #s 8233103, 8333103, and 8433101).

1999: Plastic covers most windows:

Doors: Post-1976: Hollow metal frames and doors permit access to this room.

Light Fixtures: No historic fixtures exist in this space. Modern fluorescent are suspended from steel joists.

Flooring: 1881: No floor existed at this level.

1955: Steel mezzanine level with concrete (“cement topping”) floor added. (ODC, Building #33, Project #A1552C).

Post-1976: Built-up flooring for filing system; carpet over concrete floor

Recommendations: Restore this range to its 1881 configuration of one large gallery. Retain historic plaster and the imitation stone joints. Restore the latter where necessary. Locate and restore the pairs of arched windows in the tower, annex and pavilion walls. Retain trusses.

Mechanical Electrical and Plumbing Systems: Install new systems concealed behind walls and in any existing voids. Locate piping and conduit concealed in existing chases in walls.

Security, Access Control and Fire Safety Devices: Install new systems in concealed spaces in existing chases behind the walls, ceilings and floors.

North East Court

The original 1881 configuration of this court was one large, open space with clerestory windows. A gallery was added to all four sides of the court during the 1896-1902 building renovation program. By 1958, there were only three entrances remaining into the court on the first floor and the gallery level was accessed through the south wall and a door from the East North Range (First and second floor plans, February 11, 1958, SIA, Neg. #s 96-2891 and 96-2892 — see pp. 3-43 and 3-44). The 1976 demolition drawings indicate the removal of a 16'-0" high concrete masonry unit partition that existed at the south end of the first floor room at that time. The 1976 demolition drawings also called for removal of the following: complete removal of the mezzanine gallery (columns, footings, steel, 6" reinforced concrete slab, terrazzo flooring and railings), and numerous ‘masonite’ partitions and doors throughout the second floor court. New column footings for the new second and third floors, an elevator and enclosed fire stair were constructed. A new balcony for the North Hall was created from the west side of the second floor court (see North Hall for discussion). (ODC, Building #33, Project #A17216A, First and second floor demolition plans, October 4 and 6, 1972 — see pp. 3-51 and 3-52). (See also pp. 3-151 - 3-153.)

First Floor

1135, 1136, 1181
The Museum Shop was renovated in 1990 (ODC, Building #33, OPP Project #903302)

Ceiling: 1881: Exposed trusses and metal decking of court roof

1896-1902: Gallery; skylight glazing added to monitor roof for more natural illumination.

1976: Existing vaulted ceiling installed during shop renovation: painted plaster shallow vaults with lighting track, linear supply diffusers and concealed sprinkler heads; acoustical ceiling tile exists in office 1181 (ODC, Building #33, Project #A1766A).

Walls: 1881: Pier arches with sand plaster finish with imitation stone joints and horizontal beads separating the pier base from the shaft; very little of the decorative plaster finish survives today as heavy layers of paint and replastering have concealed this work.

Doors: 1881: None
1976: ‘Period’ stained wood entry doors and frames (ODC, Building #33, Project #A17216A).

1976: ‘Period’ doors added to 1136 (ODC, Building #33, Project #A1766A).

**Light Fixtures:** No historic fixtures exist in this space.

**Wall Base:** 1881: None. 1976: Stained wood (ODC, Building #33, Project #A1766A).

**Flooring:** 1881: Georgia yellow pine laid over a concrete base. 1891-1892: "Granolithic" (concrete) pavement installed. (Superintendent’s Report, Fiscal Year 1891-92, SIA, RU 158, Box 23).

Post-1976 carpet exists throughout today in the shop and 1181 (office); vinyl composition tile exists in 1136.

**Missing Elements:** 1881 flooring, finish of arched piers, and single vaulted room configuration. The 1902 galleries do not exist today.

**1138 Vestibule**
This hall contains contemporary and non-significant finishes: acoustical tile ceiling with lights and sprinklers, stained wood base (12” high), and patterned vinyl composition tile (black and white). Very little of the historic sand plaster finish and imitation stone joints exist on the pier arches.

**1139 Electrical Room**
The existing finishes are all contemporary.

**Elevator No. 1 and Stair**
This elevator and fire stair were installed during the 1970s renovation (ODC, Building #33, Project #A17216A).

**Second Floor**
As mentioned above, this floor and offices were created in the 1970s renovation. The new second floor was installed during the 1970s renovation to allow adequate support for the third floor mechanical space that was created at this time. (SIA, RU 637, Box 2).

**2135-2143**

**Ceiling:** 1881: None

1896-1902: Mezzanine gallery installed in this space

1976: New concrete slab installed for mechanical equipment (ODC, Building #33, Project #A17216A).

Post-1976 acoustical tile ceiling installed shortly after new floors were installed.

**Walls:** 1881: Pier arches with sand plaster finish with imitation stone joints and horizontal beads separating base from shaft; very little of the decorative plaster finish survives today as heavy layers of paint and replastering have concealed this work. Joint ghosting is visible in Room 2135.

1976: Wall constructed (all new materials); stair and elevator shaft walls installed (ODC, Building #33, Project #A17216A).

Post-1976: Interior gypsum wallboard partitions and glass storefront (between reading room and reception) added to divide space; 2137 reading room has been built out completely - if historic material exists, it has been concealed.

**Doors:** 1881: None

1976: ‘Period’ stained wood entry doors and frames (ODC, Building #33, Project #A17216A).

Post-1976: All other interior doors are non-significant (many are hollow metal frames and doors).

**Wall Base:** 1881: None. Post-1976: Vinyl May 1999: New vinyl installed in 2137

**Flooring:** 1881: Second floor did not exist.

1892-1902: Gallery floor construction includes terrazzo topping

1976: New concrete slab throughout this level (ODC, Building #33, Project #A17216A).

Post-1976: Carpet throughout suite
**Missing Elements:**
1881: Finish of arched piers and single vaulted room configuration.

**2150 Vestibule**
This hall contains contemporary and non-significant finishes: acoustical tile ceiling with lights and sprinklers, stained wood base (12" high), and patterned vinyl composition tile (black and white). The doors opening off this vestibule are not historic or significant to this space. (See separate areas for discussion.) Very little of the historic sand plaster finish and imitation stone joints exist on the pier arches today. In fact, a portion of decorative plaster exists under glass (South wall) and reveals the original brick construction under the plaster.

**2153 Electrical**
The existing finishes are contemporary, and therefore, non-significant. If historic material exists, it would be readily displayed on the single pier arch that exists in this space.

**2300B Gallery North/East**
This gallery was created during the 1970s renovation. (ODC, Building #33, Project #A17216A) The gallery includes new plaster wall surfaces (over metal lathe) with pier arches and precast plaster pilaster ornament, plaster ceiling, wood base and terrazzo flooring. Similar to its sister gallery opposite, the walls were built out to accommodate HVAC equipment that was installed at that time. Thirty inch diameter circular openings were created in the plenum wall and imitate other existing 1881 openings on the tower walls. The painted cast iron railing dates from 1896-1902.

**Third Floor**
As mentioned above, a new concrete slab was installed to create a mechanical equipment space at this floor. Many original pier capitals exist on this level.

**3150 Mechanical Room**

**Ceiling:**
1881: Exposed iron trusses and metal of original monitor.
1896-1902: Glazed roof (all painted)

**Walls:**
1881: Pier arches with sand plaster finish with imitation stone joints and horizontal beads separating base from shaft; more of the decorative plaster finish survives today on this level.
1976: Gallery wall added on the north hall side; stair and elevator shaft walls installed (ODC, Building #33, Project #A17216A).

**Post-1976:** Gypsum wallboard partitions added to create maintenance offices.

**Windows:**
1881: Original masonry openings exist
1976: Existing skylights were renovated at this time; UV light filters added. Several of the windows are blocked by mechanical equipment (ODC, Building #33, Project #A17216A).

1982-84: New window units with UV light filters (ODC, Building #33, Projects #s 8233103, 8333103, 8433101).

**Date unknown:** One window has been modified to provide exit and access to range roof.

**Doors:**
1881: None.
1976, post-1976: Solid core wood or hollow metal doors and frames

**HVAC:**
1976: Building mechanical equipment is installed in this space (ODC, Building #33, Project #A17216A).

**Flooring:**
1881: No floor existed on this level.
1976: Concrete slab (ODC, Building #33, Project #A17216A).

**3150A - 3150B Offices**
The condition of the historic, exterior walls are similar to the rest of the mechanical room. Capitals are visible, as is the monitor framing

**Missing Elements:**
The 1881 single vaulted room configuration no longer exists. Much of the original material still exists on this level.

**Recommendations:**
Restore this court to its 1881 configuration. Construct new gallery similar in size to the Hornblower and Marshall gallery if space is needed.

Retain historic plaster and the imitation stone joints. Restore the latter where necessary.

Retain trusses.

Mechanical Electrical and Plumbing Systems: Install new systems concealed behind walls and in any existing voids. Locate piping and conduit concealed in existing chases in walls.
Security, Access Control and Fire Safety Devices: Install new systems in concealed spaces in existing chases behind the walls, ceilings and floors.

North East Pavilion

Beginning in November 1884, the North East Pavilion was home to the Chemical and Medical Laboratories. This pavilion retains most of its original partition walls.

Basement

B102, B103 - B106, and B108
The original Cluss & Schulze drawings of 1879 indicate that B103, B105, and B106 were intended to be one large room ("Ground Floor Plan of the Main Floor," Cluss & Schulze, October 1879, SI Neg. No. 97-1601 -- see p. 3-25). The current configuration of the basement rooms appears to date from 1896-1902 (USNM Annual Report, 1903, Plate 24. See page. 3-31).

Ceiling: 1881: Shallow brick barrel vaults; probably originally whitewashed (heavy layers of paint exist today)

Walls: 1881: Foundation walls (gneiss rubble stone to 36"+-/ A.F.F. and brick); probably whitewashed originally (heavy layers of paint exist today)

c 1900: Brick partition between B106 and B105 and B103

Windows: 1881: Masonry openings exist
1984: New window units (ODC, Building #33, Project #s 8233103, 8333103 and 8433101).

Doors: 1881: No original doors exist today.
1940-1960?: Metal door with metal frame and wire mesh panel (at top of stairs)

All other doors and frames are modern wood

Light Fixtures: Modern fluorescent fixtures today.

Stairs: 1881: Cast iron stair; painted; resides in original location.

HVAC: 1976: Fan coil units (ODC, Building #33, Project #AI7216A).

Wall Base: 1881: None; just foundation walls
1999: None; just foundation walls
Flooring: 1881: Unknown. 
1901-02: New "cement" (concrete) floor (Annual Report of Superintendent, 1901-02, SIA, RU 157, Box 1).
Presently, carpet throughout and ceramic tile in toilet room.

First Floor

1160 (Stair Hall) and Stair

This hall reflects the original 1881 configuration of the pavilion’s stair hall.

Ceiling: 1881: Painted plaster shallow scalloped vaults 
1976: Stained crown molding (ODC, Building #33, Project #A17216A).

Walls: 1881: Painted plaster

Date?: Picture molding (simple) appears on the north wall, but the date of installation is unknown.

Doors: 1881: All five doorways (most are arched) and painted wood frames in this space are original; painted doors with glass transoms appear to be original to the construction of the building (glass runs slightly.)
Post-1900: Basement door and door to conference room 1168.
1976: Stained wood ‘period’ double pavilion entry door (ODC, Building #33, Project #A17216A).

Stairs: 1881: Cast iron bracketed stair
1976?: Rubber treads with metal nosing
Date?: Plain painted beaded wood wainscot paneling installed below the bracketed stairs.

Wall Base: 1881: Stone
1976: Vinyl over stone base; wood base along wood wainscot.

Flooring: 1881: Pine
1896-1902: Terrazzo exists on landing near pavilion entry from North East Range (Report of Chief of Buildings and Superintendence for 1896-1897, SIA, RU 158, Box 23).
1999: Carpet in hall; installation date unknown.

Missing Elements:
1881 flooring (floor level has been raised slightly over the years; evident at first riser)

Recommendations:
Retain original door frames, doors with transoms, cast iron bracketed stair, and stone wall base. Remove carpet, survey wood floor if it exists, and restore and/or replace wood floor to match original wood flooring in this stair hall. Remove terrazo at landing and restore with wood flooring.

1160A - 1167 Offices

The 1879 drawings ("Ground Plan of the Main Floor," Chas & Schulze, October 1879, SI Neg. #97-1601 - see p. 3-25) indicate that 1161, 1163, and 1165 were one large office which was not subdivided until post-1950 ("First Floor Plan," February 11, 1958, Neg. #96-2892 -- see p. 3-42). The present configuration and finishes were completed before and during the 1970s renovation. In Room 1160A, a small room, similar to that which exists in the North West Pavilion, may have existed from initial construction until the early 20th century.

Ceiling: 1881: Painted plaster shallow scalloped vaults; barrel vault in 1160A
1976: Bulkheads in 1161 and 1163 (ODC, Building #33, Project #A17216A).

Corinice: 1976: Painted crown molding exists in room 1161, 1163 and 1163A and sprinklers are mounted to its face; stained picture rail in these rooms also. (ODC, Building #33, Project #A17216A)

Walls: 1881: Painted plaster walls with sand plaster finish.
Pre-1976: Gypsum wallboard partitions dividing 1161, 1163, and 1165; exterior walls are furred out to accept fan coil units built underneath the window sills.
Post-1976: Gypsum wallboard partition dividing 1163 and 1163A.

Windows: 1881: Masonry openings. Wrought iron grilles added to first floor windows as early as this year (Memo from Baird to Chus, February 5, 1881, SI-AHHp, Box 12). It is unknown if the existing grilles are original.
1982-84: Stained wood window units (trim, sills etc.) and stained wood shutters replace original windows (ODC, Building #33, Project #8233103, 8333103 and 8433101).
Doors: 1881: Wood frames and doors with transoms opening to the stair hall and both in room 1167 are probably original; original door openings with beads with acorns exist between 1160A and 1163A.

Pre-1976: Hollow metal frames and wood doors (1163, 1165).

Light
Fixtures: Modern fluorescent fixtures.

Wall Base: 1881: Stone.
Post-1976: Vinyl over stone.

Flooring: 1881: Florida pine
Post 1976: Carpet

Missing Elements:
Original 1881 wood flooring, windows, and doors.

Recommendations:
Restore large corner office (1161, 1163, and 1165)
Retain original ceiling vaults, plaster walls, original door openings (as noted above), and stone wall base.
Restore wood flooring in these offices to match original wood floors.
Reconstruct pair of arched Cluss windows that existed in 1160A and 1163A overlooking the East North Range (see photograph on page 3-140).
Lighting: Replace existing modern light fixtures with historically compatible reproduction light fixtures in this space, similar to historic fixtures which exist today in the North West Pavilion.

Second Floor
This second floor space has retained its original 1881 interior partitions.

2160 (Stair Hall) and Stair 2160A
The cast iron stair continues on the second level. All door openings accessing offices from this space are original 1881 arched openings with corner beads. The doors are not original. A hatch on the ceiling accessing the third floor exists today and the date of installation is unknown. Extensive piping runs east-west along the ceiling. The hall contains original 1881 stone base. During 1935-36, a new Georgia pine edge grain floor was installed in this hall (Annual Report, 1935-1936, Division of Buildings and Labor, SIA, RU 157, Box 6). More recent vinyl composition flooring has been added.

Missing Elements:
A pair of Cluss arched windows were removed during minor renovations in 1934-35 (Report to Mr. J. E. Graf from Superintendent of Buildings and Labor for Fiscal Year Ending June 30, 1935, SIA, RU 157, Box 6). These windows would have brought natural lighting from the surrounding halls.

Recommendations:
Restore this space to its original appearance. Retain cast iron stair and original door frames. Remove vinyl composition tile flooring and restore wood floors to match original flooring.
Reconstruct pair of Cluss arched windows that once existed in this space.
Lighting: Remove current light fixtures. Provide reproduction light fixtures to match fixtures that exist in North West Pavilion.

2160B Corridor
This corridor and its plaster walls are original to the construction of the pavilion. The date of the installation of the gypsum wallboard ceiling and the door that accesses the SI Archives is unknown. The floor is a combination of vinyl composition tile and carpet and both are more recent additions.

Recommendations:
Restore this space to its original appearance. Remove gypsum wallboard ceiling to expose plaster barrel vault ceiling and install wood floor. Reconstruct Cluss arched window that once existed in this space.

2161 - 2167 Offices
Rooms 2163, 2165, and 2166 were originally one large room. As early as 1896-1902, however, the room became equally subdivided with the north-south partition that exists today (USNM Annual Report, 1903, Plate 26 -- see p. 3-33). The partition between 2165 and 2166 was added post-1967 but before the 1970s renovation started as it is depicted on demolition drawings. (ODC, Building #33, Project #A17216A, "Second Floor Demolition Plan," October 4, 1972) The exterior walls were furred out during the 1970s to accommodate HVAC (ODC, Building #33, Project #A17216A, "Second Floor Plan," December 2, 1977).

Ceiling: 1881: Painted plaster shallow scalloped vaults; large beams exist in 2165 and 2166.


Cornice: 1976: 12" crown molding installed in 2163 and 2167 (ODC, Building #33, Project #A17216A).

Walls: 1881: Painted plaster walls with sand finish
1896-1902: Partition added to divide large room (2163, 2165, and 2166) (USNM Annual Report, 1903, Plate 26 -- see p. 3-33).
Post-1967: Plaster partition between 2165 and 2166
1976: Exterior walls furred out and ledges created for mechanical (ODC, Building #33, Project #A17216A).

Windows: 1881 masonry openings
1982-84 new wood stained window units with clear glass and interior shutters (ODC, Building #33, Project #s 8233103, 8333103, 8433101).

Doors: 1881: Original openings: 2161 both doorways; 2163 suite entry door and door to 2161 only; 2167 to corridor
Post-1900: All doors in original openings; some contain glass lights.
Post-1976: Wood frames and doors to 2165 and 2166; hollow metal door and frame to North East Annex.

Light Fixtures: No historic fixtures exist in this space.

HVAC: 1976: Fan coil units (ODC, Building #33, Project #A17216A).

Wall Base: 1881: Stone 1999: Vinyl over the stone

Flooring: 1881: pine


1999: Carpet

Other: Date?: Built-in bookcase in office 2161.

Missing Elements:
It should be noted that the closet located behind the entrance to 2161 is an arched opening. This opening may be part of a set of windows that overlooked the range. The 1881 Inauguration floor plan indicates a window in this location on the first floor ("Inauguration Ball," March 4, 1881, SI-AHHP, Box 5). In 1934-35, a pair of windows on the west wall of this suite were removed (Report to Mr. J. E. Graf from Superintendent of Buildings and Labor for Fiscal Year Ending June 30, 1934, SIA, RU 157, Box 6).

In addition, 1881 flooring, windows and doors are missing.

Recommendations:
Retain original plaster ceiling vaults, original plaster walls, original door openings (as noted above), and stone wall base.

Reconstruct Cluss arched window that existed in office 2161.

Lighting: Replace existing modern light fixtures with historically compatible reproduction light fixtures in this space, similar to historic fixtures which exist today in the NW Pavilion.

Third Floor

3160 – 3166 Offices
These offices have not retained their original 1881 configuration. The 1879 drawings indicate one large open room ("Upper Story Plans," Cluss & Schulze, October 1879, SI-AHHP, Box 3). The 1903 floor plans indicate that chimney flues were installed from the second floor to the roof to provide additional heating for the offices at that time (USNM Annual Report, 1903, Plate 27 -- see p. 3-34). This space has been modified over the years: the 1958, 1967 and 1976 plans indicate similar partition configurations (ODC, Building #33, "Third Floor Plan," February 15, 1958, SI Neg. #96-2890 - see p. 3-44;
"Third Floor Plan," June 27, 1967, SI Neg #96-2894 – see p. 3-50; and "Third Floor Plan," December 2, 1977, Project #A17216A – see p. 3-56. Drawings of OPP Projects #A1769A and #903309 indicate renovation of this space (ODC, Building #33). The latter project confirms existing office layout.

Ceiling: 1881: Exposed underside of roof; iron tie rods providing tension are visible in center space above clerestory and across pavilion space

1980s: New plaster ceiling installed during roof renovation (ODC, Building #33, Project #8233103, 8333103, 8433101).

1990: Bulkheads for mechanical; present plaster ceiling have been skimcoated (ODC, Building #33, Project #903309).

Cornice: 1990: Crown molding in 3160 (center room) (ODC, Building #33, Project #903309).

Walls: 1881: Painted plaster exterior walls

1990: Gypsum wallboard partitions added to enclose offices (ODC, Building #33, Project #903309).

Windows: 1881: Masonry and clerestory openings; corner beads exist today framing interior openings.

1982-84: New window units with clear insulated glass and translucent with UV filters clerestory window units (ODC, Building #33, Project #8233103, 8333103 and 8433101).

Doors: 1881: Unknown how many doors, if any, existed on this floor at that time.

1990: New doors and frames are stained cherry (ODC, Building #33, Project #903309).

Light Fixtures: One historic light fixture hangs in the 3160 (center room). It is unknown if the light is original to this space.

Stairs: 1881: The east iron stair and railing continues at this level.

HVAC: 1976: Fan coil units (ODC, Building #33, Project #A17216A).

Wall Base: 1881: Unknown

1990: New stained wood base throughout (ODC, Building #33, Project #903309).

Flooring: 1881: Florida pine flooring; some original flooring may still exist at top of stairs.

1990: Carpet (ODC, Building #33, Project #903309)

Missing Elements:
1881 single room configuration; 1881 flooring, wall base, and ceiling finishes.

Recommendations:
Restore original configuration of this floor to one large, open room.

Retain cast iron stair and plaster on exterior walls.

Restore wood flooring in these offices to match original wood floors.

Lighting: Retain historic light fixture. Replace existing modern light fixtures with historically compatible reproduction light fixtures in these spaces, similar to historic fixtures which exist today in the North West Pavilion.
North East Annex

The Cluss & Schulze plans of 1879 illustrate a two story annex that was accessed from the North East Pavilion on the first and second floors and the East North Range on the first floor ("Fireproof Building for the National Museum," Cluss & Schulze, October 1879, SIAB binder and SI-AHHP, Box 6).

The historic first floor room was level with the adjacent ranges and a staircase is shown on plans that would have allowed access to the first floor of the North East Pavilion. It is unknown when this floor was raised to its current level. (The stairs did exist on the 1967 drawings but are not shown on either the demolition or new construction drawings of the 1970s renovation set. See "First Floor Plan," June 27, 1967, Neg. #96-2896 on p. 3-48; "First Floor Demolition Plan," October 6, 1972, Project #AI7216A on p. 3-51; and "Ground Floor Plan, As-built," December 2, 1977, Project #AI7216A on p. 3-54.) The stairs no longer exist and the room can only be accessed from the original doorway on the south wall of the North East Pavilion.

The 1881 Inauguration Plan ("Inauguration Ball, March 4, 1881, National Museum Building," SI-AHHP, Box 5) and early photographs also indicate that sets of paired arched windows existed on both the west and south walls, first and second floors, similar to the North West and South West annexes. On the south face of the south wall, windows locations are still visible as niches (Room 1170).

Similar to the North West Annex, the second floor was constructed on the same level as the second floor of the North East Pavilion and original access was possible from the Pavilion stair hall.

First Floor

| 1168 | 1881: Painted plaster beam ceiling with shallow vaults |
| Walls: | 1881: Painted plaster, window openings existed on east, west and south walls |
| 1999: Plastered north and south wall contains a heavy sand finish (unknown how much of this finish is original); west wall was replastered at some point in its history and is very smooth. |
| Windows: | 1881: Masonry openings |
1976: Wall built out in front of window to accommodate fan coil unit (ODC, Building #33, Project #AI7216A).

1982-1984: New translucent window units with UV light filters (ODC, Building #33, Project #s 8233103, 8333103 and 8433101). These have high sills like the windows in the ranges. Exterior windows are large and the same as the range windows. There is a small percentage of operable sash in these units.

Doors: 1881: Original door opening

1999: Door appears to be historic but date is unknown.

Light Fixtures: None exist.

Stairs: 1881: Short staircase existed; removal date is unknown.

HVAC: 1976: Fan coil units built in underneath windows in furred out walls (ODC, Building #33, Project #AI7216A).

Wall Base: 1881: Unknown

1999: High wood base and vinyl base (north wall)

Flooring: 1881: Floor level was lower than existing 1999 floor; Florida pine

1999: Carpet exists, installation date is unknown.

Missing Elements:
Original 1881 flooring and floor level, interior windows, door, frame and stairs.

Second Floor

2168-2169A SA Offices

Ceiling: 1881: Unknown.

1999: Existing acoustical tile ceiling; condition and materials above ceiling tiles is unknown.

Walls: 1881: Painted plaster with sand finish (some of this finish still exists especially on piers); corner beads with acorns exists in 2168.

Post-1967 and post-1976: Interior painted (gypsum wallboard and/or plaster) partitions dividing room

Windows: 1881: Masonry openings

1982-84: New window units with UV light filters (ODC, Building #33, Project #s 8233103, 8333103, 8433101).

Doors: Post-1967: No original doors exist accessing this space today.

Light Fixtures: No historic fixtures exist here today.


Wall Base: 1881: Stone exists on the north wall


Flooring: 1881: Florida pine

Post-1976: Carpet, vinyl composition tile

Missing Elements:
1881 flooring, wall base in some areas, windows, door, frame, and single room configuration.

Recommendations:
Restore the original configuration of one large, open room by removing temporary office partitions and doors.

Retain plaster walls, original door opening into stair hall and stone wall base that exists on the north wall.

Reconstruct stone wall base where it has been removed. Determine extent of existing wood flooring underneath existing flooring and restore and/or reconstruct wood flooring to match original.

Reconstruct pairs of arched Cluss windows that originally existed on the west wall overlooking the East North Range and pairs of windows on the south wall.
North East Range

In 1881, this range was constructed as one large open room with a shed roof and arched piers on three interior walls. It did not receive a gallery in the Hornblower and Marshall renovations of 1896-1902 and remained open until 1968. This range was known as "Boat Hall" for many years. According to the 1881 Inaugural Ball floor plan ("Inauguration Ball, March 4, 1881," SI-AHHP, Box 5), sets of arched windows do appear between this room and the East Tower (today room 1202) and the North East Annex. Gypsum block partitions were in place by 1903 and separated the range from the North East Court and East Hall on the second floor (USNM Annual Report, 1903, Plate 26 -- see p. 3-33). By 1914, the ground floor appears to have only two entrances into the room on the north and south walls (USNM Annual Report, 1914, p. 15). Drawings from 1968 indicate a new mezzanine floor for this range and the future toilet rooms that exist today on the second floor (ODC, Building #33, OPP Project #A1689A). Renovations done in 1987 exist on second floor (ODC, Building #33, OPP Project #8733119). (See Chapter 3, pp. 155 - 158.)

First Floor

1120 Corridor
The finishes in this corridor were installed in 1988 (ODC, Building #33, OPP Project #883314E) and include: patterned vinyl composition tile (black, white, and red), stained wood base, 'period' stained wood doors and frames.

1170-1190 Offices
Ceiling: 1881: Exposed iron trusses and metal decking of roof 1968: Concrete floor and steel joists are installed for new 'mezzanine' or second floor level; acoustical tile ceiling probably installed at this time (ODC, Building #33, OPP Project #A1689A).

Walls: 1881: Painted plaster with sand finish along exterior walls (very little of this finish survives today in this suite except above fan coil unit ledge); piers with imitation stone joints and sand finish on the other three walls.

1933-34: Repainting of this room (this had not been done for many years because of the hanging boats) and closing three arch openings with plaster block (easternmost arch had been closed previously) (Report to Mr. J. E. Graf from Superintendent of Buildings and Labor for Fiscal Year Ending June 30, 1934, SIA, RU 157, Box 6).
1967: Interior partitions noted along north wall (ODC, Building #33, "First Floor Plan," June 27, 1967, SI Neg. #96-2896 -- see p. 3-48).

1976: Exterior wall built-out to accommodate fan coil unit; demo and as-built plans depict north-south 'stud and drywall partition' dividing range (ODC, Building #33, Project #A1726A, "Ground Floor Plan," Sheet A-2 -- see p. 3-54).

1978: Some partitions added. (ODC, Building #33, OPP Project #7833110).

1989: Some partitions added (ODC, Building #33, OPP Project #893307).

1999: It is unknown at this time when current partition configuration was completed; picture and chair rail that exists in this suite is contemporary.

Columns: 1881: Plaster arched piers with sand finish, imitation stone joints and horizontal bead along base; all exist today but historic finish has not been preserved.

19-?: Steel columns added to support second floor.

Windows: 1881: Masonry openings

1982-84: New window units with UV light filters (ODC, Building #33, Project #s 8233103, 8333103, 8433101).

Doors: Post-1976: Suite entry 'period' stained doors and frames; all interior contemporary wood doors and hollow metal frames.

Light Fixtures: No historic fixtures exist in this space.


Wall Base: 1881: Stone along exterior wall (not visible today due to wall build-out); piers did not contain wall base

Post-1976: Vinyl base

Flooring: 1881: Florida pine

1989: Terrazzo pavement installed (see p. 3-155).

Post-1976: Carpet

Missing Elements:
Original 1881 flooring, base, windows, and single two-story room configuration. It is unknown how much of the 1899 terrazzo pavement still may exist underneath the carpet.

Damaged Areas:
Office 1178A has cracked glass in the center window, stained frame and staining has occurred on an translucent panel.

1180 Storage and South Entrance to Labs
Very little historic material survives in this space. Some of the imitation stone joints and horizontal beads are still visible on the piers that border the East North Range.

Contemporary acoustical tile ceilings, gypsum wallboard partitions, 'period' stained wood door and frame, hollow metal door and frame, vinyl composition tile and concrete flooring exist in this space.

1182 Storage
Very little historic material survives in this space. Some of the imitation stone joints and horizontal beads are still visible on the piers that border the North East Court. Metal decking and bar joists from the second floor construction are visible in this space. Concrete masonry units exist between 1138 (Vestibule) and this space. Concrete and vinyl composition tile line the floor.

Second Floor

As mentioned previously, the existing layout and most of the contemporary non-significant finishes that exist on this floor today date from 1987 (ODC, Building #33, OPP Project #8733109). The entire floor is contemporary infill.

2151 (Women’s Toilet), 2152 (Men’s Toilet)
All finishes in these rooms date from 1968 when the second mezzanine floor was added (ODC, Building #33, OPP Project #A1689A). Existing, contemporary and non-significant finishes include acoustical tile ceilings, 6" ceramic tile wainscot with cove base, 1" ceramic floor tile, hollow metal door frames with louvered wood doors with kick plates, sink and toilet fixtures and partitions.

2153 Janitor’s Closet
This closet contains a visible portion of an 1881 pier arch along the south wall, 1968 concrete floor with vinyl base, 1968 interior partitions (ODC, Building #33, Project #A1689A), and wood door with hollow metal frame.
2171-2173 Offices
Along the north wall, imitation stone joints and original 1881 arched openings with post-1881 infill do exist. However, contemporary and non-significant finishes from 1968 to the present include acoustical tile ceilings, carpet with vinyl base, hollow metal frames and doors and gypsum wallboard partitions. Specifications from 1975 were located which detail installation of the Archives' offices (SLA, RU 637, Box 2).

2176-2191 Offices
Ceiling: 1881: Exposed iron trusses and metal decking of roof; plaster added and then removed after failure occurred.
1967: Acoustical tile ceiling grid
1987: Acoustical tile ceiling repaired as necessary (ODC, Building #33, Project #8733109).

Walls: 1881: Painted plaster with sand finish along exterior and south walls (very little of this finish survives today in this suite)
1967: Gypsum wallboard partitions added along east wall (ODC, Building #33, OPP Project #A1689A).
1977: Pantry added at the south area of the suite which was later removed. (ODC, Building #33, OPP Project #7733112).
1987: Current partition layout constructed (ODC, Building #33, Project #8733109).

Columns: 1881: Plaster arched piers with sand finish, imitation stone joints and horizontal bead along base; all exist today but historic finish has not been preserved.

Windows: 1881: Masonry openings
1982-84: New window units with UV light filters (ODC, Building #33, Project #s 8233103, 8333103, 8433101).

Doors: All doors are contemporary, non-historic additions. Most are 'period' stained wood doors and frames.

Light Fixtures: No historic fixtures exist in this space.


Wall Base: 1881: None
1896-1902: None
1987: Stained wood (9" high) (ODC, Building #33, Project #7733109).

Flooring: 1881: None
1896-1902: None; gallery was not added in this range.
1968: Metal decking and steel bar joists are installed for new second floor level; vinyl asbestos tile installed over concrete floor (ODC, Building #33, Project #A1689A).
1987: Carpet

Missing Elements:
Original 1881 first floor flooring and base, windows, and single two-story room configuration.

Recommendations:
Restore this range to its 1881 original space configuration.
Install new systems concealed behind walls and in any existing chases, trenches and voids.
East Hall

The configuration of the East Hall has always appeared as one large, open hall with exposed trusses. The Hornblower and Marshall galleries of 1896-1902 still exist today and are discussed below. Infill between the arched piers occurred at various points in the history of the building. (See pp. 3-159 - 3-170.)

First Floor

Ceiling: 1881: Plaster (USNM Annual Report, 1903, p. 255); later removed due to failure of the plaster and underside of metal gratings is exposed (Report of the Architects of the National Museum Building for 1881, SI-AHHP, Box 2).

1912-13: #20 gauge beaded sheet iron is installed in triangular areas near Rotunda (Report of the Superintendent of Construction & Labor, 1912-1913, SIA, RU 157, Box 1).

1992: Metal ceiling painted and asbestos removed (ODC, Building #33, OPP Project #923311).

Walls: 1881: Painted plaster with imitation stone joints (Program for Inauguration Ball for President Garfield, March 4, 1881, SI-AHHP, Box 5); pilasters on the pier arches were painted with contrasting colors; some decorative stenciling at the west wall adjacent to the Rotunda.

1900+: Plaster block infill added between the pier arches for fireproofing purposes and character of hall is changed.

1976: New plenum wall is inserted within the arches of the 4-5 bays closest to rotunda (ODC, Building #33, Project #AI7216A).

1990-1992: According to drawings, Rotunda and hall were repainted at the head of arches, below clerestory windows, and the shafts of pier arches. It is unknown how much of this work was completed (ODC, Building #33, OPP Projects #903321 and #923311).

Pilasters: 1881: Painted plaster with imitation stone joints and molded capitals; shaft is smooth and is painted with an accent color.

Windows: 1881: Decorative "Cathedral" colored glass between towers; double glazed glass in clerestory and monitor windows (Letter to Cluss & Schulze from L. E. Gannon, December 23, 1879, SI-AHHP, Box 2). Monitor and last bay of clerestory windows were operable.

1982-1984: Decorative colored glass was to be laminated; window units repaired and frame, sash, trim and glass was replaced as necessary; clerestory windows received new glass with UV filters, frames, trim and sash (ODC, Building #33, Project #s 8233103, 8333103 and 8433101).

Doors: See East Tower vestibule and individual offices. No original doors exist in this space. All wood stained "period" doors were installed during the 1970s renovation.

Light Fixtures: 1881: None.

c. 1896-1902+: Simple glass globe pendants hung throughout hall

c. early 1900s: Decorative globe pendants on thick chains hang throughout hall for many years and become museum standard. Lights were also mounted on railing posts (see p. 3-161).

1976: Existing chandeliers are modern, contemporary additions to this hall (ODC, Building #33, Project #A17216A).

HVAC: 1976: Plenum walls supply and return air (ODC, Building #33, Project #A17216A).

Wall Base: 1881: None?
1976: Stained wood (ODC, Building #33, Project #A17216A).

Flooring: January - March 1881: Temporary wood floor

Late 1881: Slate and marble floor 1" thick; 12" x 24" "American-Italian" white veined marble, 18" x 12" grey Vermont slate, 12" square red Vermont slate and black slate tile. Installed by E. Frisch of NYC. (Report of the Architects of the National Museum Building for 1881, SI-AHHP, Box 2.) Parti-colored Portland cement (mostly red) and 1 ½" thick dark blue Pennsylvania slate around perimeter. (Request for "Proposals for Marble and Slate Tiling and for Slate Floor Slabs," March 31, 1881, SIA, RU 7081, Box 28 and Report of the Architects of the National Museum for 1881, January 1, 1882, SI-AHHP, Box 2).

Post-1990: Carpet covers large portion of floor.

Other: 1976: Sprinklers at ceiling (ODC, Building #33, Project #A17216A).

Missing Elements:
The character of the hall has been compromised with the addition of the 1976 plenum walls. Restore the 1896-1902 configuration of the hall with its open pier arches overlooking the courts and ranges. Retain columns and galleries.

Damaged Areas:
Extensive rust exists on the triangular portions of the metal ceiling near the Rotunda. Extensive staining and missing paint at ridge beam, lantern and other portions of the ceiling.

Extensive plaster deterioration near entrance to 2150 Vestibule, outside 2201-2203 Offices (at top of wall and below interior window), and cracking above the arched opening to 2189.

Slate and marble floor is damaged in some places.

Second Floor

2200 Gallery East/North
1896-1902: Hornblower and Marshall added this gallery, its cast iron railing, North East cast iron balcony stairs and terrazzo floor.

1976: Furred plenum added to the arched piers to provide supply and return air. Diffusers were masked as circular openings in the center of the niches. Return air grilles were disguised by the new baseboard (ODC, Building #33, Project #A17216A).

2200A Balcony East
1881: This balcony is original to the construction of the building and includes its original decorative brackets.

1916-17: Old wood floor is removed and terrazzo floor is added to match the existing floor on the north and south sides of the gallery (Report of the Superintendent of Buildings and Labor for the Fiscal Year 1916-1917, SIA, RU 157, Box 3).

2200B Gallery East/South
1896-1902 Hornblower and Marshall added this gallery, its metal railing, South East metal balcony stairs and terrazzo floor.
1956: Black terrazzo with zinc divider strips was added in curved pattern during renovation of the South East Court (ODC, Building #33, Project #A561C).

1976: Furred plenum added to the arched piers to provide supply and return air. Diffusers were masked as circular openings in the center of the niches. Return air grilles were disguised by the new baseboard (ODC, Building #33, Project #A7216A).

**Stair E1**

Cast Iron:

1881: Spiral stair with iron balusters and railing.

1976-1982: Floor plans indicate that portion of stair may have been removed at this time and existing 1999 configuration created.

**Stair E2**

Cast Iron:

1881: Spiral stair w/ iron balusters and railing.

1903: Floor plans indicate that the first floor portion of this stair was removed at this time (USNM Annual Report, 1903, Plate 25 -- see p. 3-32). Configuration shown on these floor plans exists today

1976: New balustrade installed (ODC, Building #33, Project #A7216A).

**Missing Elements:**

Some 1896-1902 terrazzo flooring is missing near the South East balcony. The original 1896-1902 configuration has been greatly changed with the addition of the 1976 furred plenum walls. Portions of the 1881 cast iron circular stairs have been removed over the years.

**Recommendations:**

Retain the following primary character defining elements of the hall: exposed metal ceilings, decorative pier arches, Hornblower and Marshall galleries, terrazzo floor and iron railings, and the slate and marble floor.

Clean, repair and repaint metal gratings and trusses. Repair roof as necessary.

Remove 1976 plenum walls and other infill that exists between the 1881 pier arches and restore the design intent of open, flowing gallery space between the halls and the courts. Repair plaster pier arches and paint room (especially decorative pilasters) with historically accurate 1881 colors. Restore imitation stone joints throughout hall.

Flooring and Base: Clean and polish existing slate and marble floor. Replace mismatched slate and marble floor tiles with new tiles that more closely match the 1881 floor.

Remove 1956 black terrazzo floor on the gallery at the South East balcony and replace with terrazzo that matches the rest of the galleries.

**Lighting:** Replace current chandeliers with reproductions of historic pendant lights as depicted in historic photographs. Provide reproduction light standards and mount on Hornblower and Marshall gallery railings as indicated in historic photographs. Do not mount fixtures on decorative plaster walls.

**Heating Ventilating and Air Conditioning:** Install new systems concealed behind walls and in any existing voids. Locate piping and conduit concealed in existing chases in walls.

**Electrical, Security, Access Control and Fire Safety Devices:** Install new systems in concealed spaces in existing chases behind the walls, ceilings and floors.
East Tower

The East Tower and the South Tower retain the only original entrances to the building's tower first floor offices. All other tower entrances are later alterations.

Since its original construction in 1881, the East Tower was home to offices, similar to the other three towers. However, in May 1882, the south set of first and second floor offices were outfitted as a café and the basement level (below grade) was created and used as a kitchen (Sets of arched windows were added to allow natural light to illuminate the space.) (Letter and semi-annual report to G. Brown Goode from Henry Horan, May 31, 1882, SI-AHHP, Box 16). A small annex was built south of the East Tower in 1886 (Semi-Annual Report to G. Browne Goode for period January 1 - June 30, 1887, SI-AHHP), later extended ("a total length of 77 feet"), and served as a restaurant for many years. This additional building appears on complete floor plans as early as 1895 and as late as the 1976 renovation construction drawings. Photographs of the east facade indicate the one-story brick building contained arched masonry openings and shed roofs (see pp. 3-91 and 3-92). A large skylight also existed and was frequently covered with awnings. This skylight was removed during 1928-1929 and the roof was made solid. The old wood floor was removed at that time and replaced with a cement floor covered with cork carpet (Report to Mr. W. deC. Ravenel from Superintendent of Buildings and Labor For Fiscal Year Ending June 30, 1929, SIA, RU 157, Box 5). More alterations were conducted during 1932-33 when the walls and ceiling were covered in composition board and new fixtures were installed (Report to Mr. J. E. Graf from Superintendent of Buildings and Labor For Fiscal Year Ending June 30, 1933, SIA, RU 157, Box 6). The annex appeared on the 1976 renovation construction documents and may have been removed prior to 1983.

The East Tower has always served as the freight delivery entrance. At one time, a hydraulic lift may have been added in the 1950s but does not appear on subsequent floor plans (ODC, Building #33, Project #s A157-1 and A157-2, "Doors and Hydraulic Lift" show construction of lift at the east entrance). A cast iron frame is embedded in the concrete floor today and may indicate where the lift once existed. There is a functioning lift outside in the asphalt pavement. The East Tower has endured extensive wear and tear, especially in the Vestibule, due to heavy use and traffic.

First Floor and Mezzanine

The Cluss & Schulze plans of 1879 do not indicate that the a mezzanine level (1202A and 1202B) existed for this tower ("Ground Plan of the Main Floor," October 1879, SI Neg. #97-1601 -- see p. 3-25). A set of stairs did access the current level of 1201 and 1202. The 1896-1902 floor plans indicate that stairs were added in the East Tower vestibule (1205) which may mean that the floor level changed as well. The "Report of the National
Museum for 1929* mentions that the wood floor in what is now 1203 and 1204 was removed at that time and a new concrete floor was laid on the same level as the main floor of the building. This space was then used for storage (Annual Report of the Board of Regents, 1929, p. 28). It is unknown when the current configuration the rooms above 1203 and 1204 were established but documentation indicates post-1929 and prior to the 1970s renovation as the demolition plans of that time indicated this floor did exist by that time (ODC, Building #33, Project #AI7216A, "Ground Floor Demolition," October 6, 1972).

1201, 1202, 1202A, 1202B Offices
Renovations took place in 1987 including a new door between 1201 and 1202 (ODC, Building #33, Project #8733106).

Ceiling: 1881: Painted plaster shallow scalloped ceiling vaults
1976**: Flat painted plaster (sand finish) ceiling in 1202; bulkheads exists in 1201 and 1202A; ceiling is fairly flat in 1201.

Walls: 1881: Painted plaster with sand finish; the original finish is concealed under subsequent repairs and replastering
1987: Plaster repair and repainting (ODC, Building #33, Project #8733106)

Windows: 1881: Masonry openings
1881 Exterior iron grilles; it is unknown if these are original.
1982-84: New window units with clear insulated glass; new shutters added; ledge built-out in 1202 in front of window (ODC, Building #33, Project #8233103, 8333103 and 8433101).

Doors: 1881: Original arched doorway openings between all rooms; corner beads with acorns still exist; niche in 1201 indicates original doorway that accessed 1203.
1976: 'Period' stained wood louvered door and frame added to suite entry (ODC, Building #33, Project #AI7216A).
1987: New door and infill between 1201 and 1202 (ODC, Building #33, OPP #8733106).

Light Fixtures: One historic fixture hangs in 1202. It is unknown if this fixture is original to this office.

Stairs: 1881: Original location of entry steps into these tower offices (this is the only place in the building where this exists).
1896-1902: Suite entry steps relocated to East Tower vestibule (1205); floor level may have changed at this time.
1914: Floor plan indicates that steps reappeared in original location (USNM Annual Report, 1914, p. 15).
1976: New stained (oak?) wood steps with handrail (ODC, Building #33, Project #AI7216A).

HVAC: 1976: Fan coil units in each space (ODC, Building #33, Project #AI7216A).

Wall Base: 1881: Stone
1976: Vinyl (ODC, Building #33, Project #AI7216A).
1987: New wood base (ODC, Building #33, Project #8733106).

Flooring: 1881: Florida pine
Post-1929: New mezzanine level added for 1202A and 1202B.
1976: Metal trench plates in 1201 and 1202 conceal piping; carpet over wood flooring (ODC, Building #33, Project #AI7216A).

Missing Elements:
Original 1881 flooring(?) wall base, windows, doors and continuous floor level throughout space. Pair of arched Cluss windows overlooking range in 1202.

1203, 1204 Offices
The entry into this space was not constructed until 1896-1902. At that time, a set of steps accessing a raised floor was evident on the first floor plans (USNM Annual Report, 1903, Plate 25 -- see p. 3-32). As mentioned above, a concrete floor was laid at grade level during 1928-1929 and the rooms were utilized as storage from that point on (Report to Mr. W. deC. Ravenel from Superintendent of Buildings and Labor for Fiscal Year Ending June 30, 1929, SIA, RU 157, Box 5).

7-34
Historic, significant finishes include 1881 corner beads separating 1203 and 1204.

Contemporary, non-significant finishes include: plaster ceiling, wood entry door and frame, windows, and carpet with vinyl base.

1205 Vestibule
The 1879 floor plans indicate that neither door nor window openings existed between this vestibule and the first floor offices. Entry to the first floor offices actually took place from the East Hall. The arched door opening on the north side of the vestibule was added during the 1896-1902 building renovation and are reflected on floor plans that date from that time (USNM Annual Report, 1903, Plate 25 -- see p. 3-32).

Portions of the frames of the entry doors appears to date from 1881. The heavy, oak doors were reconstructed during the 1970s renovation (ODC, Building #33, Project #A17216A).

During 1911-12, the "cement" floor in the inner vestibule and the tile floor (original decorative Cluss encaustic tile floor) were completely removed and a "granolithic" (concrete) floor was added and painted with "symatex" (Report of Superintendent of Construction & Labor, 1911-1912, SIA, RU 157, Box 1). Portions of this floor appear today.

Missing Elements:
Original 1881 encaustic tile flooring (design would have been the same as that which exists in the West and South entries) and doors.

1206 - 1209 Offices
It should be noted that a "basement" level (below ground level) exists and was utilized as early as 1882 when the cafè kitchen occupied this space. This space has difficult access from the interior. It does appear on the 1970s construction documents (ODC, Building #33, Project #A17216A). 

1206-1209 are similar in configuration to the north set of offices. The 1879 floor plans indicate that a cast iron stair (similar to the one that still exists in the North Tower) existed in room 1208 and accessed the second floor. It is unknown when this stair was removed but it does not appear in floor plans in 1903 (USNM Annual Report, 1903, Plate 25 -- see p. 3-32). Rooms 1206 and 1207 are elevated similar to 1202A and 1202B and are accessed by steps. 1209 is also elevated a considerable amount and storage exists underneath the playroom floor.

This set of offices was renovated in 1988 (ODC, Building #33, OPP Project #883314D) and the existing finishes reflect the construction of that time.

Historic, significant finishes include: 1881 painted plaster shallow scalloped ceiling vaults, 1881 corner beads accentuating the original opening between 1206 and 1207, and a historic light fixture in 1209 (it is unknown if this fixture is original to these tower offices).

Contemporary, non-significant finishes include: vinyl wall covering over all wall surfaces, new chair rail, hollow metal or wood frames and doors, window units and shutters, steps accessing 1206 and 1209, vinyl flooring and/or carpet with vinyl base.

Missing Elements:
Original 1881 flooring, wall base, windows, doors and continuous floor level throughout space. Cast iron stair accessing second floor offices (1208). Pair of Cluss arched windows in 1208 overlooking Range.

Recommendations for First Floor:
Restore the original space configuration of the offices, vestibules and their entrances to their 1881 design. Remove floor which separates first floor and mezzanine office space and convert offices back to their original configuration. Vestibule 1205 should reflect its original plastered brick niches and the door to 1204 should be filled in. Renovate these spaces as necessary while maintaining the existing 1881 significant historic fabric noted above. Remove carpet and refinish wood floors to match existing. Restore pairs of arched Cluss windows in 1202 and 1208 as mentioned above.

Lighting: It is unlikely that overhead lighting existed in these offices historically. Replace existing fixtures with more historically compatible fixtures. Utilize task lighting for detail work.

Heating, Ventilating and Air Conditioning: Provide new installations of mechanical and ventilating equipment as necessary in existing equipment locations concealed behind walls and conceal in any existing voids. Locate piping and conduit concealed in existing chases in walls.

Electrical, Security, Access Control and Fire Safety Devices: Accommodate all repairs, additions and alterations to the systems in concealed spaces in existing chases behind the walls, ceilings and floors. Integrate new devices into ceilings, appropriately located and compatible in material finish and design to the surface to which they are applied.

Second Floor
These offices were originally accessed from a cast iron stair that existed in room 1208 up to the balcony. See East Hall for discussion of Balcony East (2200A) which has existed since original construction. These rooms retain their original 1881 configuration. Both sets of offices were renovated during 1989 (ODC, Building #33, OPP Project #893304).
and included servicing HVAC equipment, electrical modifications, patching of plaster and painting, new carpet and light fixtures.

2201, 2203 Offices

Ceiling: 1881: Shallow painted plaster vaults
9767: Sloped gypsum wallboard ceiling in 2203

Walls: 1881: Painted plaster with sand finish

Windows: 1881: Masonry openings (a window in 2203 and 2207 opened onto the balcony).
1982-84: Stained wood units with clear insulated glass; stained wood shutters. (ODC, Building #33, Project #8233103, 8333103, 8433101.)

Doors: 1881: Door openings with corner beads with acorns
1896-1902: Terrazzo threshold at entry door
1976: Painted 'period' paneled door (ODC, Building #33, Project #87216A)

Light Fixtures: No historic light fixtures exist in this space. Current light fixtures were installed in 1989.

HVAC: 1976: Fan coil units (ODC, Building #33, Project #87216A)

Wall Base: 1881: Painted stone; exists today

Flooring: 1881: Florida pine
1989: Carpet (ODC, Building #33, Project #893304)

Missing Elements:
1881 flooring, windows, and doors.

1881 plaster walls with sand finish, flooring, windows, and doors.

Recommendations for the Second Floor:
Maintain the existing configuration and original materials. Remove carpet and refinish wood floors to match existing.

Lighting: Replace existing fixtures with more historically compatible fixtures. Utilize task lighting for detail work.

Heating, Ventilating and Air Conditioning: Install new systems concealed behind walls and conceal in any existing voids. Locate piping and conduit concealed in existing chases in walls.

Electrical, Security, Access Control and Fire Safety Devices: Install new systems concealed behind the walls, ceilings and floors.

Third Floor

These rooms retain their original 1881 configuration. They were renovated in 1989 including servicing HVAC equipment, electrical modifications, patching of plaster and painting, new carpet and light fixtures. (ODC, Building #33, Project #893304)

3201 Office

Ceiling: 1881: Painted plaster shallow scalloped vaults

Walls: 1881: Painted plaster walls with sand finish

Windows: 1881: Masonry openings; corner beads do not exist.
1882-84: Stained wood window units with clear insulated glass (ODC, Building #33, Project #8233103, 8333103 and 8433101).

Doors: 1881: Painted yellow pine door (appears to be original)

Light Fixtures: No historic fixtures exist in this space; 1989 modern fluorescent lights.

HVAC: 1976: Fan coil units; fan on ceiling (ODC, Building #33, Project #87216A)

Wall Base: 1881: Stone exists today (painted)

Flooring: 1881: Florida pine
1989: Carpet (foam pad) over plywood substrate over wood flooring (appears to be original flooring) (ODC, Building #33, Project #893304)

Missing Elements:
1881 windows

3209 Office
The finishes in this office are similar to those noted for 3201. Original 1881 wood threshold exists at doorway. Although there are several layers of paint on existing yellow pine door, it may not be original to the construction of the building. Much of the painted wood jambs appear to be original, however.

Damaged Areas:
Condensation exists between layers of insulated glass on the north wall. Doorknob is missing from door.

Recommendations for the Third Floor:
Remedy failed glass as soon as possible. Replace door knob with 'period' knob to match existing.

Maintain their existing configuration and original materials. Remove carpet and refinish wood floors to match existing.

Heating, Ventilating and Air Conditioning: Install new systems concealed behind walls and in any existing voids. Locate piping and conduit concealed in existing chases in walls.

Electrical, Security, Access Control and Fire Safety Devices: Install new systems concealed in existing chases behind the walls, ceilings and floors.

South East Range

In 1881, this range was constructed as one large open room with a metal shed roof supported by iron trusses and pier arches on three interior walls. According to the 1881 Inaugural Ball floor plan, sets of arched windows do appear between this room and the East Tower (today room 1208) ("Inauguration Ball, March 4, 1881, National Museum Building," SI-AHHP, Box 5). The Hornblower and Marshall renovations of 1896-1902 added a complete second floor to this range. Gypsum block partitions were in place by 1903 and separated the range from the South East Court and East Hall on the second floor. During 1904-05, skylights existed on the roof at this time as documentation notes painting (Annual Report of Superintendent of Construction & Labor, 1904-05. SIA, RU 157, Box 1). By 1914, the ground floor appears to have only two (arched?) entrances into the room on the north and south walls. These entry points still exist today. The 1958 second floor plans indicate interior partitions along the exterior wall ("Second Floor Plan," February 15, 1958, SI Neg. #96-2891 – see p. 3-43). The 1967 floor plans indicate many partitions on both floors ("First and Second Floor Plans," June 27, 1967, SI Neg. #s 96-2896 and 96-2895 – see pp. 3-48 and 3-49). Drawings from 1988 indicate the extensive work that was constructed to house the current childcare center (ODC, Building #33, OPP Project #883314D; see also p. 3-173). (See Chapter 3, pp. 3-171 through 3-173 for photos and drawing of this area.)

First Floor

1210-1222 (Nursery SEECD) As mentioned above, OPP Project #883314D greatly altered the configuration and historic finishes of this range. (ODC)

Historic elements that remain in this space today are the 1881 masonry window openings and 1896-1902 cast iron columns which support the second floor. The 1881 plastered brick arched piers have been concealed behind contemporary materials such as gypsum wallboard. The 1881 plastered exterior wall has been concealed with vinyl wall covering and gypsum wallboard for enclosure of 1976 fan coil units. The 1896-1902 second floor still exists above the acoustical tile ceiling. (This has been confirmed by Tobey + Davis.)

All existing finishes are contemporary and non-significant: acoustical tile ceiling with supply and return diffusers, fluorescent lights, and ceiling fans; gypsum wallboard partitions; stained wood frames and doors; vinyl wall base; vinyl wall covering, carpet, linoleum, ceramic tile and vinyl composition tile. The window units with UV light filters date from the 1982-84 exterior window renovation (ODC, Building #33, Project #s 8233103, 8333103, 8433101).
Missing Elements:
1881 single room configuration; 1881 flooring, wall base, and windows.

1218 Corridor
This space was renovated in 1988 (ODC, Building #33, OPP Project #883314D) and received new stained wood 'period' paneled doors and frames, acoustical tile ceiling, patterned vinyl composition tile (black, white and red), and stained cherry wall base. No historic material exists in this space today.

Missing Elements:
1881 flooring and single room configuration.

1230 and 1234 Labs
These labs were created after the 1970s renovation and contain contemporary, non-significant materials including acoustical tile ceiling, gypsum wallboard partitions, carpet with vinyl base. Some 1881 imitation stone joints do exist on exposed piers. Cast iron columns (paired with those in childcare area) to support second floor are still visible.

Missing Elements:
1881 flooring, single room configuration and character.

Second Floor

2211 - 2224B: 2213, 2217, 2221; 2225, 2226 Offices
As mentioned above, this floor was created during the Hornblower and Marshall renovations. The second floor range appears as one large open room on many early floor plans from 1902-1930 (USNM Annual Report, 1903, Plate 26 -- see p. 3-33). The 1930s and 1940s indicate that this exhibition space was subdivided into two equal gallery spaces (Brief Guide to the Smithsonian Institution, 1933, 1936, 1939 and 1946, SI-AHHP, Box 15 - see pp. 3-39 - 3-40). The 1958 drawings indicate that temporary office partitions were in place by this time ("Second Floor Plan," February 15, 1958, SI Neg. #96-2891 -- see p. 3-43). The layout of the central corridor with offices flanking either side occurred prior to the 1970s renovation and is reflected on demolition and as-built drawings (ODC, Building #33, "Second Floor Demolition," October 4, 1972 and "Second Floor Plan," December 2, 1977, Project #A17216A -- see pp. 3-52 and 3-55). The current partition configuration dates from post-1976.

Very little historic material exists in these offices. A number of original sand plaster finish and imitation stone joints exist on the piers and exterior wall. A few of the 1881 arches separating the East Hall and South East Court and this range are visible amidst infill construction. The condition of the 1896-1902 flooring underneath the carpet is unknown.

It is very possible that the floor is terrazzo as the other galleries were constructed with this flooring.

Contemporary and non-significant finishes include: acoustical tile ceiling with supply and return diffusers, gypsum wallboard and plaster partitions, hollow metal frames and doors, wood doors, window units with UV light filters, carpet with vinyl base, and fin tube radiators. It appears as though the South East Annex wall has been replastered with a new, sand finish and imitation joint lines have been added.

Missing Elements:
1881 single room configuration and character of the hall; 1896-1902 Hornblower and Marshall continuous second floor open gallery.

2230 Corridor
This corridor did not exist in 1881 as the range was one open space. This space was renovated in 1988 (ODC, Building #33, OPP Project #883314H) and received new stained wood 'period' paneled doors and frames, acoustical tile ceiling, patterned vinyl composition tile (black, white and red), and stained wood wall base. No historic material exists in this space today.

Missing Elements:
1881 single room configuration and 1896 flooring.

Recommendations:
Restore the range to the 1896-1902 configurations. Retain and restore the galleries and terrazzo flooring. Retain and restore the original plaster and imitation stone joints.

Locate and restore the pairs of arched windows at the tower, annex and pavilion walls.

Heating, Ventilating and Air Conditioning: Install new systems concealed behind walls and in any existing voids. Locate piping and conduit concealed in existing chases in walls.

Electrical, Security, Access Control and Fire Safety Devices: Install new systems concealed in existing chases behind the walls, ceilings and floors.
The original 1881 configuration of this court was one large, open space with clerestory windows, plastered brick arched piers and Georgia yellow pine flooring laid over a concrete base. The roof skylight and a ‘mezzanine’ gallery was added to all four sides of the court during the 1896-1902 building renovation program. The 1903 floor plans indicate that the second floor gallery was enclosed by gypsum block infill and was only entered from the rotunda (USNM Annual Report, 1903, Plate 26 -- see p. 3-33). By 1914, the first floor was completely enclosed and entered through a doorway from the East South Range (USNM Annual Report, 1914, p. 15 -- see p. 3-36). The court received a complete second floor when the Hall of Health was installed in 1956 (ODC, Building #33, Project #A1561C -- see pp. 3-176 and 3-177). By 1958, there were only two entrances into the court on the first floor and the gallery level was accessed through the north wall and a door from the South Hall (“First and Second Floor Plan,” February 1958, SI Neg #s 96-2891 and 96-2892). The 1967 drawings indicate that this space was heavily partitioned on both floors and probably had stopped accommodating gallery installations (“First and Second Floor Plans,” June 27, 1967, SI Neg. #s 96-2896 and 96-2895). The 1976 as-built drawings depict the present 1999 configuration of the mechanical spaces on the first floor and most of the layout of the office partitions on the second floor (“Ground and Second Floor Plans,” December 2, 1977, Project #A17216A -- see pp. 3-54 and 3-55). There is no third floor. The space is open to the monitor trusses above. (See Chapter 3, pp. 3-175 through 3-180 for photos/drawings of this court.)

First Floor

1236-1239 (EAP Offices); 1243 Office

These offices were created post-1976. Very little historic material remains or has been completely concealed by new finishes. Some of the piers still reveal the imitation stone joints, plaster bead reveal and plaster sand finish while others have been concealed with plaster or furred out with new material.

Contemporary and non-significant finishes include: acoustical tile ceiling, gypsum wallboard partitions, hollow metal doors and wood doors, ‘period’ suite entry door, and carpet with vinyl base.

Missing Elements:
1881 single room configuration, wood flooring and character of the hall.
1238, 1242 Mechanical Rooms
These rooms were both created during the 1970s renovation and the walls were soundproofed. The gallery exists above these spaces.

1242 contains contemporary, non-significant materials including: Gypsum wallboard ceiling and vinyl composition tile with vinyl base. The only historic material that is visible in this space occurs on the exposed brick plastered piers which still retain some imitation stone joints. All other material has previously been removed or concealed. The existing floor has experienced heavy wear and tear.

1238 contains contemporary, non-significant materials including: Gypsum wallboard ceiling, concrete and 9" vinyl tile flooring, and portions of lowered floors covered with grates. Almost all historic materials has been removed or concealed in this area; the original cast iron gallery column exists in this space. This space has experienced reasonable wear and tear.

1240, 1241 Storage and Offices
This space was created post-1976. The finishes reflect that of a typical contemporary storage room: exposed steel beams and metal deck (painted black), gypsum wallboard partitions, vinyl composition tile with vinyl base, and hollow metal frames and wood doors. These finishes are not significant and can be removed during future renovations; they represent infill construction between the second floor galleries.

All significant historic finishes with the exception of the Hornblower and Marshall gallery that appears in 1241 (an original cast iron column exists in 1241), have been removed from this space or concealed.

Missing Elements:
1881 single room configuration, wood flooring and character of the hall.

Second Floor

2238 Mechanical Room
This room allows access via a ladder on the north wall to the third floor mechanical area. The 1896-1902 terrazzo floor of the gallery exists in the space. A portion of pier construction remains unpainted with imitation stone jointing clearly visible.

2210 - 2288 Offices: 2239, 2239A Library
These offices were in their current configuration after 1967 but before the 1970s renovation and their present finishes reflect heavy soiling and general wear and tear. The library was modified to its present configuration in 1988 (ODC, Building #33, OPP Project #88337). Many of the 1881 piers have been replastered, repainted and are missing their original decorative imitation stone joints, etc. The offices do not contain any other significant historic materials.

Third Floor

This space is accessed via a ladder in mechanical room 2238. A series of catwalks have been assembled on this level above the existing acoustical tile ceiling and extensive mechanical equipment is visible. Catwalks provide for close inspection of pilaster capitals and imitation stone jointing.

Historic material includes the 1881 iron trusses in monitor, metal ceiling gratings and plastered exterior walls with sand finish. Operator mechanism of operable monitor sash is disconnected but still in place.

It is difficult to assess if the monitor glazing was replaced during the 1970s-1980s exterior renovation. It is unknown if this is the original glazing. Today, the glass is partially covered with a black film which may have been added when the monitor was open to cut down on light intensity or heat. It is unknown when this film was added. The iron skylight framework was added 1896-1902; it is possible that the glazing dates to that period.

Contemporary and non-significant items include the monitor sash replacements with UV filters (replaced during the 1970s-1980s exterior renovation program), all mechanical equipment, and wood and steel framed catwalks.

Missing Elements:
1881 single room configuration and character; operable monitor sash disconnected.

Recommendations:
Restore this room to its 1896-1902 condition of one large room with gallery and arched piers. Restore skylight to match other courts: remove black film, repair, replace glass as needed and restore.

Heating, Ventilating and Air Conditioning: Install new systems concealed behind walls and in any existing voids. Locate piping and conduit concealed in existing chases in walls.

Electrical, Security, Access Control and Fire Safety Devices: Install new systems concealed in existing chases behind the walls, ceilings and floors.

Note: The area above the second floor ceiling is a good resource area. Most of the historic finishes/construction is visible.
South East Annex

According to Cluss and Schulze's 1879 floor plans ("Ground Plan of the Main Floor," October 1879, SI Neg. #97-1601), this annex was originally one large two-story room with plastered brick arched piers. The annex was originally the "Retiring Room" for the restrooms. The annex was not divided into two floors until 1889. The Semi-Annual Curators' Report from January 1 - June 30, 1889 mentions that work (iron beams, brickwork and plaster) was begun in December 1888 and completed by February 1889 (SIA, RU 158, Box 22). The 1903 floor plan indicates that a gallery (only on three sides) with stairs (similar to the North West Annex) existed at that time (USNM Annual Report, 1903, Plate 25 -- see p. 3-32). It is interesting to note that the second floor of the annex was constructed about two feet below the second floor of the South East Pavilion and the surrounding ranges. This was true until after the 1970s renovation as the 1976 floor plans still indicate that sets of short stairs still existed along the west and south walls (ODC, Building #33, Project #A17216A, "Second Floor Demolition," October 4, 1972). The current configuration of the annex dates post-1976 with the first floor renovations dating from 1988 (ODC, Building #33, OPP Project #883314D). The second floor configuration is more recent.

First Floor

1260 Women's Locker Room
Historic material includes the original 1881 stone base along two walls and 1889 plastered beam ceiling.

Contemporary and non-significant finishes include: ceiling bulkheads for mechanical, stained wood door with wood frame, wood picture molding, exposed sprinkler lines, electrical conduit, and carpet.

1261-1262 Corridor
According to the 1879 Cluss and Schulze floor plans, the entry into vestibule 1263 is original to the construction of the building ("Ground Plan of the Main Floor," October 1879, SI Neg. #97-1601). Unfortunately, all historic details have been removed from this space. This corridor contains contemporary, non-significant finishes including acoustical tile ceiling and vinyl composition tile.
Second Floor

2258 - 2260 Offices
Although, infill has obscured the original intent of this space, the original arched openings are still evident which indicate the flow of space from this room into the ranges. Some original ‘imitation stone joints’ exist along the west wall.

As mentioned above, these offices were renovated after the 1970s renovation and all partitions and their finishes are contemporary and non-significant.

Missing Elements:
1881 single room configuration; 1896-1902 Hornblower and Marshall mezzanine gallery. Very little of the original 1881 detail of the imitation stone joints exists today.

Recommendations:
Restore this room to the 1889 configuration of two floors, retain historic plastered beam ceiling on the first floor. Preserve second floor ceiling now above the acoustical tile ceiling.

Reconstruct base that matches original stone base in the Pavilion offices. Reconstruct wood flooring on both floors to match original.

Reconstruct pairs of arched Class windows that existed on the adjacent South East Pavilion walls (south wall of annex) on both the first and second floors.

Reconstruct imitation stone joints on all Annex walls.

Heating, Ventilating and Air Conditioning: Install new systems concealed behind walls and conceal in any existing voids. Locate piping and conduit concealed in existing chases in walls.


South East Pavilion

Since 1881, the first floor of this pavilion has served as public restrooms. The second and third floors of the pavilion served as the photography laboratory for a number of years. The restrooms have been continually updated over the years and have reflected the latest trend in sanitary hygiene. (See photos and drawings on pp. 3-181 - 3-187.)

First Floor

The first floor originally contained painted plaster walls with a sand finish (very little of this finish still survives) and Florida pine floors over concrete. Archival documentation indicates that the restrooms were renovated frequently throughout the history of the building. The most recent renovation occurred during the renovation of the childcare center in 1988 and most of the existing finishes appear to date from that time (ODC, Building #33, OPP Project #B83318D; see also p. 3-182).

1223 Janitor
This room was originally part of the stair hall and contains original painted plaster walls on three sides. This room was created in its present configuration during 1896-1903 and was used to access the Ladies’ Retiring Room and Toilets after the South East Annex was enclosed (USNM Annual Report, 1903, Plate 25 – see p. 3-32). The installation date of the existing concrete floor is unknown. Today, the room is very damp.

1260 Stair Hall and Stair
This room originally had a set of paired arched windows on the north wall on the first floor similar to the other annexes and pavilions. The cast iron stair is original to the construction of the building and remains in its 1881 location. The hall has experienced extensive plaster repair, patching and repainting. The hall is completely utilitarian and does not contain any ornament today. It has a contemporary vinyl composition tile floor.

1262 Vestibule
This room was originally (1881) the retiring room for the ladies’ restroom. There is no surviving historic material and the finishes are similar to those noted below for the existing toilet rooms including acoustical tile ceilings and ceramic tile.

1265 Women’s Toilet, 1267 Men’s Toilet
With the exception of original 1881 plastered partitions, the exterior walls and some original stone wall base, the existing finishes are contemporary. The toilet rooms were renovated quite often over the last one hundred years and little original plaster with the sand finish survives today. In 1898, the entry to the women’s restroom was changed. Extensive renovation of these rooms occurred during 1905-06 (Annual Report of...
Superintendent of Construction & Labor, 1905-1906, SIA, RU 157, Box 1). During the summer of 1912, these rooms were further updated including: marble (Light Cloud Vermont) stalls and wainscoting, 2” white hexagonal floor tile in men’s inner room, panned red oak doors, nickle plated hardware and marble base was installed in the women’s room (Report of Superintendent & Labor, 1911-1912, SIA, RU 157, Box 1). The 1930-31 renovation created a larger room for the women with five additional toilets (Report to Mr. W. deC. Ravenel from Superintendent of Buildings and Labor for Fiscal Year Ending June 30, 1931, SIA, RU 157, Box 5). The 1988 renovation of the child care facility included the renovation of these rooms (ODC, Building #33, Project #883314D).

Both toilet rooms contain similar contemporary, non-historic finishes including: acoustical tile ceiling with fluorescent lights, window units with clear insulated glass and stained wood shutters, c. 1912 marble stall partitions, 4” white ceramic tile to window sill level, and hexagonal ceramic tile flooring with cove tile base. The 1988 renovation installed new hexagonal ceramic tile.

1265A Janitor’s Closet
This room, dating from the late 1980s renovation, is contemporary and does not contain any significant, historic materials.

1269 Office
This room was originally the retiring room for the Gentlemen’s restroom. The existing door opening is original to the construction of the pavilion although the frame and door are not historic. The room contains the original arched opening (although infill exists today) that would have accessed the Gentlemen’s toilet room. In 1893, a concrete floor was added to this space (Letter/annual report to Dr. G. Brown Goode from Henry Horan, June 30, 1893, SIA, RU 158, Box 23).

The room contains contemporary, non-significant materials including: acoustical tile ceiling, 4” white ceramic tile wainscot, built-out ledge for fan coil and dehumidifiers, and carpet.

Missing Elements:
1881 toilet room configuration and “retiring rooms” for toilet rooms, pair of Cluss arched windows in stair hall, 1881 flooring, stone wall base, windows, doors, toilet fixtures and hardware.

Recommendations:
Retain original plaster beam ceiling, original plaster walls and original door opening into stair hall and office 1269.

Remove existing wall base and reconstruct base that matches original stone base in the Pavilion offices.

Restore 1881 character of stair hall and construct pair of arched Cluss windows on the north wall in the existing stair hall.

Heating, Ventilating and Air Conditioning: Provide new installations of mechanical and ventilating equipment concealed behind walls and conceal in any existing voids. Locate piping and conduit concealed.

Electrical, Security, Access Control and Fire Safety Devices: Accommodate systems in concealed spaces in existing chases behind the walls, ceilings and floors.

Second Floor
This floor housed the photography lab for many years, beginning with the occupancy of the building in 1881. During original construction, construction costs were increased by $1965 to put "two sheets of glass for each pane"... "and an improved skylight for photographer" (Report of Superintending Architects for Fire-Proof Building for National Museum, 1880, January 1, 1881, SI-AHHP, Box 12). There are also several references to "an additional room" for the Entomological Department being located in the southeast pavilion above the ladies' reception room (USNM Annual Report, 1889, p. 101); and the installation of "two large skylights" in Department of Insects in the southeast pavilion (Letter/annual report to Dr. G. Brown Goode from Henry Horan, June 30, 1893, SIA, RU 158, Box 23).

With the exception of temporary partitions added in 1990 to divide offices, this suite has retained its original 1881 configuration (ODC, Building #33, Project #903301).

2261 - 2267A Offices
Part of the existing closet room 2261 was a doorway to the South East Annex between 1896 and 1976. Prior to 1896, this second story portion of the wall may have contained two sets of paired windows similar to the other pavilions. These windows would have allowed natural light from the annex to filter into these spaces, especially in the dark stair hall. The original Cluss and Schulze plans clearly indicate the openings ("Upper Story Plans," October 1879, SI Neg. #1314).

The existing office configuration and finishes are a result of 1990 renovations (ODC, Building #33, OPP Project #903301; see also p. 3-184).

Ceiling: 1881: Painted plaster shallow vaults
1990: Bulkheads added throughout office for HVAC.
1990: Stained wood picture rail exists in most rooms.

Walls: 1881: Painted plaster walls with sand plaster finish.
1990: Offices throughly renovated.

Windows: 1881: Masonry openings
1982-84: Stained wood window units (trim, sills etc.) with clear insulated glass and stained wood shutters replace original windows (ODC, Building #33, Project #8233103, 8333103 and 8433101).

Doors: 1881: Wood doors and frames no longer exist from this period; original openings do exist: between 2270 and 2261; 2261 and 2267; 2262 and 2265; 2267 and 2269 (infill present.)
1896: Doorway created in 2261 to access new second floor of South East Annex.
1990: Stained oak four panel doors and frames

Light Fixtures: All rooms contain contemporary and reproduction fixtures.

Wall Base: 1881: Stone
1990: Stained wood throughout offices (electrical and telephone are run through base.)

Flooring: 1881 Florida pine
1990 New carpeting installed throughout.

Missing Elements: Original 1881 wood flooring, wall base, Cluss pairs of arched windows and doorways.

Third Floor

The third floor may not have been accessible after initial construction of the building. It is unknown when the existing cast iron stair was added but floor plans do not show the stair until 1903. The 1903 floor plans also indicate that chimney flues were installed from the second floor to the roof to provide additional heating for the offices at that time (USNM Annual Report, 1903, Plate 27 - see p. 3-34). Hornblower and Marshall designed extensive alterations to the third floor space in 1908-09 for the utilization of the photography laboratories (SIA Binder, Drawing Control No. S01/1189, Neg. No. 89-10060; see p. 3-187). Archival information, photographs and drawings indicate the addition of a very large skylight at north end of room, new windows, and a small addition on the west side of the roof. Encaustic tile was installed on the floor at that time and probably still exists underneath the carpet (Annual Report of Superintendent of Construction & Labor, 1908-09, SIA, RU 157, Box 1). These modifications existed until some time after the 1976 renovation. The north facing skylight has been removed and exterior north wall reconstructed.

The current configuration of offices dates to prior to 1988 as they existed on the Project #883314D construction documents and include contemporary finishes. The carpet was installed in 1988.

2260-3266 Offices

Arched doorway is visible and is still framed by its original corner beads with acorn ornament.

The addition of the pantry occurred during OPP Project #883314D (ODC, Building #33). All other finishes, unless other mentioned, are contemporary and non-significant.

2270 Stair Hall to First Floor

The doorway that exists accessing the East South Range today from the South East Pavilion was originally part of one of the sets of paired arched windows that overlooked the large East South Range. It is very likely that a pair of arched windows existed on the north wall overlooking the South East Annex. It is unknown when these windows were removed. Today, a flat gypsum wallboard ceiling, stained 'period' paneled wood doors and frames, rubber stair treads, and carpet with wood base are contemporary, non-significant materials. The hall is filled with fire extinguisher and standpipe and electrical boxes and the east wall has been built-out to accommodate this.
Ceiling: 1881: Exposed underside of roof; iron tie rods providing tension are visible in center space above clerestory and across third floor space (see photographs of typical 1880s pavilion third floor open room).


1980s: New plaster ceiling installed during roof renovation (ODC, Building #33, Project #s 8233103, 8333103, 8433101).

Cornice: 1976: Stained wood picture rail exists in all rooms. Painted crown molding exists in room 1463 and sprinklers are mounted to its face (ODC, Building #33, Project #A7216A).

Walls: 1881: Painted plaster exterior walls with sand plaster finish.

1896: Partitions added for photography laboratory’s use.

Pre-1988: Current configuration of gypsum wallboard partitions with oak trim throughout space. Wall has been built out under clerestory windows in center room to accommodate sprinklers etc.

Windows: 1881: Masonry openings; some corner beads on this floor may be original.

1885: Existing windows “were taken out, new sash made and windows changed so as to swing instead of hoist” (Letter/semi-annual report to G. Brown Goode, SIA, RU 158, Box 22).

1893: Two large skylights installed (Letter/annual report to Dr. G. Brown Goode from Henry Horan, June 30, 1893, SIA, RU 158, Box 23).

1908-09: New windows and large skylight is installed (none of this work exists today) (Annual Report of Superintendent of Construction & Labor, 1908-09, SIA, RU 157, Box 1).

1982-84: Painted wood window units (trim, sills etc.) with clear insulated glass replace original windows and clerestory are replaced with new translucent units. 1896 skylight and additional windows were removed and the 1881 configuration was restored (ODC, Building #33, Project #s 8233103, 8333103, 8433101).

Doors: 1881: None.

Pre-1988: Oak storefront doors with glass panels and large glass sidelights and transoms.

Light Fixtures: Contemporary fixtures exist today.

Stairs: It is unknown when these stairs were installed but they existed on the 1903 floor plan.

Wall Base: 1881: Unknown.

1908-09: Concrete base (8” high by 1” thick) (Annual Report of Superintendent of Construction & Labor, 1908-09, SIA, RU 157, Box 1).

Pre-1988: Stained oak throughout offices (electrical and telephone are run through base).

Flooring: 1881: No stairs appeared to have accessed this level.

1908-09: Encaustic maroon and buff tile was installed to prevent vibration in the floor (Annual Report of Superintendent of Construction & Labor, 1908-09, SIA, RU 157, Box 1). It may still exist underneath the carpet. Later renovation notes the placement of plywood sheathing on top of the tile before carpet installation.


Missing Elements:
1896 floor tile and wall base, 1881 windows and sand plaster wall finish.

Recommendations:
Restore pavilion room to its original 1881 configuration of one large space.

Remove existing floor coverings and restore and/or reconstruct wood flooring to match original in spaces not covered by tile.

Retain original plaster ceilings, plaster walls, stone wall base, cast iron staircases and original door openings as mentioned above.

Restore stone base throughout floor.
Reconstruct pairs of arched Class windows (two sets in stair hall, one set in 2269 and one set in 2261).

Heating, Ventilating and Air Conditioning: Install new systems concealed behind walls and in any existing voids. Locate piping and conduit concealed in existing chases in walls.

Electrical, Security, Access Control and Fire Safety Devices: Install new systems in chases behind the walls, ceilings and floors.

---

East South Range

In 1881, this range was constructed as one large open room with a metal shed roof supported by iron trusses and pier arches on three interior walls (see p. 3-189). According to the 1881 Inaugural Ball floor plan, sets of arched windows existed between this room and the East Tower (today room 1302) and the South East Pavilion ("Program for Inauguration Ball for President Garfield, March 4, 1881, SI-AHH, Box 5).

The Hornblower and Marshall renovations of 1896-1902 added a gallery level to the three interior walls of this range (USNM Annual Report, 1903, Plate 26). Gypsum block partitions were in place by 1903 and separated the range from the South East Court, South East Range and South Hall on the second floor. During 1904-05, skylights, "with movable frame for ventilation," were installed on both the east and west sides (Annual Report of Superintendent of Construction and Labor, 1904-05, SIA, RU 157, Box 1).

By 1914, the ground floor appears to have "macite" or gypsum block infill between many of its pier arches (USNM Annual Report, 1914, p. 15).

In 1932-33, "improvements" were made including filling in window openings at the east end with plaster block; removing "small dark room with wood partitions," filling three open arches on north and west sides of gallery with plaster block; erecting plaster block partitions and metal covered doors between the East South Range Gallery and South Hall Gallery and east end of East South Range Gallery and Room 90 to replace old wooden partitions and wooden doors; and filling open arches on west side and windows and door on the east side of Room 90 with plaster block (Report to Mr. J. E. Graf from Superintendent of Buildings and Labor for Fiscal Year Ending June 30, 1933, SIA, RU 157, Box 6). In the following year, a wooden partition and door was constructed across the east end of the East South Range gallery (Report to Mr. J. E. Graf from Superintendent of Buildings and Labor for Fiscal Year Ending June 30, 1934, SIA, RU 157, Box 6). During 1935-36, two windows in the southwest corner were filled with plaster block; Door #90 at the east end of the gallery was closed and a door installed in an adjoining arch as part of remodeling above the Gallery; and an iron pipe railing with diagonal wire mesh was installed along the gallery level, which remained until 1972 (see p. 3-191) (Annual Report, 1935-36, Division of Buildings and Labor, SIA, RU 157, Box 6).

The 1958 second floor plans indicate interior partitions along the exterior wall (ODC, Building #33, Project #A1582A; see p. 3-192). The 1967 floor plans indicate many partitions along the north wall on the first floor and several on the mezzanine gallery. The installation of a complete second floor (steel and concrete mezzanine level) occurred in 1972 (ODC, Building #33, Project #A1722A; see p. 3-193). Little work occurred in this area during the 1976 renovation with the exception of furting out the existing exterior wall.
to accommodate fan coil units similar to the other ranges and some other minor changes (ODC, Building #33, Project #A17216A). Later construction project drawings (ODC, Building #33, OPP Projects #7733435, 8333107, 8733107 and #883314D) indicate the existing (1990) partition layout on the first floor and 1990 drawings indicate the existing partition layout on the second floor (ODC, Building #33, Project #903314). Drawings for 1994 (OSEC) modifications reflect existing 1999 conditions (ODC, Building #33, Project #943302A).

First Floor

1218 Corridor
Existing finishes date from 1988 and are not significant (ODC, Building #33, OPP Project #883314H). The wall adjacent to the pavilion and annex does include some original 1881 plaster and the horizontal plaster bead separating the pier base from its shaft is evident. It is unknown how much of this bead is original as the 1980s renovation included repair work to this bead in the building corridors.

1270 and 1273 Corridor
This space was renovated in 1988 and received new stained wood ‘period’ paneled doors and frames, acoustical tile ceiling, patterned vinyl composition tile (black, white and red), and stained cherry wall base (ODC, Building #33, OPP Project #883314D). No historic material exists in this space today.

1271 - 1275, 1274, 1276-1282B Offices
Historic walls can be viewed in 1276B through a metal panel in the temporary gypsum wallboard partition. Early paint colors can be readily seen as well as construction of the wall. The only historic material that is still visible in the rest of this space are the masonry window openings and the imitation stone joints on the plastered piers.

As mentioned above, these offices were created after the 1976 renovation and all finishes, unless mentioned otherwise, are modern and non-significant: acoustical tile ceiling with supply and return diffusers and fluorescent lighting, gypsum wallboard partitions (some gypsum block exists between the piers), window units with UV filters, ledge in front of window containing fan coil units, and carpet with vinyl base.

Second Floor

Construction documents from OPP Project #903314 indicates existing 1999 conditions. (ODC)

2230 Corridor
All existing finishes are contemporary (OPP Project #883314H) and are not significant.

2261 - 2285, 2279, 2283-2283B, 2288, 2289 Offices, Storage, Library
These rooms contain very little historic material. The majority of the exterior wall and original piers has been replastered and little of the historic imitation stone joints are visible today. Contemporary non-significant finishes include: acoustical tile ceiling with supply and return diffusers, gypsum wallboard partitions, hollow metal frames with wood doors (some with glass side lights), ‘period’ suite-entry stained wood paneled doors and frames, HVAC, window units with UV filters and carpeting with vinyl base.

2280 Mechanical Room
The Blower and Marshall (1896-1902) second floor gallery still exists in this space. The yellow and white terrazzo flooring with its red border and small white squares is clearly visible and in good condition. The rest of this room is built-out with contemporary materials including: gypsum wallboard walls and ceiling, hollow metal door and frame.

Missing Elements:
1881 single room configuration and character of the hall; 1896-1902 Blower and Marshall second floor mezzanine gallery. Very little of the original 1881 detail of the imitation stone joints exists today.

Recommendations:
Restore this range to its 1896-1902 configuration of one large room with the Blower and Marshall gallery. Retain historic terrazzo and imitation stone joints and restore where necessary. Locate and restore the pairs of arched windows in the tower, annex and pavilion walls.

Heating, Ventilating and Air Conditioning: Install systems in concealed behind walls and conceal in any existing voids. Locate piping and conduit concealed in existing chases in walls.

Electrical, Security, Access Control and Fire Safety Devices: Install new systems in concealed spaces in existing chases behind the walls, ceilings and floors.
South Hall

The South Hall remains a single open space as original constructed. The space has always appeared as one large, open hall with exposed trusses. The Hornblower and Marshall galleries of 1896-1902 still exist today and are discussed below. Infill between the arched piers occurred at various points in the history of the building. This hall was known as the Textile Hall in 1957. (See photos/drawings on pages 3-195 - 3-205.)

First Floor

Ceiling: 1881: Plaster (USNM Annual Report, 1903, p. 255); later removed due to failure of the plaster (Report of the Architects of the National Museum Building for 1881, January 1, 1882, SI-AHHP, Box 2).

1912-13: #20 gauge beaded sheet iron is installed in triangular areas near Rotunda and exists today (Report of Superintendent of Construction & Labor, 1912-13, SIA, RU 157, Box 1).

1992: Metal ceiling painted; asbestos removed (ODC, Building #33, OPP Project #923311).

1999: Paint is peeling throughout. Rust is occurring on the metal near the ridge beam of both the main ceiling and the lantern.

Walls: 1881: Painted plaster with imitation stone joints ("Program for Inauguration Ball for President Garfield, March 4, 1881, SI-AHHP, Box 5); pilasters on the pier arches were painted with contrasting color; some decorative stenciling at the north wall adjacent to the Rotunda.

1900+: Plaster block infill is added between the pier arches for fireproofing purposes and the character of the hall is changed.

1976: New plenum wall is inserted within the arches of the 4-5 bays closest to rotunda (ODC, Building #33, Project #AI7216A).

Post-1976: Gypsum wallboard is applied to build out walls for exhibition purposes and the historic piers are concealed completely on this floor. Only the South wall remains to indicate historic finishes. Much of the south wall was skim coated during the 1970s renovation and the plaster bead that runs underneath the pairs of Claus arched windows were installed at that time.
1990-1992: According to OPP Projects #903321 and 923311, the rotunda and hall were repainted in the following locations: at the head of arches, below clerestory windows, and the shafts of pier arches. It is unknown how much of this work was completed (ODC, Building #33).

Pilasters: 1881: Painted plaster with imitation stone joints and molded capitals; shaft is painted with an accent color.

Windows: 1881: Decorative "Cathedral" colored glass at south windows; double glazed glass in clerestory and lantern windows (Letter to Class & Schulze from E. Gannon, December 23, 1879, SI-AHHP, Box 2). Some of the clerestory and lantern windows were operable.

1976: Pairs of Class arched windows are restored on south wall at this time (ODC, Building #33, Project #A17216A).

1982-1984: Decorative colored glass was to be laminated; window units repaired and wood frame, sash, trim and glass (translucent appears to date from this time) was replaced as necessary; clerestory windows received new glass with UV filters, frames, trim and sash (ODC, Building #33, Project #s 8233103, 8333103, 8433101).

Doors: See South Tower vestibule and individual offices. No original doors exist in this space. All wood stained "period" doors were installed during the 1970s renovation (ODC, Building #33, #A17216A).

Light Fixtures: 1881: None.

c. 1896-1902+: Simple glass globe pendants hang throughout hall (p. 3-195 through 3-197).

c. early 1900s: Decorative globe pendants on thick chains hang throughout hall for many years. Photos also show lights mounted on gallery newel posts (p. 3-197).

1976: Existing incandescent chandeliers are modern, contemporary additions to this hall (ODC, Building #33, Project #A17216A; see p. 3-205).

Post-1976: Track lighting supplies illumination for exhibits and is hung from the Hornblower and Marshall galleries and between them on light weight trusses which extend from one ralling to the other.

HVAC: 1976: Plenum walls, return and supply air (ODC, Building #33, Project #A17216A).

Base: 1881: None.

1976: Stained wood (12’); 4” painted wood base on gypsum wallboard walls (ODC, Building #33, Project #A17216A).

Flooring: January - March 1881: Temporary pine

Late 1881: Slate and marble floor 1” thick: 12” x 24” "American-Italian" white veined marble, 18” x 12” grey Vermont slate, 12” square red Vermont slate and black slate tile. Installed by E. Frisch of NYC (Report of the Architects of the National Museum Building for 1881, SI-AHHP, Box 2). Parti-colored Portland cement (mostly red) and 1 1/2” thick dark blue Pennsylvania slate around perimeter. Floor is laid on 2” +/- concrete base on top of the earth (Request for "Proposals for Marble and Slate Tiling and for Slate Floor Slabs," March 31, 1881, SIA, RU 7081, Box 28 and Report of the Architects of the National Museum for 1881, January 1, 1882, SI-AHHP, Box 2).

1976: New utility trench disturbs existing flooring (see p. 3-201). Wood flooring was installed at this time for "1876" exhibit (ODC, Building #33, Project #A17216A).

1999: A contemporary post-1976 built-up floor (4-7” above finished flooring) with carpeting exists throughout exhibit space in the South Hall. Some of the 1881 slate and marble decorative flooring, colored Portland cement and Pennsylvania slate border exists near South Tower. The condition of the marble underneath the built-up floor is unknown. Contemporary vinyl composition tile exists near the south ramp that accesses the built-up floor. ADA pipe metal handrails and a slip-resistant surface have been installed on both sets of ramps accessing the exhibit area.

Other: 1976: Sprinklers installed at ceiling (ODC, Building #33, Project #A17216A).

Missing Elements:
The character of the hall has been compromised with the addition of the 1976 plenum walls.
Slate and marble floor appears to be poor condition near the South Tower. Terrazzo flooring of the galleries appears stained and rather dirty throughout.

Second Floor

2300 Gallery South/West
1896-1902: Hornblower and Marshall renovations added the existing concrete and steel gallery, its cast iron railing, southwest cast iron balcony stairs and terrazzo floor.

1976: Furred plenum added to the arched piers to provide supply and return air. Diffusers were masked as circular openings in the center of the niches. Return air grilles were disguised by the new baseboard (ODC, Building #33, Project #A1716A).

2300A South Balcony
1881: This balcony is original to the construction of the building and includes its original decorative brackets and crown molding.

1925: Terrazzo floor replaces old 1881 wooden floor for exhibition purposes and matches the east and west galleries (Report of the Superintendent of Buildings and Labor For Fiscal Year 1925-26, SIA, RU 157, Box 4).

2300B Gallery South/East
1896-1902: Hornblower and Marshall renovations added this gallery, its cast iron railing, South East cast iron balcony stairs and terrazzo floor.

1956: Black terrazzo with zinc divider strips was added in curved pattern during the renovation of the South East Court (ODC, Building #33, Project #A1561C, "SI Modernization of Exhibits").

1976: Furred plenum added to the arched piers to provide supply and return air. Diffusers were masked as circular openings in the center of the niches. Return air grilles were disguised by the new baseboard (ODC, Building #33, Project #A17216A).

Stair S1

Cast iron spiral and partial wood stair (wood from the 2nd floor to the 13th riser) replaces original 1881 cast iron stair. Installation date is unknown but wood stair did exist in 1957. Handrail near beginning of spiral stair is not attached to wall and just hangs in midair.

Stair S2

Cast Iron: 1881 spiral stair with iron balusters and railing.

1903 floor plans reflect that the first floor portion of this stair was removed at this time (USNM Annual Report, 1903, Plate 25 -- see p. 3-32). Configuration shown on these floor plans exists today.

Recommendations:

Restore the 1896-1902 configuration of the hall with its open pier arches into the courts and ranges. Retain and restore the exposed metal ceilings, decorative pier arches, Hornblower and Marshall galleries, terrazzo floor and iron railings, the slate and marble floor that should still exist underneath the more recent build-up floor.

Remove 1976 plenum walls and other infill that exists between the 1881 pier arches and restore the design intent of open, flowing gallery space between the halls and the courts. Repair plaster pier arches and paint room with historically accurate colors. Restore imitation stone joints throughout hall.

Flooring and Base: Remove built-up flooring, clean and polish existing slate and marble floor. Replace mismatched slate and marble floor tiles with new tiles that more closely match the 1881 floor.

Remove 1956 black terrazzo floor on the gallery at the South East balcony and replace with terrazzo that matches the original gallery floor.

Lighting: Replace current chandeliers with reproductions of historic pendant lights as depicted in historic photographs. Provide reproduction light standards and mount on Hornblower and Marshall gallery railings as indicated in historic photographs.

Heating Ventilating and Air Conditioning: Install systems concealed behind walls and in any existing voids. Locate piping and conduit concealed in existing chases in walls.

Electrical, Security, Access Control and Fire Safety Devices: Install new systems in chases behind the walls, ceilings and floors.
South Tower

Hornblower and Marshall's renovations closed the South Tower entrance in 1896-1902 and turned interior and exterior vestibules into offices. During the 1970s building renovation, a number of temporary office partitions were removed from the first floor and the vestibules were restored to their former use. (See photos and drawings on pp. 3-207 through 3-211.)

First Floor

1301-1304 Office

Ceiling: 1881: Painted plaster shallow scalloped ceiling vaults
1976: Bulkheads in 1301

Walls: 1881: Painted plaster with sand finish; very little of the original finish exists and most is concealed under subsequent repairs and replastering
1976: Exterior walls furred out for mechanical (ODC, Building #33, Project #A17216A).

Date Unknown: Original arched openings between offices have been filled in with glass. Original corner beads with acorns framing arched openings still exist in these offices.

Windows: 1881: Masonry openings; exterior iron grilles
1976: Pair of arched windows with clear glass reconstructed in 1304 (overlooking South Hall) (ODC, Building #33, Project #A17216A).
1982-84: New stained window units with clear insulated glass; new shutters added (ODC, Building #33, Project #s 8233103, 8333103, 8433101).

Doors: 1881: Original arched doorways opening between all offices; niche in 1301 indicates original doorway; corner beads with acorns still exist framing openings; paneled stained wood door with transom between 1302 and 1304 is original to the construction of the door.
1976: 'Period' stained wood paneled door and frame added to suite entry (ODC, Building #33, Project #A17216A).
Date Unknown: New door and side light added to 1301 entry from 1302.

Light Fixtures: It is unknown if the historic light fixtures that exist in this suite (one in each room) are original to these offices.

Stairs: 1881: Steps accessing this suite were originally located outside 1302 as they exist today.
1976: New wood steps added to exterior of 1302 (ODC, Building #33, Project #A17216A).

HVAC: 1976: Fan coil units in each space except 1304 (ODC, Building #33, Project #A17216A).

Wall Base: 1881: Stone
1976: Stained wood base (ODC, Building #33, Project #A17216A).

Flooring: 1881: Pine
1976: Carpet (ODC, Building #33, Project #A17216A).

Missing Elements:
Original 1881 flooring, wall base, windows, doors, and steps into original entry 1302. Pair of Cluss arched windows on the east wall of 1302.

1305 Vestibule
As noted previously, Hombower and Marshall closed the South entrance at the turn of the century and added masonry and window infill (“Prof. True Office at South Entrance,” Hombower & Marshall, August 16, 1901, SI-AHHP, Box 6; see p. 3-207). Renovations during the 1970s restored the vestibule. (ODC, Building #33, OPP Projects #A17216A, CP #5 and A1747A; see p. 3-209).

Significant historic and replicated material in the exterior vestibule includes: 1881 Cluss design pattern encaustic multi-color tile installed in 1976 (see p. 3-211), brick walls, barrel vaulted ceiling and replica entry gates.

Significant and replicated historic material in the interior vestibule includes: 1881 painted plaster shallow scalloped vaults and restored pairs of arched brick plastered wall niches. Portions of the plaster beads were reproduced during the 1976 renovation.

Contemporary and non-significant material in both spaces include 1970s oak double doors with walnut inlay and clear beveled glass panels and arched transom windows which match the other three entrances; scored concrete to resemble stone pavement in the interior vestibule; painted wood base; and plaster horizontal bead. The globe light fixture that hangs in the exterior vestibule was added to the building during the 1976 renovation.

Missing Elements:
1881 flooring and wall base in interior vestibule.

Damaged Areas:
Gates have scratched surface of tile.

1306-1308 Offices
Renovations in 1983 installed the existing finishes of this suite of offices. (ODC, Building #33, OPP Project #8333107)

These offices are similar in existing finishes to 1301-1304 and experienced similar renovation work during the 1970s. The arched opening with corner beads separating 1308 from 1307 is original to the construction of the tower. Portions of the painted wood frame, transom and door between 1306 and 1308 date from 1881. The corner beads in room 1307 are not original. Replacement Georgia pine floors were laid in these rooms in 1911-12 and may still exist underneath the carpet (Report of Superintendent of Construction & Labor, 1911-12, SIA, RU 157, Box 1).

Missing Elements:
Original 1881 flooring, wall base, windows, doors, steps accessing suite of offices (outside 1308) and cast iron stair accessing second floor offices (inside 1308). Two of the arched windows that appear in historic photographs and on floor plans still exist (without glazing) on the west wall of 1308 as visible within the telephone closet 1312..

Recommendations for First Floor:
For the most part, the existing offices, vestibules and entrances reflect Cluss’ 1881 design. Maintain the existing 1881 significant historic fabric noted above. Restore 1881 Cluss pair of arched windows in offices 1302 and 1308. Remove carpet and refinish or replace wood floors to match original.

Heating, Ventilating and Air Conditioning: Install new systems concealed behind walls and in any existing voids.

Electrical, Security, Access Control and Fire Safety Devices: Install new systems in concealed spaces in existing chases behind the walls, ceilings and floors.
Second Floor

These offices have retained their original 1881 configuration and character for the most part.

2301, 2303 Offices

Ceiling: 1881: Painted plaster shallow scalloped ceiling vaults in 2301

1976?: Flat sloped painted plaster ceiling in 2303; bulkheads exists in 2301 (ODC, Building #33, Project #AI7216A).

Walls: 1881: Painted plaster with sand finish; the original finish is concealed under subsequent repairs and replastering.

1976: Exterior walls built out to accommodate HVAC (ODC, Building #33, Project #AI7216A).

Windows: 1881: Masonry openings; window jambs, sill and trim in 2303 is original although glazing has been replaced.

1982-84: New window units with clear insulated glass; new shutters added (ODC, Building #33, Project #8233103, 8333103, 8433101).

Doors: 1881: Original arched doorway openings; original wood frames with corner beads.

1976: New entry door with painted grained finish (ODC, Building #33, Project #AI7216A).

Light Fixtures: There are no historic light fixtures in these spaces.

HVAC: 1976: Fan coil units in each space (ODC, Building #33, Project #AI7216A).

Wall Base: 1881: Stone; some stone base still exists in 2303.

Date Unknown: ‘New’ wood base; conduit runs along it for electrical.

Flooring: 1881: White pine

Existing: Carpet

Missing Elements:
Original 1881 flooring, door, and windows.

2305, 2309 Offices

These offices contain finishes which are very similar to 2301, 2303. The ceiling in 2309 appears to have been replastered. Very little of the original sand plaster finish still survives today. Most wall surfaces have a rough, heavy sand finish which appears to be contemporary.

The small arched window on the north wall of 2305 appears to contain its original framing. The glazing appears to be a replacement (same as 2303).

Missing Elements:
Original 1881 flooring?, doors and windows.

Recommendations for Second Floor:
Maintain the existing configuration and original materials. Remove carpet and refinish wood floors to match existing.

Heating, Ventilating and Air Conditioning: Install new systems concealed behind walls and conceal in any existing voids. Locate piping and conduit concealed in existing chases in walls.

Electrical, Security, Access Control and Fire Safety Devices: Install new systems in concealed spaces in existing chases behind the walls, ceilings and floors.

Third Floor

These offices have retained their original 1881 configuration and character for the most part.

2301, 3309 Offices

Ceiling: 1881: Painted plaster shallow scalloped ceiling vaults

Date unknown: Roof hatches and supply air vents in ceiling

Walls: 1881: Painted plaster with sand finish

Windows: 1881: Masonry openings

1982-84: New window units with clear insulated glass; new shutters added (ODC, Building #33, Projects #8233103, 8333103, 8433101).
Doors: 1881: Original arched doorway openings with wood frames and corner beads; wood paneled doors appear to be older than those added in 1976 but do not appear to be original.

1976: Existing doors painted a decorative grained finish (ODC, Building #33, Project #A7216A).

Light Fixtures: No historic light fixtures in these offices.

HVAC: 1976: Fan coil units (ODC, Building #33, Project #A7216A).

Wall Base: 1881: Stone exists today.

Post-1990: Some 'newer' painted wood base added.

Flooring: 1881: White pine

Post-1990: Carpeting added. It is unknown if the wood flooring underneath the existing carpet is original.

Missing Elements: Original 1881 flooring?, windows, and doors.

Recommendations:
Maintain the existing configuration and original materials. Remove carpet and refinish or replace wood floors.

Heating, Ventilating and Air Conditioning: Install new systems concealed behind walls and conceal in any existing voids. Locate piping and conduit concealed in existing chases in walls.

Electrical, Security, Access Control and Fire Safety Devices: Install new systems in existing chases behind the walls, ceilings and floors.

West South Range

Prioritity Two Zone

The original 1881 configuration of this range was as one large open gallery. A historic photograph (page 3-213) clearly indicates the pairs of arched windows that existed between the range and the South West Pavilion and the South West Annex. During 1891-1892, a concrete or granolithic pavement was added to the first floor (Superintendent's Report, Fiscal Year 1891-92, SIA, RU 158, Box 23). During the 1896-1902 building renovations, a gallery floor was added to three interior walls (USNM Annual Report, 1903, Plate 26). In 1903-04, two new "Paradigm" skylights were installed (Annual Report of Construction & Labor, 1903-04, SIA, RU 157, Box 1). By 1914, gypsum block infill had separated much of the range from the neighboring rooms (USNM Annual Report, 1914, p. 15). During 1927-28, photographs indicate what written documentation mentions: 40" high pipe railing with diamond wire mesh panels was installed. A corrugated sheet metal ceiling existed at that time and was repainted with lead and oil (Report to Mr. W. deC. Ravenel from Superintendent of Buildings and Labor for Fiscal Year Ending June 30, 1928, SIA, RU 157, Box 5). A few partitions and doors along the exterior wall of the first floor existed by 1958 ("First Floor Plan," February 11, 1958, SIA Binder, Drawing #S01/I148), and by 1967, the second floor made use of the balcony for offices ("Second Floor Plan," June 27, 1967, SIA Binder, Drawing #S01/I165). The second floor was completely reformed in 1972 with steel and concrete (ODC, Building #33, OPP Project #A7222A). It should be noted that the Hornblower and Marshall gallery is concealed by an acoustical tile ceiling. The 1976 demolition drawings indicate partitions had already been constructed throughout the second floor for offices (ODC, Building #33, OPP Project #A7216A, "Second Floor Demolition," October 4, 1972). (See pp. 3-213 - 3-218 for photos/drawings.)

First Floor

1310-1321A Offices

Renovations in 1994 were directly responsible for the existing layout of offices 1310 through 1314 north of Corridor 1311 (ODC, Building #33, OPP Project #943302A). Earlier renovations in 1977 and 1983 contributed to the layout of the existing configuration of offices south of Corridor 1311 (ODC, Building #33, OPP Project #773345 and 8333107).

Both sets of offices contain contemporary, non-significant finishes which can be completely removed during future renovations including: acoustical tile ceiling and gypsum wallboard ceilings, built-out wall along south exterior wall to accommodate fan coil units (1976), hollow metal frames and doors, wood doors, new window units with UV filters (1982-84) and carpet with vinyl base.
The north set of offices does not contain any visible historic, significant material. The north wall has been furred out with gypsum wallboard and the historic piers are completely concealed.

The south set of offices contains some imitation stone joints are visible and a plaster bead runs along the west wall.

Telephone closet 1312 contains evidence of a pair of 1881 arched window openings between the range and the South Tower. The underside of the historic Hornblower and Marshall gallery can also be observed in this room.

1311, 1316 Corridors
In 1988, 1311 and 1316 received new stained wood ‘period’ paneled doors and frames, acoustical tile ceiling, patterned vinyl composition tile (black, white and red), and stained cherry wall base (ODC, Building #33, Project #883314H). No historic material exists in this space today.

It should be noted that a metal access panel, outside of the entrance into the southwest pavilion, conceals the existing condition of the historic walls which includes the original sand plaster finish, imitation stone joints, plaster bead and late 19th century paint colors.

Second Floor
Partitions existed throughout the range on this floor after 1958 and before the 1976 renovation ("Second Floor Plan," June 27, 1967, SIA Binder, #S01-1166 -- see p. 3-49). They were removed post-1976: the present office 2310 appears to have been recently renovated.

2310 Office
This office was renovated into its existing configuration post-1976 and contains very few significant, historic finishes: top of pier arches along the east wall are still visible; some imitation stone joints can be seen on the exterior wall (this wall has been replastered fairly recently and a good part of the decorative work is now concealed) and along the piers on the north wall.

Contemporary, non-significant materials include: acoustical tile ceiling and gypsum wallboard bulkheads, all doors and frames, gypsum wallboard systems furniture, window units with UV filters and carpet with vinyl base.

2362 and 2362A Corridor and Storage
In 1988, 2362 and 2362A received new stained wood ‘period’ paneled doors and frames, acoustical tile ceiling, patterned vinyl composition tile (black, white and red), and stained cherry wall base (ODC, Building #33, Project #883314H).

Very little historic material exists in these spaces today. The original 1881 top of the pier arches exists in this corridor by the toilet rooms. The storage room contains 1896-1902 terrazzo flooring and some imitation stone joints on the small bit of exposed historic pier.

Missing Elements:
Original 1881 flooring, windows, and doors. It is unknown how much of the 1896-1902 terrazzo still exists underneath the present carpet or tile. The condition of the Hornblower and Marshall mezzanine gallery cannot be fully assessed. All gallery columns are replacements.

Recommendations:
Restore this range to its 1896-1902 configuration of one large room with the Hornblower and Marshall gallery. Retain historic terrazzo and imitation stone joints. Locate and restore the pairs of arched windows in the tower, annex and pavilion walls.

Heating, Ventilating and Air Conditioning: Install new systems concealed behind walls and in any existing voids. Locate piping and conduit concealed in existing chases.

Electrical, Security, Access Control and Fire Safety Devices: Install new systems in concealed spaces in existing chases behind the walls, ceilings and floors.
South West Court

The original 1881 configuration of this court was one large, open space with clerestory windows, plastered brick arched piers and Georgia yellow pine flooring laid over a concrete base. The gallery was added to all four sides of the court during the 1896-1902 building renovation program. The 1903 floor plans indicate that the second floor gallery was enclosed by partition infill and was only entered from the hall galleries near the rotunda (USNM Annual Report, 1903, Plate 26). By 1914, the first floor was completely enclosed and entered through doorways from the West South and South West Ranges (USNM Annual Report, 1914, p. 15). The court received a complete second and third floor (above the Hornblower and Marshall gallery), freight elevator and stair when the Hall of Health was installed in the late 1950s (ODC, Building #33, Project #A151-1 and A151C indicate new concrete columns, a new concrete mezzanine level, vent shaft, elevator and stairs). By 1958, there was only one entrance into the court on the first floor and the gallery level was still accessed from the hall galleries near the rotunda (First Floor Plan, February 11, 1958, SIA Binder, Drawing #S01/L148 and Second Floor Plan, February 15, 1958, SIA Binder, Drawing #S01/L149). The 1967 drawings indicate that the third floor contained offices and the lower floors contained some partitions (First, Second and Third Floor Plans, June 27, 1967, SIA Binder, Drawings #S01/L165, S01/L166, S01/L167). During the 1976 renovations, a concrete floor and metal grating was installed to form the mezzanine level between the ground and second floor (Hornblower and Marshall gallery level) (ODC, Building #33, Project #A17216A). Later renovations reflect the existing second floor partition layout (ODC, Building #33, Project #763217). (See pp. 3-219 - 3-222 for photos/drawings.)

First Floor

Elevator No. 2 and Stair
These elements have existed since the 1950s and consist of contemporary, non-significant materials including brick walls in the stair hall and concrete steps with rubber treads and metal nosing (ODC, Building #33, Project #A151-1 and A151C).

1336 Mechanical Room
Some of the 1892 flooring still exists on the first floor of this court: two sets of stamps on the 'stone' floor indicate "Richardson's Pat. Oct. 89 Carbonized Cement Stone Manuf'd at 210 N. St. SW, Wash. D.C." (see p. 3-220). The 1892 Superintendent's Report remarks that this floor was "Artificial Stone Pavement" (Superintendent's Report, Fiscal Year 1891-92, SIA, RU 158, Box 23). The "concrete" floor appears to be composed of "square tiles" that retain some of the reddish-brown finish coat.
The remainder of the space is obscured by contemporary additions including: the mezzanine level, elevator, stairs, temporary partitions (concrete masonry unit, etc.), concrete floor infill and hollow metal doors and frames. A portion of the floor has been lowered in the northeast corner to accommodate mechanical equipment.

1337 Office, 1338 Storage
Significant historic material in this space includes the 1881 horizontal half round bead on the piers' bases. The original sand finish and imitation stone joints are not visible in this space. Contemporary finishes include concrete masonry units, walls, carpet and concrete ceiling.

1339-1340 Locker Rooms
No significant historic material exists in this area with the exception of the structural piers. These 1881 piers have been skim coated and painted. The concrete and metal ceiling of the mezzanine level above dates from the 1970s renovations (ODC, Building #33, Project #AI7216A). Other contemporary finishes include the temporary wall partitions, doors, vinyl composition tile and carpet.

1341 Shop
Similar to office 1337, only the 1881 horizontal bead is still visible between the shaft and the base of the piers. Contemporary finishes include the temporary wall partitions, doors, vinyl tile, concrete and metal decking ceiling.

Mezzanine Floor
The mezzanine level was created during the 1970s renovation project and consists of a steel and concrete slab with metal decking infill and a considerable amount of mechanical equipment (ODC, Building #33, Project #AI7216A). The original 1881 pier arches have been damage over the years. One pier in particular in the northeast corner clearly displays a hollow interior at its cracked base. Many of the imitation stone joints are visible on this level.

The underside of the 1896-1902 Hornblower and Marshall gallery with its shallow scalloped concrete vaults and thin iron columns is visible throughout this level and appears to be in good condition.

A few locked storage spaces with temporary partitions (gypsum wallboard and stud walls) and new doors and frames have been constructed rather recently at the southeast corner on this level.

Second Floor
As noted above, the second floor was created during the 1950s when infill was constructed to span between the Hornblower and Marshall gallery (ODC, Building #33, Project #A151-1 and A1551C). In 1976, the floor plan appeared to be relatively open (ODC, Building #33, Project #AI7216A); however, some new wall partitions were added soon after (ODC, Building #33, Project #7633217).

2231 - 2251 Offices
The only historic material are the imitation stone joints on the piers. It is unknown how much of the Hornblower and Marshall terrazzo gallery exists underneath the carpet.

Contemporary, non-significant materials include: wall partitions, hollow metal doors and frames, stained wood "period" entry doors, acoustical tile ceiling with mechanical and fluorescent lighting, and carpet with vinyl base.

2330 Mechanical Room
This small mechanical space retains the 1902 terrazzo flooring and 1881 imitation stone joints on the piers. The underside of the 1950s third floor is visible in this space.

Third Floor
Minor modifications were completed in 1976. The current configuration of the computer room dates from post-1976 and appears to have been renovated within the last decade. All materials in this space are contemporary and all historic walls and ceiling have been completely concealed.

3350 Corridor
Contemporary finishes include hollow metal doors and frames, acoustical tile ceiling and vinyl flooring with vinyl base.

3351 - 3353 Computer Rooms
All materials in this space are contemporary additions to the South West Court including: acoustical tile ceiling with fluorescent lights and supply and return diffusers, gypsum wallboard partitions, gypsum wallboard in front of window walls and historic pier arches, hollow metal doors and frames, and access or raised flooring system for computer wiring.

Recommendations:
Restore Court to its original 1881 configuration of one large room, restoring the clerestory windows and lantern (monitor) above. Retain and restore the 1896-1902 Hornblower and Marshall gallery. Retain the 1892 concrete floor on the first floor and restore floor throughout.
Heating, Ventilating and Air Conditioning: Install new systems concealed behind walls and conceal in any existing voids. Locate piping and conduit concealed in existing chases.

Electrical, Security, Access Control and Fire Safety Devices: Install new systems in concealed spaces in existing chases behind the walls, ceilings and floors.

South West Annex

This Annex was originally composed of a single large room on each the first and second floors. Early photographs indicate that pairs of arched windows overlooked the West South Range on both floors (see p. 5-213). Early floor plans also indicate that pairs of arched windows overlooked the South West Range as well. As the notes describe below, very little historic material survives on either floor of the South West Annex today.

First Floor

As it is today and in 1881, this floor of the annex was on the same level as the surrounding ranges and a set of stairs accessing the South West Pavilion’s first floor appeared along the annex’s south wall on floor plans until 1973. The 1903 set of floor plans (USNM Annual Report, 1903, Plate 25 – see p. 3-32) indicates that a mezzanine level existed from that time until the 1970s renovation. The toilet rooms were renovated in 1973 (ODC, Building #33, Project #AI732A) and were reflected as “as-built” on the 1976 renovation drawings. (ODC, Building #33, Project #AI7216A).

1358 Men’s Toilet and 1359 Women’s Toilet

All of the finishes are a result of the 1973 renovation and are contemporary, non-significant materials: a new structural floor was provided between the first and second floors, "period" stained wood paneled door with kick plate and marble threshold, ceramic tile floor, ceramic tile wainscoting, composite plastic stall partitions, toilet and sink fixtures and painted plaster shallow scalloped vaults. (ODC, Building #33, Project #AI732A). New window units with UV filters were installed during the 1982-84 renovation (ODC, Building #33, Project #8 8233103, 8333103 and 8433101).

Second Floor

The Chemical laboratory occupied the second floor of this annex originally and an original floor plan illustrating this room as the ‘Assay Room’ can be found in the Annual Report of the Smithsonian Institution for 1881 (Annual Report of the Board of Regents of the Smithsonian Institution, 1881, p. 162, SIA and SI-AHHP, NBM Floor Plan Binder – see p. 3-227). The toilet rooms were constructed in 1973 (ODC, Building #33, Project #AI732A).

2368 Women’s Toilet and 2369 Men’s Toilet

All of the finishes in this room date from the 1973 renovation and are contemporary, non-significant materials: a new structural floor was constructed between the first and second floors, "period" stained wood paneled door with marble threshold, ceramic tile floor, 4" brown ceramic tile walls to finished ceiling, metal stall partitions, toilet and sink fixtures,
and acoustical tile ceiling with fluorescent lights. New window units with UV filters were installed during the 1982-84 renovation (ODC, Building #33, Project #s 8233103, 8333103 and 8333101). The small supply closets have been inserted in the original arched window openings.

Missing Elements:
Original office configuration, 1881 flooring, wall base, original plaster wall finish, windows, doors, and set of first floor steps accessing the South West Pavilion. Pairs of Cluss arched windows.

Recommendations:
Restore the first and second floor plan configuration of large, single rooms.

Restore Cluss' pairs of arched windows overlooking the ranges: three sets in the West South Range (See historic photograph on page 3-213) and the two to four sets that existed in the South West Range. Floor plans for the latter indicate that two sets may have existed on the first floor. An April 1881 floor plan indicates that two sets did exist on the second floor in the "Assay" Room at that time (Annual Report of the Board of Regents of the Smithsonian Institution, 1881, p. 161, SI-AHHP NBM Floor Plan Binder -- see p. 3-227).

South West Pavilion

At its original construction, this pavilion housed the chemical laboratories (USNM Annual Report, 1881, p. 17). The pavilion has always lodged offices of some kind and has never been employed for gallery space. The basement contained the first boilers for the building; a chimney for the boilers is located in the northeast corner. (See pp. 3-225 - 3-231)

Basement

In 1881, the basement accommodated the first boilers and continues to serve mechanical needs today. For a time following 1937-38, portions of the basement were utilized for a toilet and locker room for the workers where the boilers were removed and evidence of this use is still noticeable today (Annual Report, 1937-1938. Division of Buildings and Labor, SIA, RU 157, Box 7).

B411, B417 Storage
Technically, these rooms are underneath the West South Range. Original 1881 historic material includes: painted brick barrel vaults and gneiss rubble stone and brick foundation walls.

B413, B414 Storage
With the exception of the exterior walls, the Generator Room is composed of contemporary, non-historic material including: concrete masonry unit walls, hollow metal doors and frames. The windows have been concealed by louveres etc.

The remainder of the space, including the wall that separates this space from B415, was constructed during 1937-38 when this area became a locker room for building workers. The 1977 as-built drawings indicate that this space still functioned as a toilet room (ODC, Building #33, Project #A17216A). Rectangular white ceramic tiles line much of the walls as wainscoting and 2" hexagonal white ceramic tile covers the floors. The door that accesses this space is covered in sheet metal (date of installation is unknown).

B415
Historic material includes original whitewashed gneiss and brick plastered foundation walls and shallow brick ceiling vaults. As mentioned above, the wall separating this space from B414 and B415 was added in 1937-38. The telephone closet in this room was added post-1976.

The concrete floor is scored into 4’ x 4’ blocks. Date of installation is unknown.
Historic materials include plastered foundation walls, shallow brick ceiling vaults, and window masonry openings.

The installation date of the brick and concrete ledge and concrete floor is unknown.

Contemporary, non-historic finishes include the window units (1982-84) and existing door (ODC, Building #33, Project #8233103, 8333103, 8433101).

**Stair**
The stairs accessing this level continue as part of the original 1881 cast iron stair. It is unknown when the concrete masonry unit partition was added to enclose the stair.

**First Floor**

This floor became the new print shop during 1930-1931 and several photographs from this time exist today. This floor was configured with its current office partition layout during 1977 and 1983 (ODC, Building #33, OPP Projects #7733435 and #8333107).

**1360 and Stair**
The cast iron stair is original to the construction of the building and remains in its 1881 location. Significant finishes in this hall include original arched door openings framed with corner beads leading to offices, painted plaster walls, painted stone base and painted plaster shallow scalloped vaults.

It is unknown when the plain painted wood wainscot located on the open side of the bracketed stairs was added to this space.

Today, the hall includes the following contemporary, non-historic finishes: 1976 ‘period’ half entry door and plaster arch, wire glass paneled doors with transoms leading to offices, rubber stair treads and carpet. The hall also contains extensive exposed piping on the ceiling.

**Missing Elements:**
Original 1881 wood flooring, wall base, and doors.

**1361-1367 Offices**
Similar to the other pavilions, rooms 1363, 1363A and 1365 were originally one large room. At the north end of room 1361, a small toilet room, similar to that which exists in the North West Pavilion, may have existed from initial construction until 1903.

**Ceiling:** 1881: Painted plaster shallow scalloped vaults

**1976:** Bulkheads added throughout office for mechanical systems (ODC, Building #33, Project #A17216A).

**Cornice:**

**Walls:**
1881: Painted plaster walls with sand plaster finish; some of the original finish survives throughout this space.

**Post-1976:** Painted gypsum wallboard partitions added to create 1363, 1363A and 1365; partitions also added to create 1362.

**Windows:**
1881: Masonry openings; existing exterior grilles either original or replicas.

1982-84: Stained wood window units (trim, sills etc.) with clear insulated glass replace original windows; wood stained shutters (ODC, Building #33, Project #8233103, 8333103, 8433101).

**Doors:**
1881: Original openings and portions of painted wood frames exist at all three openings to these offices from the stair hall; it is very likely that the tall, wood painted doors with glass transoms are original to the pavilion.

The wire glass panels are contemporary additions.

**Light Fixtures:**
All offices contain contemporary fixtures which are mounted to the underside of the plastered beams.

**HVAC:** 1976: Fan coil units (ODC, Building #33, Project #A17216A).

**Wall Base:**
1881: Stone exists on original 1881 walls.

**Post-1976:** New wood base at added partitions.

**Flooring:**
1881: Florida pine

**Post-1976:** New carpeting installed throughout.

**Second Floor**

Minor renovation work occurred during 1977 and 1979 (ODC, Building #33, OPP Projects #7733435 and 7933106). The current configuration of the second floor dates from post-1979.
2360 and 2360A Stair
The cast iron stair continues in this hall and is located in its original, historic location. As mentioned with the first floor stair, extensive exposed piping exists on both the south and east walls. The walls of the stair hall leading to the third floor have been replastered and the original sand plaster finish no longer survives.

Recommendations:
Restore the stair to the original 1881 configuration with the pairs of arched windows overlooking the West South Range.

2361 - 2367 Offices
These offices are largely true to their original 1881 configuration. Minor renovation work occurred in 1977 and 1979 (ODC, Building #33, OPP Projects #7733435 and 7933106).

With the exception of the gypsum wallboard partitions dividing offices 2363A, 2363B, 2365 and 2366, all walls and most door openings are original to the construction of the pavilion. It should be noted that one of the arched window openings is still somewhat defined along the east wall of 2361. The opening has been filled in but the niche that has been created is clearly defined.

Ceiling: 1881: Painted plaster shallow scalloped vaults
1979: Bulkheads added throughout office for HVAC; acoustical tile ceiling added in reception area (ODC, Building #33, Project #7933106).

Cornice: 1976-1979: Painted crown molding added to 2361, 2365 and 2367; sprinklers are mounted on face, similar to other pavilions.

Walls: 1881: Painted plaster walls with sand plaster finish.
1976: Exterior walls furred out to accommodate HVAC (ODC, Building #33, Project #A17216A).
1979: Gypsum wallboard partitions dividing original 1881 large square office into four equal offices (2363A, 2363B, 2365 and 2366).

Windows: 1881: Masonry openings
1982-84: Stained wood window units (trim, sills etc.) with clear insulated glass and shutters replace original windows (ODC, Building #33, Project #8233103, 8333103, 8433101).

Doors: 1881: Few wood doors and frames exist from this period with the exception of the wood paneled door between 2360A and 2361 and the wood paneled door with transom between 2367 and 2363A (transom glass is probably not original). Original doorways with corner beads exist from the stair halls and between 2367 and 2363A. The original opening between 2361 and 2365 still exists today although infill construction has made this doorway impassable.
1979: Most doors in this space are contemporary, wood bifold etc. (ODC, Building #33, Project #7933106).

Light Fixtures: All rooms contain contemporary fixtures.

Wall Base: 1881: Stone
1979: Painted wood throughout offices, except on original walls which still contain the 1881 stone base (ODC, Building #33, Project #7933106).

Flooring: 1881: Florida pine
1979: Carpeting installed throughout (ODC, Building #33, Project #7933106).

Missing Elements:
Original 1881 wood flooring, windows, doors and partition configuration.

Third Floor
The third floor was originally one large open room. The 1967 floor plans indicate that partitions divided this space by that time ("Third Floor Plan," June 27, 1967, SI Neg. #96-2894 -- see p. 3-50). Major renovation work occurred during 1977 (ODC, Building #33, OPP Project #7733435) when everything except the exterior walls was completely demolished. A few partitions were added after this renovation and much of the existing finishes actually date from 1987-1988. (The latter was confirmed by one of the floor's longtime tenants.)

3260 - 3265 Offices
Ceiling: 1881: Exposed underside of roof; iron tie rods are visible in center space above clerestory and across pavilion space (see photographs of typical 1881 third floor pavilion open room such as p. 3-230).
1980s: New plaster ceiling installed during roof renovation.
1990: Bulkheads added throughout office for HVAC, etc.
Cornice:  1990: Stained wood picture rail exists in most rooms.

Walls:  1881: Painted plaster walls with sand plaster finish.

Windows:  1881: Masonry openings; original corner beads still exist in 3360a, 3361, 3362b and 3364.
        1885: All windows were removed, new sash was made and windows were made "so as to swing instead of hoist" (Letter/semi-annual report submitted to G. Brown Goode, January 1885, SIA, RU 158, Box 22).
        1982-84: Painted arched wood window units (trim, sills etc.) with clear insulated glass; clerestory windows contain UV filters (ODC, Building #33, Project #s 8233103, 8333103, 8433101).
        c. 1987-88: Many additional clear glass lights have been added to office partitions to increase amount of natural lighting for darker offices.

Doors:  1881: None.

Light Fixtures: All rooms contain contemporary, reproduction fixtures.

HVAC:  1976: Fan coil units (ODC, Building #33, Project #AI7216A).

Wall Base:  1881: Stone
        1990: Painted wood throughout offices; height matches existing painted original stone base that still appears on the exterior walls.

Flooring:  1881: Florida pine
        1977?: New carpeting installed throughout.

Missing Elements:
Original 1881 wood flooring, wall base, windows, and doors.

Recommendations:
Restore the original configuration of the spaces.

Retain original plaster ceilings, plaster walls, stone wall base, cast iron staircases and original door openings as mentioned above.

Remove existing floor coverings and restore and/or reconstruct wood flooring to match original throughout first floor.

Reconstruct pairs of arched Cluss windows in office in stair halls and offices.

Heating, Ventilating and Air Conditioning: Install new systems concealed behind walls and in any existing voids. Locate piping and conduit concealed in existing chases in walls.

Electrical, Security, Access Control and Fire Safety Devices: Install new systems concealed behind the walls, ceilings and floors.
South West Range

This range was originally one large open space similar to all of the other ranges. During the 1896-1902 Hornblower and Marshall renovations, a mezzanine gallery was added to the three interior sides of the room and a "cement" floor was added to the first floor (Report of the Chief of Buildings and Superintendence of the United States National Museum for the Fiscal Year Ending June 30, 1898, SIA, RU 158, Box 22). During May 1903, new "Rendle" skylights (8.5' by 12') were erected on the roof (Annual Report of Superintendent, 1902-03, SIA, RU 157, Box 1). By 1914, gypsum block infill had separated much of the range from neighboring rooms (USNM Annual Report, 1914, p. 15). During 1933-34, metal pipe railing with diagonal wire mesh panels was installed on the gallery (Report to Mr. J. E. Graf from Superintendent of Buildings and Labor For Fiscal Year Ending June 30, 1934, SIA, RU 157, Box 6; see also p. 3-233). Interior partitions first appeared on the second floor on the 1967 floor plans (Second Floor Plan, June 27, 1967, SI Neg. #96-2895 - see p. 3-49) and some of these partitions still exist today. The current configuration of the Discovery Theater which encompasses much of the first and second floor dates from 1978 (ODC, Building #33, OPP Project #7833109). The storage rooms on the second floor were constructed later. (See pp. 3-233 - 3-236 for photographs and drawings.)

First Floor

Concrete or "cement" flooring (c. 1898), scored into blocks, is evident on the first floor in 1955 photographs. In 1960, a latex terrazzo floor was placed over the scored concrete with a 6" rubber base (ODC, Building #33, Project #A1601C).

1317 Corridor

This corridor was created during the construction of the theater renovation. The terrazzo flooring in this corridor was installed in 1960 (ODC, Building #33, Project #A1601C). The north, south and west wall infill (gypsum block) of the original arched piers existed on floor plans as early as 1914 (USNM Annual Report, 1914, p. 15).

1370 Theater and 1370A Box Office

This space contains a few significant historic finishes. A portion of the Hornblower and Marshall gallery railing and steel beam of the gallery can still be seen along the east wall. This portion of railing appears to have been added after the early 1960s. Historic photographs and drawings indicate that a metal pipe railing with wire mesh existed on the gallery in this range since 1933-34 (see pp. 3-233 and 3-235). Imitation stone joints and plaster beads separating the pier base from its shaft are still visible along the wall underneath the covered windows and on many of the piers. The underside of the historic concrete mezzanine galleries along the north and south walls are visible in this space. Finally, two original cast iron columns remain in this space.
Contemporary, non-significant finishes include: partitions in front of window, theater seating and walls, metal decking of the roof above, lighting, terrazzo near the West Hall entrance and carpet.

**Second Floor**

**2370 Corridor**
This corridor was constructed during the theater renovation. It was completely renovated during 1988 corridor renovations (ODC, Building #33, OPP Project #883314H) and includes the following contemporary, non-significant finishes: stained wood "period" paneled doors and frames, acoustical tile ceiling with fluorescent lights and sprinklers, patterned vinyl composition tile (black, white and red), and stained cherry wall base.

**2371 - 2375 Storage.**
Some of these rooms existed before the 1976 renovation and the rest were constructed after the theater renovation was completed. They consist of contemporary, non-significant materials including: gypsum wallboard ceiling and walls, "period" paneled doors, frames and 9" vinyl tile flooring. Portions of the Hornblower and Marshall gallery railing can be seen in this space.

**2377 - 2377B Offices**
These offices partially existed on the 1967 floor plans ("Second Floor Plan," June 27, 1967, SI Neg. #96-2895 -- see p. 3-49). The original 1881 pier arches with imitation stone joints exist in this space today. Non-historic finishes include acoustical tile ceiling, gypsum wallboard partition along the south wall and carpet with vinyl base.

**2376 Locker Room**
It is unknown if any of the 1896-1902 gallery finishes exist underneath the existing finishes. The original 1881 pier arches with imitation stone joints exist in this space today. Non-historic finishes include acoustical tile ceiling, gypsum wallboard partition along the north wall and carpet with vinyl base.

**Missing Elements:**
1881 configuration of one large room with 1896-1902 Hornblower & Marshall gallery; 1881 flooring, wall base, windows and doors.

**Recommendations:**
Restore this range to its 1896-1902 configuration of one large room with the Hornblower and Marshall gallery. Retain historic terrazzo and imitation stone joints (restore where necessary). Locate and restore the pairs of arched windows in the tower, annex and pavilion walls.

Heating, Ventilating and Air Conditioning: Install new systems concealed behind walls and in any existing voids. Locate piping and conduit concealed in existing chases in walls.

Electrical, Security, Access Control and Fire Safety Devices: Install new systems concealed behind the walls, ceilings and floors.
West Hall

The West Hall remains as originally constructed as one large, open hall with exposed trusses. The Hornblower and Marshall galleries of 1896-1902 are extant. Infill between the arched piers occurred at various points in the history of the building. (See pp. 3-237 - 3-243 for photos/drawings.)

First Floor

Ceiling: 1881: Plaster; later removed due to failure of the plaster.

1912-13: #29 gauge beaded sheet iron is installed in triangular areas near Rotunda (Report of Superintendent of Construction & Labor, 1912-13, SIA, RU 157, Box 1).

1992: Metal ceiling painted; asbestos removal (ODC, Building #33, Project #923311).

Walls: 1881: Painted plaster with imitation stone joints; pilasters on the pier arches were painted with contrasting colors; some decorative stenciling at the east wall adjacent to the Rotunda.

1900+: Plaster block infill is added between the pier arches for fireproofing purposes and the character of the hall is changed.

1976: New plenum wall is inserted within the arches of the 4-5 bays closest to Rotunda (ODC, Building #33, Project #A17216A).

1990-1992: According to OPP Projects #903321 and 923311, the rotunda and hall were repainted in the following locations: at the head of arches, below clerestory windows, and the shafts of pier arches. It is unknown how much of this work was completed (ODC, Building #33).

Pilasters: 1881: Painted plaster with imitation stone joints and molded capitals; shaft is painted with an accent color.

Windows: 1881: Decorative "Cathedral" colored glass between towers; double glazed glass in clerestory and lantern windows (Letter to Cluss & Schulze from L. E. Gannon, December 23, 1879, SI-AHHP, Box 2).
1982-1984: Decorative colored glass was to be laminated; window units repaired and frame, sash, trim and glass was replaced as necessary; clerestory windows received new glass with UV filters, frames, trim and sash (ODC, Building #33, Project #s 8233103, 8333103 and 8433101).

Doors: See West Tower vestibule and individual offices. No original doors exist in this space. All wood stained "period" doors were installed during the 1970s renovation.

Light Fixtures: 1881: None.

c. 1896-1902+: Simple glass globe pendants hang throughout hall (p. 3-239). Light fixtures at gallery railings.

c. early 1900s: Decorative globe pendants on thick chains hang throughout hall for many years and become museum standard (p. 3-240).

1976: Existing chandeliers are modern, contemporary additions to this hall (ODC, Building #33, Project #AI7216A).

HVAC: 1976: Plenum walls supply and return air (ODC, Building #33, Project #AI7216A).

Wall Base: 1881: None

1976: Stained wood (ODC, Building #33, Project #AI7216A).

Flooring: January - March 1881: Temporary pine floor

Late 1881: Slate and marble floor 1" thick: 12" x 24" "American-Italian" white veined marble, 18" x 12" grey Vermont slate, 12" square red Vermont slate and black slate tile. Installed by E. Fritsch of NYC (Report of the Architects of the National Museum Building for 1881, SI-AHHP, Box 2). Parti-colored Portland cement (mostly red) and 1 ½" thick dark blue Pennsylvania slate around perimeter (Request for "Proposals for Marble and Slate Tiling and for Slate Floor Slabs," March 31, 1881, SIA, RU 7081, Box 28 and Report of the Architects of the National Museum for 1881, January 1, 1882, SI-AHHP, Box 2).

1976: New utility trench disturbs existing flooring (ODC, Building #33, Project #AI7216A).

Other: 1976: Sprinklers appear inconspicuous along ceiling (ODC, Building #33, Project #AI7216A).

Missing/Damaged Elements:
The character of the hall has been compromised with the addition of the 1976 plenum walls.

Failure of the translucent glass has occurred in both the center bay and right bay of the decorative windows on the west wall.

The slate and marble floor appears to be extensively damaged at the present time. Due to previous exhibits containing heavy objects (trains, etc.), many tiles are missing and are in the process of being replaced. The earth floor is exposed in many places and indicates that the 1881 bed of concrete is only about 2" thick. Floor is heavily stained in a large area near the Rotunda

Second Floor

2400A Balcony West

1881: This balcony is original to the construction of the building and includes its original decorative brackets and molding.

1918: Terrazzo floor replaces old 1881 wooden floor for exhibition purposes and matches that of the north and south galleries (2400 and 2400B) (Report of the Superintendent of Buildings and Labor for the Fiscal Year 1918-1919, SIA, RU 157, Box 3).

2400B Gallery North/South

1896-1902: Hornblower and Marshall added this gallery, its cast iron railing, cast iron balcony stairs and terrazzo floor.

1976: Furred plenum added to the arched piers to provide supply and return air. Diffusers were masked as circular openings in the center of the niches. Return air grilles were disguised by the new baseboard (ODC, Building #33, Project #AI7216A).

Stair W1

Cast Iron: 1881: Spiral stair with iron balusters and railing.

1976-1982: Floor plans reflect that portion of stair may have been removed at this time and existing 1999 configuration created.
Stair W2
Cast Iron: 1881: Spiral stair with iron balusters and railing.

1903: Floor plans reflect that the first floor portion of this stair was removed at this time (USNM Annual Report, 1903, Plate 25 -- see p. 3-32). Configuration shown on these floor plans exists today

Recommendations:
Retain the exposed metal ceilings, decorative pier arches, colored glass of the west windows, the Hornblower and Marshall galleries, terrazzo and iron railings, and the slate and marble floor.

Clean, repair and repaint metal gratings and trusses.

Remove 1976 plenum walls and other infill that exists between the 1881 pier arches and restore the design intent of open, flowing gallery space between the halls, courts and ranges. Repair plaster pier arches and paint room (especially decorative pilasters) with historic colors. Restore imitation stone joints throughout hall.

Windows: Replace translucent glass that has failed in the decorative windows of the west wall.

Clean and polish existing slate and marble floor if it exists. Replace mismatched slate and marble floor tiles with new tiles that more closely match the 1881 floor.

Lighting: Replace current chandeliers with reproductions of historic pendant lights as depicted in historic photographs. Provide reproduction light standards and mount on Hornblower and Marshall gallery railings as indicated in historic photographs.

Heating, Ventilating and Air Conditioning: Install new systems concealed behind walls and in any existing voids. Locate piping and conduit concealed in existing chases in walls.

Electrical, Security, Access Control and Fire Safety Devices: Install new systems concealed in existing chases behind the walls, ceilings and floors.

West Tower
PRIORITY ONE ZONE

Hornblower and Marshall closed the West Tower entrance in 1898 and turned renovated the interior and exterior vestibules for office use ("Alterations and Additions," August 8, 1898, SI Neg. #89-12893 -- see p. 3-245). During the 1970s building renovation, a number of temporary office partitions were removed from the first floor and the vestibules were restored to their original use. (See pp. 3-245 - 3-249 for photos and drawings.)

First Floor

1401-1404 Offices
Ceiling: 1881: Painted plaster shallow scalloped ceiling vaults

1976? (date unknown): Bulkhead exists in 1403

Walls: 1881: Painted plaster with sand finish; the original finish is concealed under subsequent repairs and replastering

1976: Walls built-out in front of windows in 1401 and 1403 to accommodate and conceal HVAC (ODC, Building #33, Project #A17216A).

Windows: 1881: Masonry openings

1976: Pair of arched windows with clear glass reconstructed in 1404 (overlooking West Hall) (ODC, Building #33, Project #A17216A).

1982-84: New window units with clear insulated glass; new shutters added (ODC, Building #33, Project #s 8233103, 8333103, 8423101).

Doors: 1881: Original arched doorway opening between 1401 and 1403; corner beads with acorns still exist

1976: 'Period' stained wood paneled door and frame added to suite entry (ODC, Building #33, Project #A17216A).

Light Fixtures: There are no historic light fixtures in this suite.

Stairs: 1881: Steps accessing this suite were originally located outside 1402

1896-1902: Suite entry steps relocated to East Tower vestibule
1976: New oak steps with handrail added to 1404 (ODC, Building #33, Project #A17216A).

HVAC: 1976: Fan coil units in each space (ODC, Building #33, Project #A17216A).

Wall Base: 1881: Stone

1976? (date unknown): Vinyl

Flooring: 1881: Florida pine

1896-1902: Terrazzo added during this time still exists at door threshold and entry into 1404. (It is unknown how much of this exists today under the present carpet.)

1976? (date unknown): Carpet over wood strip flooring

**Missing Elements:**
Original 1881 flooring, wall base, windows, doors, and steps into original entry 1402. Pair of arched Cluss windows in 1402 overlooking the adjacent Range.

**1405 Vestibule:**
In 1890, the West entrance walnut doors and transoms were relocated to the outside of the decorative entry archway to give more room to office space (Semi-Annual Report of Superintendent of Buildings and Labor, July 1 - December 31, 1889, SIA, RU 158, Box 22). As noted previously, the West entrance was closed altogether in 1898 when Hornblower and Marshall added glass and masonry infill to create more office space ("Alterations and Additions," August 8, 1898, SI Neg. #09-121893 — see p. 3-245). The 1976 building renovation restored the West entry to its former splendor (ODC, Building #33, Project #A17216A).

Historic material in the exterior vestibule includes: 1881 design encaustic multi-color tile (replicated 1976), brick walls and barrel vaulted ceiling, and original wrought and cast iron entry gates (salvaged portions of original gates restored 1979 -- see p. 3-249).

Historic material in the interior vestibule includes: 1881 painted plaster shallow scalloped vaults.

Contemporary and non-significant material includes: pair of 1970s oak double doors with clear beveled glass panels and arched transom windows which match the other three entrances; stained period doors and frames leading to offices, stone pavement (black, green, and red) in the interior vestibule; black rubber mat with brass strips; painted wood base; and plaster horizontal head. The globe light fixture that hangs in the exterior vestibule was added to the building during the 1976 renovation.

**Missing Elements:**
Original 1881 flooring, wall base, and original configuration of pair of plastered brick arches niches in inner vestibule.

**1406-1409 Offices**
These offices are similar in existing finishes to 1401-1404. The doorway between 1407 and 1409 is the only doorway that is original to the suite. Portions of the painted wood frame date from 1881. The door with glass panel and transom are not original. All other walls have been modified over the years. A pair of arched windows with clear glass was reconstructed in Room 1406 in 1976 (ODC, Building #33, Project #A17216A).

Other contemporary non-significant finishes that were not present in 1401-1404 include painted and stained wood base, chair and picture molding throughout suite.

**Missing Elements:**
Original 1881 flooring, wall base, windows, doors, steps accessing suite (outside 1408) and cast iron stair access second floor offices (inside 1408). Pair of arched Cluss windows in 1408 overlooking the adjacent Range.

**Second Floor**

**2401, 2403, 2407, 2409 Offices**

**Ceiling:**
1881: Painted plaster shallow scalloped ceiling vaults in 2401

1881?: Sloped painted plaster ceiling in 2403

1976? (date unknown): Bulkheads in 2401

**Walls:**
1881: Painted plaster with sand finish; the original finish is concealing under subsequent repairs and replastering

1976: Wall built out in 2401 to accommodate HVAC (ODC, Building #33, Project #A17216A).

**Windows:**
1881: Masonry openings; window jambs, sill and trim in 2403 is original although glazing has been replaced.
1982-84: New window units with clear insulated glass; new shutters added (ODC, Building #33, Project #s 8233103, 8333103, 8433101).

Doors: 1881: Original arched doorway openings; original wood frame with corner beads

1976: Entry door is repainted with decorative grain finish; does not appear to be original to these offices (ODC, Building #33, Project #AI7216A).

Light Fixtures: There are no historic light fixtures in these spaces.

HVAC: 1976: Fan coil units in each space (ODC, Building #33, Project #AI7216A).

Wall Base: 1881: Stone
1976: Vinyl (ODC, Building #33, Project #AI7216A).

Flooring: 1881: Florida pine; original wood flooring still exists at door threshold; stone threshold between balcony and 2403.
1976: Carpet (ODC, Building #33, Project #AI7216A).

Missing Elements:
Original 1881 flooring?, doors and windows.

Third Floor

3401 and 3409 Offices
Ceiling: 1881: Painted plaster shallow scalloped ceiling vaults
1976: Roof hatch and supply? air vent in ceiling (ODC, Building #33, Project #AI7216A).

Walls: 1881: Painted plaster with sand finish; the original finish is concealed under subsequent repairs and replastering

Windows: 1881: Masonry openings
1982-84: New window units with clear insulated glass; new shutters added; stain of wood is lighter than usual in 3409 (ODC, Building #33, Project #s 8233103, 8333103, 8433101).

Doors: 1881: Original arched doorway opening with wood frame and corner beads

1976: Doors are repainted with decorative grain finish; do not appear to be original to these offices (ODC, Building #33, Project #AI7216A).

Light Fixtures: No historic light fixtures hang in these offices.

HVAC: 1976: Fan coil units in each space (ODC, Building #33, Project #AI7216A).

Wall Base: 1881: Stone exists today.
1976?: Some painted wood base added 3409.

Flooring: 1881: Florida pine; stone threshold at doorway to 3409
1976?: Carpeting added.

Missing Elements:
Original 1881 flooring?, windows, and doors.

Recommendations
Restore the original space configuration of the offices, vestibules and their entrances to their 1881 design. The side walls of 1405 should reflect their original plastered brick niches. Maintain the existing 1881 significant historic fabric noted above. Reconstruct pairs of arched windows in offices 1402 and 1408 that overlook the ranges. Remove carpet and refinish/reconstruct wood floors to match original.

Lighting: Replace existing vestibule and office lighting with historically compatible fixtures.

Heating, Ventilating and Air Conditioning: Install new systems concealed behind walls and in any existing voids. Locate piping and conduit concealed in existing chases in walls.

Electrical, Security, Access Control and Fire Safety Devices: Install new systems in concealed spaces in existing chases behind the walls, ceilings and floors.
North West Range

In 1881, this range was constructed as one large open room with a shed roof and pier arches on three interior walls. According to the 1881 Inaugural Ball floor plan, sets of arched windows do appear between this room and the West Tower (today room 1208) and the North West Annex ("Inauguration Ball, March 4, 1881, National Museum Building" program, SI-AHHP, Box 5). During the 1896-1902 Hornblower and Marshall renovation, a second floor gallery was constructed only along the north wall for use by the library (located in the North West Annex) and remained until 1971 (Annual Report of the Board of Regents of the Smithsonian Institution, 1898, p. 7 and USNM Annual Report, 1903, Plate 26). Gypsum block partitions were erected about this time (1900) and separated the range from the North West Court and West Hall on the second floor (USNM Annual Report, 1903, Plate 26). By 1914, the ground floor appears to have only three (arched?) entrances into the room (USNM Annual Report, 1914, p. 15). Floor plans indicate that this range displayed "costumes" from 1919-1930 (Floor plans in USNM Annual Reports, 1918 (Plate 4), 1919 (Plate 7) and 1925; but gone by 1930 Brief Guide to the Smithsonian Institution; found in SI-AHHP, NMB Floor Plan Binder). This range was known as the Numismatics Hall in the late 1950s (ODC, Building #33, Project #A1591C – see p. 3-252 and 3-253). The 1970s demolition floor plans indicate that the second floor of the range was completely floored in on the second level by the time of the 1976 building renovation (ODC, Building #33, OPP Project #A1713A indicates construction of a "steel and concrete mezzanine level structural floor"). Partitions were added to the second floor during 1976 (ODC, Building #33, OPP Project #7633338). Today the gallery remains above the acoustical ceiling tile but columns are replacements, probably dating from the infill construction. (See photos/drawings on pp. 3-251 - 255.)

First Floor

1410-1417, 1430-1432 Offices

These office spaces were renovated in 1988 and 1990 (ODC, Building #33, OPP Project #883310, ODC, Building #33, OPP #903303).

Ceiling:

1881: None; metal trusses and grating supporting roof were visible.

1896-1902: Steel and concrete gallery added along north wall; Polshek Tobey + Davis has visually confirmed that this gallery still exists.

1904-05: Skylight(s) installed over "north" end (Annual Report of Superintendent of Construction & Labor, 1904-05, SIA, RU 157, Box 1).
1971: Second floor created; acoustical tile ceiling installed at this time? (ODC, Building #33, Project #A1713A.)

1999: Acoustical tile ceiling exists; steel joists and metal decking support the second floor and are visible above the acoustical tile ceiling today.

Walls: 1881: Painted plaster walls (pier arches on three out of four walls; decorative imitation stone joints with half-round horizontal bead separating pier base from shaft accentuate the plaster).

1914: Gypsum block infill between original pier arches existed by this time (USNM Annual Report, 1914, p. 15).

1976-1990: Gypsum wallboard partitions added for offices; OPP #7633338 (most) and #883310 drawings indicate 1430-1432 current configuration; OPP Project #9033303 drawings indicate current 1410-1417 partition layout (ODC, Building #33).

Columns: 1881: Pier arches; many of the piers are still differentiated from the infill construction and contain their original plaster sand finish, horizontal half-round bead and decorative masonry joint lines.

Windows: 1881: Horizontal half-round bead separates the base from the upper wall and is evident the entire length of the west wall; masonry openings date from this period. The 1881 Inauguration floor plan indicates that pairs of arched windows existed on the first floor annex walls overlooking the NW range ("Inauguration Ball, March 4, 1881, National Museum Building," SI-AHHP, Box 5). If these existed, they may have been removed or concealed when bookcases were placed against the walls.

1982-1984: Window units replaced with opaque glazing (ODC, Building #33, Project #8233103, 8333103, 8433101).

Doors: 1976: "Period" stained wood frame and door (suite entry from West Hall) (ODC, Building #33, Project #A17216A).

1976-1990: Hollow metal frames and doors throughout offices suites.

Light Fixtures: No historic fixtures exist in this space; modern fluorescent fixtures are mounted in the acoustical tile ceiling grid.

HVAC: 19- (date unknown): Supply and return diffusers are mounted in the acoustical tile ceiling.

Wall Base: 1960: Six inch rubber cove base
1988: Stained wood

Flooring: 1881: Florida pine

1891-92: Concrete ("cement or granolithic pavement") scored into large 5'-0" blocks (approx.) (Superintendent's Report, Fiscal Year 1891-92, SIA, RU 158, Box 23).


1960: Vinyl asbestos tile over existing scored concrete pavement (ODC, Building #33, Project #A1591C).

1988: Carpet

Missing Elements:
1881 flooring, base, original single room configuration, and windows, especially the pairs of arched openings on the West Tower and NW Annex walls.

Second Floor

Construction of the second floor was done during 1971 (ODC, Building #33, Project #A1713A) with the installation of a "steel and concrete mezzanine level structural floor." Renovations carried out in 1976 resulted in the current partition layout (ODC, Building #33, OPP Project #763338).

2410 - 2420, 2432 Offices
Finishes are very similar to those described for the first floor. This set of offices is currently undergoing renovation and partitions have been modified. The exterior wall contains a sand plaster finish in 2418 but it is unknown if this is original. Rooms 2414 and 2412C contain smooth walls which were probably replastered. Some decorative imitation stone joints do exist on most of the exposed piers. The south wall contains original masonry arches which are still visible. The acoustical tile ceiling is composed of return and supply diffusers and fluorescent lights. The exterior wall contains translucent glass windows similar to the first floor. The carpet and vinyl base are relatively new additions.
Steel trusses and decking are visible above the acoustical tile ceiling. Many doors contain ribbed glass lights or are replica doors.

**Missing 1881 Elements:**
Pairs of Cluss arched windows existed between the second floor North West Annex and the Range.

**Recommendations:**
Restore this range to its 1896-1902 configuration of one large room with the Hornblower and Marshall gallery. Retain historic terrazzo and imitation stone joints (restore where necessary). Locate and restore the pairs of arched windows in the annex walls.

**Heating, Ventilating and Air Conditioning:** Install new systems concealed behind walls and in any existing voids. Locate piping and conduit concealed in existing chases in walls.

**Electrical, Security, Access Control and Fire Safety Devices:** Install new systems in existing chases behind the walls, ceilings and floors.

---

**North West Court**

**PRIORITY TWO ZONE**

The original 1881 configuration of this court was one large, open space with clerestory and lantern windows, exposed iron trusses and roof construction, plastered brick arched piers and Georgia yellow pine flooring laid over a concrete base. The roof skylight and gallery was added to all four sides of the court during the 1896-1902 Hornblower and Marshall building renovation program. During this renovation, both the first and second floors received gypsum block infill on two or more walls to divide space and provide enclosure (USNM Annual Report, 1903, Plate 26). The 1914 floor plan indicates that the court was completely enclosed by that time and one entrance was available from the North West Range (USNM Annual Report, 1914, p. 15). The 1958 floor plan indicates the present east side entrance on the first floor and an open north wall with arched openings on the second floor ("First and Second Floor Plans," February 11 and 15, 1958, SI Neg. #96-2892 and #96-2891 – see pp. 3-42 and 3-43). Archival research indicates that this room already contained extensive mechanical equipment by the 1970s renovation. The current configuration of this mechanical room was completed during the 1976 renovation when new environmental systems were installed ("Restoration Program," date unknown, SIA, RU 630, Box 3 and ODC, Building #33, Drawing #5-17, April 18, 1968, by Chatelain, Gauger and Nolan, no project number). A new second floor was added and the Hornblower and Marshall gallery was removed (a small portion of the latter may still exist at the north end of the room today). (See pp. 3-257 - 3-259 for photos of this space.)

**First Floor**

1434-1436 (OPP Mechanical Rooms).
This mechanical space contains little historic material from either initial construction or from the 1896-1902 Hornblower and Marshall renovation. The interior partitions (gypsum wallboard and concrete masonry unit), doors, west portion of concrete floor, concrete curbs, 4" high concrete pads for mechanical equipment, steel stairs, and HVAC equipment date from 1976. The piers do retain their original 1881 imitation stone joints and horizontal beads. All perimeter walls were "soundproofed" in 1976 (ODC, Building #33, Project #A17216A).

**Missing Elements:**
1881 character and finishes. Traces of the original finishes appear only on the piers.

**Second Floor**

2300 Gallery: North/West
This gallery was created during the 1970s renovation (ODC, Building #33, Project #A17216A) and includes new plaster wall surfaces (over metal lath) with pier arches and
North West Annex

Rare Books Library
The North West Annex served as a library for the Smithsonian from its initial construction. The Cluss and Schulze floor plan indicates a large, square room that was divided into two floors (“Ground Plan of the Main Floor” and “Upper Story Plan,” Cluss & Schulze, October 1879, SI Neg #s 97-1601 and #1314 -- see pp. 3-24 and 3-25). The door openings that are indicated on the 1881 plans still exist, although the original doors do not. The report of Professor Baird for 1882 documents that “the original library room was connected with the one above it by means of a stairway, so that practically two stories- the lower one with a gallery- have been provided...” (Annual Report of the Board of Regents of the Smithsonian Institution, 1882, p. 6). The c.1896-1902 floor plans (USNM Annual Reports, 1899, 1900 and 1903) and archival research (including a photograph dated between 1887 and 1892--see p. 3-261) indicate the present configuration of the existing library. These same plans also indicate the skylight that was added in 1882 on the annex roof (Annual Report of the Board of Regents of the Smithsonian Institution, 1883, p. 166) and the 1882 set of stairs that established contact between the first and second floors (see photographs from 1971 – pp. 3-262 and 3-263). Renovation photographs from 1974 indicate the room’s present configuration with the removal of the stairs between the mezzanine and second floor, covering of the windows with gypsum wallboard, and renovation of the library in general (p. 3-264).

Ceiling: 1881: Painted plaster shallow scalloped vaulted ceiling constructed to separate first and second floors of North West Annex.
1882: Large skylight constructed in roof of the library, supplying "much additional illumination" (Annual Report of the Board of Regents of the Smithsonian Institution, 1883, p. 166).
1974: Shallow vaults restored and stained wood beams added.

Walls: 1881: Painted plaster with sand finish.
1882: Large skylight constructed in roof of the library.

Windows: 1881: Early photographs indicate that windows lit this space with natural light. The closet that exists in 1430 today might indicate that pairs of arched Cluss windows may have existed on the south wall of the first floor before bookcases were added along the south wall in the early 1880s.
1974: The covering of the windows with gypsum wallboard? occurred during the 1970s building renovation (ODC, Building #33, Project #A17216A).
Doors: 1881: The opening to 1460 Stair Hall is original to this space and painted wood beads reinforce this. The 'period' door that exists by the stair may be original to the space.

1974: The 'period' door (stained wood door and frame) opening to the West North corridor was added at this time. This door opening appears to be original to the construction of the building (ODC, Building #33, Project #A17216A).

Light Fixtures: Historic fixture exists in library today. It is unknown if this fixture was original to this space. During the 1970s renovation, a 'historic' fixture was placed in this space but the present fixture is different and reflects historic photographs.

Balcony: 1882: Stained wood floor and railing added for mezzanine level.

Pre-1971: Painted metal rods with turn buckles are attached to existing railing to support weight of balcony.

Stairs: 1881: Stairs existed at this time to access 1460 Stair Hall.

1882: Stained wood stairs added to access second floor and the first floor stairs are constructed to match and access new mezzanine balcony for library.

1974: Stair between mezzanine level and second floor are removed and ceiling is restored (ODC, Building #33, Project #A17216A).

Bookcases: 1882: Historic photographs depict stained wood bookcases with glass panels and metal hardware (p. 3-261).

1932: Steel shelves added to replace old wood shelves, supposedly to help fireproof (Report to Mr. J. E. Graf from Superintendent of Buildings and Labor for Fiscal Year Ending June 30, 1933, SIA, RU 157, Box 6).

1974: Restored with new glass doors and wood shelves. It appears that the basic configuration of the wood shelves date from 1882.

Wall Base: 1881: Unknown; probably stone that existed in the other annexes.

1976: Stained wood base added to 'new' section of wall (ODC, Building #33, Project #A17216A).

Flooring: 1881: Florida pine on first floor level.

1882: Wood floor added to balcony level.

1921-1922: Composition floor with concrete base installed and 1881 wood floor removed completely.

1927-1928: Cork carpet installed.

1974: Existing carpet installed.

Missing Elements:
1881 windows, doors, flooring, and wall base.

Recommendations:
Repair plaster damage on ceiling in northwest corner.

Retain all historic material that is present in the library at this time. Remove carpet and reconstruct wood floor to match original wood flooring.

Lighting: Retain reproduction light fixture. It would be optimal at a later date to replace this fixture with another reproduction that is more accurate match to those visible in historic photographs from 1882.

Heating, Ventilating and Air Conditioning: Install new systems concealed behind walls and in any existing voids. Locate piping and conduit concealed in existing chases in walls.

Electrical, Security, Access Control and Fire Safety Devices: Install new systems concealed in existing chases behind the walls, ceilings and floors.

Second Floor

2461 - 2461B Offices
The annex's second floor has existed since the original 1881 construction. The door opening that is indicated on the 1881 plans still exists, although the original door does not. The c.1896-1902 floor plans indicate that a skylight existed on the roof above the second floor (USNM Annual Reports, 1899, 1900 and 1903). Photographs from 1971 indicate the 1882 set of stairs that was added to access this level (pp. 3-262 and 3-263). The 1976 floor plans indicate the room's present configuration (ODC, Building #33, Project #7733xxxx, also found but not identified in SI-AHHP, Box 3). Some minor renovation work was performed in this space in 1994 (ODC, Building #33, OPP Project #943302C).
Ceiling: 1881: It is unknown how much of this ceiling still exists.

1882: Large skylight is added to the roof. It is unknown when this skylight was removed (Annual Report of the Board of Regents of the Smithsonian Institution, 1883, p. 166).

Post-1974?: Acoustical tile ceiling with fluorescent light fixtures.

Walls: 1881: Painted plaster walls with sand finish and arched masonry openings on both the exterior and west wall.


Windows: 1881: Original masonry openings.

1982-84: New translucent window units with UV filters (ODC, Building #33, Project # 8233103, 8333103, 8433101).

Doors: 1881: The only original doorway indicated on the Cluss and Schulze drawings opens into the Stair Hall 2460 ("Upper Floor Plan," Cluss & Schulze, October 1879, SIA Binder, Drawing S801/S2117 – see p. 3-25). The existing "period" door does not appear to be original.

A small curved door and ribbed frame exists on the south wall of 2461A. This "door" was originally one of a pair of arched windows that existed throughout the building in the annexes and pavilion, overlooking the ranges.

Light Fixtures: No historic light fixtures exist today.

Stairs: 1971: Stairs leading from first floor gallery up to second floor still exist before renovation (lower photos on p. 3-262 and 3-263).

1974: Stairs are removed and existing configuration dates from this time (ODC, Building #33, Project #AI7216A).

Wall Base: 1881: Painted plaster
Post-1974: Vinyl

Flooring: 1881: Wood strip

Post-1974: Carpet

Missing Elements:
1881 floor, base, doors, windows and general configuration.

Recommendations:
Restore this room to reflect its 1881 configuration. Remove existing acoustical tile ceiling and expose 1881 ceiling trusses. Locate arched masonry openings that exist on interior walls and restore Cluss’ two pairs of arched “windows” that overlook the North West Range and the two pairs that overlook the West North Range.

Heating, Ventilating and Air Conditioning: Install new systems concealed behind walls and in any existing voids. Locate piping and conduit concealed in existing chases in walls.

Electrical, Security, Access Control and Fire Safety Devices: Install new systems concealed in existing chases behind the walls, ceilings and floors.
North West Pavilion

Basement

The tunnel to the Smithsonian Castle is located on this level and was constructed in 1901 to accommodate a covered passage for Smithsonian employees between the Arts & Industries Building and the Castle. In general, this basement is utilitarian in nature. Extensive piping lines the brick vaulted ceiling. The foundation walls consist of gneiss with concrete coping and brick walls. The 1881 masonry window openings exist and the decorative wrought iron window grilles still exist. All hollow metal doors and frames are circa post-1900.

B420, B421
The Steam Room contains original masonry door openings and indicates that the south wall that runs along the stairs is composed of concrete masonry units on the Steam Room side.

B422 Locker Room
The concrete masonry unit partitions for this room are a contemporary addition. 1881: Painted plaster shallow scalloped vaults exist, although they were plastered after 1881. Vinyl composition tile covers the floor.

B424 Storage and Workshop
This room contains original 1881 walls and a couple of later partitions on the south wall. A concrete ledge runs around the perimeter of the room. 1881 painted shallow brick vaults exist and the original 1881 entrance (brick surround) to this room exists. Vinyl composition tile covers the floor.

B425 Corridor to Tunnel
A rubber tile floor (over wood substrate and concrete floor) covers most of this corridor from the start of the tunnel to the bottom of the pavilion stairs. 1881 painted brick vaults and painted brick walls (probably whitewashed in 1881) exist.

First Floor

It should be noted that the North West Pavilion has always housed the Administrative Offices. Due to this fact, this pavilion includes quite a bit of significant, historic material. Minor alterations occurred in 1971 including installation of shutters and transom lights (ODC, Building #33, OPP Project #711A). During May 1999, this suite of offices was currently undergoing minor renovation for new tenants. (See photos on pp. 3-267 - 3-275 for historic and current photographs.)
1460 Hall and Stair
This hall reflects the original 1879 configuration of the pavilion. It is possible that the first wide flight of stairs accessing the first floor landing were made wider post-1879. The original drawings seem to indicate this ("Ground Plan of the Main Floor," Cluss & Schulze, October 1879, SI Neg. #1314 -- see p. 3-24).

Ceiling: 1881: Painted plaster shallow scalloped vaults
1976: Crown molding (ODC, Building #33, Project #AI7216A).

Walls: 1881: Painted plaster
1889: Paneled oak wainscot is added throughout hall (Semi-Annual Report of Superintendent of Buildings and Labor, USNM, July 1 - December 31, 1889, SIA, RU 158, Box 22).

Doors: 1881: All five doorways in this hall are original.
1889: "Self-closing, self-deadening doors" were added to divide pavilion from lecture room (then the West North Range); these have since been removed (Annual Report of the Board of Regents of the Smithsonian Institution, 1890, p. 65).
1976: 'Period' wood stained doors and frames; infill in arched openings (ODC, Building #33, Project #AI7216A).

Stairs: 1881: Cast iron bracketed stair
1890-91: Oak handrail, newel post and "a second much-needed staircase has been built..." The staircase is probably the one located between toilet room 1469A and office 1469 (USNM Annual Report of the Board of Regents of the Smithsonian Institution, 1890, p. 65).
1976: Rubber treads with metal nosing

Wall Base: 1881: Unknown
1890: Wood base probably added when wainscoting was added.

Flooring: 1881: Florida pine

1901-02: Wood floor replaced in stair hall (Annual Report of Superintendent, 1901-02, SIA, RU 157, Box 1).
1976: Vinyl composition tile exists near door opening to West North Range.

Missing Elements:
The floor level has changed on the landing between the first short flight of steps and the door to the basement. The original 1881 handrail, wall base, short flight of steps and flooring are missing.

Recommendations:
Retain all 1880s-1890s historic material defined above including: stair hall configuration, painted plaster walls and shallow ceiling vaults, cast iron stairs, door openings, paneled oak wainscoting, newel post and handrail.

Restore wood floor to match original wood flooring. Remove vinyl composition tile near West North Range door opening and reconstruct wood flooring to match original flooring.

1463 - 1469 Offices
These offices have retained their original 1881 configuration for the most part. The 1879 drawings indicate that 1463, 1467 and 1467A were one large office which was not subdivided until at least 1967 ("Ground Plan of the Main Floor," Cluss & Schulze, October 1879, SI Neg. #1314 -- see p. 3-24; "First Floor," June 27, 1967, SI Neg. #96-2896 -- see p. 3-48). The present configuration was completed post-1976. Minor changes were constructed in 1971 (ODC, Building #33, OPP Project #AI711A).

The exterior entrance into this building has existed since the building’s original construction. Renovation of this entrance occurred most recently during the 1970s renovation.

Ceiling: 1881: Painted plaster shallow scalloped vaults
1976: Bulkheads exist in 1465 and 1467

Cornice: 1976: Stained wood picture rail exists in all rooms. Painted crown molding exists in room 1463 and sprinklers are mounted to its face.

Walls: 1881: Painted plaster walls with sand plaster finish.
1902: Paneled oak wainscot was installed at this time in 1463; date of later removal is unknown (Annual Report of Superintendent, 1902-03, SIA, RU 157, Box 1).
Pre-1967: Gypsum wallboard partition dividing 1465 and 1467.

Post-1976: Gypsum wallboard partition dividing 1467 and 1467A; exterior walls are furred out to accept fan coil units built underneath the window sills.

May 1999: New paint has been applied throughout suite.

Windows: 1881: Masonry openings; niche with shelves in 1469 indicate the original opening of one of a pair of windows that are clearly indicated on the 1881 Inaugural floor plan ("Inauguration Ball, March 4, 1881, National Museum Building," SI-AHHP, Box 5). (The other pavilions had similar sets of windows.) As early as this year, wrought iron grilles were added to first floor windows (Memo from Baird to Cluss, February 5, 1881, SI-AHHP, Box 12).

1982-84: Stained wood window units (trim, sills etc.) with clear insulated glass and shutters replace original windows (ODC, Building #33, Project # 8233103, 8333103, 8433101).

Doors: 1881: Exterior mahogany door and frame, side lights, and curved transom with stone threshold in room 1463 are original. It is possible that glass panels are not original and were later replaced. Portions of frames in original doorways are original (1465 south doors, 1469 both, and 1465 all).

1896: Doorway from vestibule leading to exterior is enlarged and opening becomes a wide archway (USNM Annual Report, 1896, p. 281).

1976?: All doors in suite are 'period' stained wood doors and frames and do not appear to be original. Some contain the Cluss etched glass transom that is typical in the Old Patent Office Building. The transoms that exist in this space today may be reproduction as a drawing appeared in 1971 drawings (ODC, Building #33, Project #A1711A) and no other "Cluss" decorative transoms exist in the building. Other transoms are filled with translucent glass or stained wood louver. Some metal room number plates still exist when the doors were numbered in 1911. Infill of most arched doorway leading to vestibule occurred during the 1970s renovation.

Light Fixtures: All rooms contain historic fixtures, probably gas lights at one time. It is unknown which are original to these pavilion offices. Rooms 1467 and 1467A have large globe fixtures which are not historic.

Stairs: As mentioned in the discussion concerning Toilet Room 1469A, these stairs do not appear on floor plans until 1895 but may be as early as 1889.


Post-1976: Stained wood throughout offices (electrical and telephone are run through base).

Flooring: 1881: Florida pine throughout except in 1463; white with multi-color border original mosaic floor installed in 1463 exists today.

May 1999: New carpet installed throughout suite (except 1463.)

Missing Elements:
Original 1881 wood flooring, windows, and doors.

Recommendations:
Reconstruct pair of Cluss arched windows that were located in 1469 and 1469A.

Clean, repair, and protect original mosaic floor in 1463.

Restore and/or reconstruct wood floor to match existing wood floor throughout office suite.

1469A (OMD Toilet)
According to the 1879 drawings, this toilet room has existed since that time. Cosmetic alterations have occurred over the years and the existing configuration is evidence of this fact. The stained wood steps that lead down to this level from office 1469's closet space above were added post-1879. A progress report from 1889 indicated that: "a private stairway leading from first to second floors of the Assistant Secretary's apartments have been built" (Semi-Annual Report of the Superintendent of Buildings and Labor, USNM, July 1 to December 31, 1889). Other than this short note, there is little documentation to suggest that they were earlier than the c.1895 floor plans in which they appear.

The current room has 1881 painted plaster walls, contemporary toilet fixtures and vinyl composition tile flooring. The doorway that accesses this space form the stair hall is original to the construction of the building.

7-78
Second Floor

2460 Stair Hall and Stair 2460A
The 1890 (or 1895) oak wainscot continues on this level. All doorways that open from this stair hall are original openings (1881) but contain more recent doors. Portions of the stained wood frames are original 1881 construction.

Stair 2460A, accessing the third floor, remains in its 1881 location and the original cast iron handrail is still in place. The rubber stair treads are more recent additions. The electrical closet underneath this stair appears to contain original hardware.

2463 - 2469 Offices
These offices have retained their original 1881 configuration for the most part. A chimney flue was installed from the second floor to the roof in 1895 presumably to provide additional heating for the executive offices at this time (Annual Report of the Board of Regents of the Smithsonian Institution, 1896, p. 281). The 1932-33 Annual Report indicates removal of "mantles and fireplaces" and some remodeling (Report to Mr. J. E. Graf from Superintendent of Buildings and Labor For Fiscal Year Ending June 30, 1933, SIA, RU 157, Box 6). The 1879 drawings ("Upper Floor Plan," Cluss & Schulze, October 1879, SI Neg. #97-1601 -- see p. 3-25) indicate that 2465, 2465A, 2465B and 2467 were one large office which was not subdivided until 1976 (partitions first appear on 1976 plans) (ODC, Building #33, Project #A17216A, Sheet A-3 -- see p. 3-55). The present configuration was completed post-1976.

Ceiling: 1881: Painted plaster shallow scalloped vaults 1976?: Bulkheads exist in all rooms.

Cornice: 1976: Stained, thin wood picture rail exists in 2463, 2465B, and 2469. Painted crown molding exists in other rooms and sprinklers are mounted on its face.


Windows: 1881: Masonry openings

1982-84: Stained wood window units (trim, sills etc.) with clear insulated glass and shutters replace original window units (ODC, Building #33, Project #s 8233103, 8333103, 8433101).

Doors: 1881: As noted above, portions of the frames in the stair hall are original. Post-1976: Simple painted wood doors and frames.

Light Fixtures: All rooms contain historic fixtures, probably gas lights at one time. It is unknown which are original to these pavilion offices.

HVAC: 1976: Fan coil units are mounted on floor in front of windows (ODC, Building #33, Project #A17216A).


Flooring: 1881: Florida pine 1918-19: Some wood floors in the "two smaller inner rooms" were replaced with "new Georgia pine" (Report of the Superintendent of Buildings and Labor for the Fiscal Year 1918-1919, SIA, RU 157, Box 3). Room 2465B contains wood flooring under new carpet and is in good condition.


Missing Elements:
Original 1881 wood flooring, wall base, windows, and doors.

Recommendations:
Retain all historic light fixtures, original plaster ceilings, original plaster walls with sand finish, and original door frames as noted above.

Remove carpet, refinish existing wood floors, and reconstruct wood floors to match existing where necessary.

Heating, Ventilating and Air Conditioning: Install new systems concealed behind walls and in any existing voids. Locate piping and conduit concealed in existing chases in walls.

Electrical, Security, Access Control and Fire Safety Devices: Install new systems concealed behind the walls, ceilings and floors.
Third Floor

3460 – 3467 Offices

These offices have not retained their original 1881 configuration. The 1879 drawings indicate one large open room (“Upper Floor Plans,” Cluss & Schulze, October 1879, SI Neg. #97-1601 – see p. 3-25). The USNM Annual Report for 1889 indicates that partitions were built in this space during that year and ‘extra ceilings were put in’ (“Report of the Assistant Secretary,” pp. 74-75). The 1903 third floor plan indicates that partitions subdivided the space (USNM Annual Report, 1903, Plate 24 – see p. 3-31). This space has been modified over the years: the 1958 and 1967 plans indicate similar partition configurations (“Third Floor Plan,” February 15, 1958, SI Neg. #96-2890 – see p. 3-44 and “Third Floor”, June 27, 1967, SI Neg. #96-2894 – see p. 3-50). Drawings from 1983 indicate much of the material that exists today (ODC, Building #33, OPP Project #8333103, Sheets A-86, A-87 and A-88). Drawings from 1979 and 1982 indicate minor renovations (ODC, Building #33, OPP Project #7933102 and 8233107).

Ceiling:

1881: Exposed underside of roof appears to be plastered between framing members; iron tie rods providing tension are visible in center above clerestory and across the pavilion room dividing ceiling into thirds. (See photographs of typical 1881 pavilion third floor open room-- p. 3-230.)

1889: "Ceilings" were put in.

1976?: Bulkhead exists in 3462

1982: New plaster ceiling installed during roof renovation (ODC, Building #33, Project #8233103).

Crown:

1976: Painted crown molding exists in center room.

Walls:

1881: Painted plaster walls with sand plaster finish.

1889 (June): Placement of partitions. Some of these may still exist today especially those surrounding the stairs, and offices 3463 and 3484 (Annual Report of the Board of Regents of the Smithsonian Institution, 1889, pp. 74-75).

1982: Partitions with glass lights are installed to bring light into spaces that lack windows. All existing, original 1881 plaster walls are skimcoated. (ODC, Building #33, Project #8233103, Drawings A-86 through A-88).

May 1999: New paint has been applied throughout suite.

Windows:

1881: Masonry openings

1889: Large window cut in the wall on the east (photo indicates south wall) to assist in moving large objects in and out of third floor rooms (see p. 3-98) (Semi-Annual Report, June 30, 1889, SIA, RU 158, Box 22).

1982-84: Painted wood window units with clear insulated glass replace original window units; clerestory windows in lantern contain translucent glass and 'new' trim; hardware may be original (ODC, Building #33, Project #8233103, 8333103, 8433101).

Doors:

1881: It is unknown if a door existed in this room at the top of the stairs.

1982: Painted wood four panel with ribbed frames and clear glass transoms above. Door frames are fairly worn. They might have existed prior to the 1970s renovation (ODC, Building #33, Project #8333103, Drawing A-86).

Light Fixtures:

One historic fixture exists in the center room. The fixture was hanging in the center of this space in 1982. It is possible that it is original to this space (ODC, Building #33, Project #8333103, Drawings A-86, A-87, A-88).

1982: All existing fluorescent lights date from this time (ODC, Building #33, Project #8333103, Drawings A-86 and A-87).

HVAC:

1976: Fan coil units are freestanding

Wall Base:

1881: Unknown.


Flooring:

1881: Florida pine


Missing Elements:

Very little historic material exists on this floor today. Original 1881 wood flooring, wall base, ceilings, windows, plaster and sand finish on exterior walls and single room configuration are all missing.

Recommendations:

Restore original 1881 single room configuration to this pavilion. Retain historic light fixture.
West North Range

The original 1881 configuration of this range was one large room. This room was utilized as a lecture room (600 seats) from 1882 until 1901 when it was decided that the East North Range was better suited for this purpose (see p. 3-279) (USNM Annual Report, 1883, p. 162; Visitor's Guide to the USNM, c. 1891; and USNM Annual Report, 1901, p. 15).

During the 1896-1902 building renovations, a mezzanine gallery floor was added to three of the four walls (except the north exterior wall) and "Library" was assigned to this space (USNM Annual Report, 1903, Plate 26 -- see p. 3-33). "Paradigm" skylights were installed during 1903-04 and later during 1904-05 over the gallery (Annual Report of Superintendent of Construction & Labor, 1903-04 and Annual Report of Superintendent of Construction & Labor, 1904-05, SIA, RU 157, Box 1). Floor plans indicate that costumes were displayed in this area from 1933-1946 (Brief Guide to the Smithsonian Institution, 1933, 1939 and 1946, SI-AHHP, Box 15) and this range was designated as the First Ladies Hall in the 1950s. Major exhibit installation occurred during this time and the first floor gallery was transformed completely as historic material was thoroughly concealed (see p. 3-281 and 3-282) (ODC, Building #33, Project #A1541C). Partitions and doors existed by 1958 (First and Second Floor Plans, February 11 and 15, 1958, SI Neg. #s 96-2891 and 96-2892 -- see pp. 3-42 and 3-43). By 1967, the first floor was completely subdivided into offices and the second floor made use of the balcony for separate offices. (First and Second Floor Plans, June 27, 1967, SI Neg #s 96-2896 and 96-2895 -- see pp. 3-48 and 3-49). The second floor was completely filled in by the time construction documents had been completed for the 1976 renovation (Second Floor Plan, no date; believed c. 1977, ODC, Building #33, Project #7733xxxx, found in SI-AHHP, Box 3).

First Floor

1470 - 1489 Offices and Corridor

Drawings from renovations in 1988 (ODC, Building #33, OPP Project #883314C) indicate the range's current configuration. In May of 1999, the first floor space was unoccupied and being renovated. Very little historic material exists today, but some material may be concealed behind renovation work.

Ceiling: 1881: Exposed metal shed roof with plaster infill

c. 1988: Acoustical tile ceiling at 303cm above finished floor; existing 1902 gallery ceiling is visible in 1489 (ODC, Building #33, Project #883314C).

Walls: 1881: Painted plaster with sand finish.
1954: Many partitions installed for First Ladies Hall exhibit (ODC, Building #33, Project #A1541C).

1988 (and pre-1988): Existing gypsum wallboard wall partitions (ODC, Building #33, Project #883314C).

Columns: 1881: Some decorative horizontal beads still exist (1481)

Windows: 1881: Masonry openings; pairs of arched Cluss windows on east and west walls. See below for more information.

1982-84: New window units with translucent glazing; sash, trim and sills are in good condition (ODC, Building #33, Project #s 8233103, 8333103 and 8433101).

Doors: 1881: The only original door opening that survives leads to the North West Pavilion.

c. 1988: Stained ‘period’ doors throughout central corridor (ODC, Building #33, Project #883314C).

Light Fixtures: No historic light fixtures are located in this space.

HVAC: 1988: Supply and return diffusers are mounted in the acoustical tile ceiling grid (ODC, Building #33, Project #883314C).

Wall Base: 1881: Unknown

1988: Stained wood base (ODC, Building #33, Project #883314C).

Flooring: 1881: Florida pine

1896-1902: Terrazzo (2'-0" square blocks—see photo on p. 3-280).

1954: New flooring may have been installed but it is unknown. Photographs are deceiving.

1988: Vinyl composition tile (black, white and red patterned) flooring installed in corridor; vinyl composition tile in 1484; carpet in offices (ODC, Building #33, Project #883314C).

Missing Elements:
Original 1881 flooring, wall base, doors, pair of Cluss arched windows and single room configuration. 1896-1902 second floor gallery. It appears that a section of the historic pier at the entrance to the North Hall was removed to accommodate the installation of the present doorway during the late 1960's-1970's (exact date unknown).

Recommendations:
Restore this range to its 1896-1902 configuration of one large room with the Hornblower and Marshall gallery. Retain historic terrazzo and imitation stone joints (restore where necessary). Locate and restore the pairs of arched windows in the tower, annex and pavilion walls.

1473 Women’s Toilet
This room does not contain any significant historic finishes. This room does appear on the 1958 floor plan and it is unknown when it became a toilet room.

Second Floor

2420A Corridor
This corridor contains very little historic material. 1881 arched doorways with imitation stone joints leading into the annex are clearly visible amidst infill construction.

2471 - 2473 Offices
These offices were renovated into their current configuration in 1994 (ODC, Building #33, OPP Project #943302C) with minor changes made earlier during 1988 (ODC, Building #33, Project #883314E). Imitation stone joints are visible on the wall that supports the pavilion stairs at this level, along the piers on the south wall and the windows at the north. Other than this, very little historic material exists.

2480 - 2480F Offices
These offices were renovated into their current configuration during 1997 (ODC, Building #33, OPP Project #973312) with minor changes made earlier during 1983 and 1993 (ODC, Building #33, Projects #8333106 and 933310). Very little historic material is visible in this space.

Ceiling: 1881: Exposed metal shed roof with trusses, gratings and plaster infill.

1903-04: "Paradigm" skylights installed; date of removal is unknown (Annual Report of Superintendent of Construction & Labor, 1903-04, SIA, RU 157, Box 1).
1997: New acoustical tile ceiling installed (ODC, Building #33, Project #973312).

Walls & Piers: 1881: Some masonry joint lines do exist on the exterior plastered walls and the columns along the south wall, but for the most part, the exterior walls and columns are smooth now.

1997: Gypsum wallboard partitions (ODC, Building #33, Project #973312).

Windows: 1881: Masonry openings

1982-84: New window units installed with translucent glazing (ODC, Building #33, Project #s 8233103, 8333103 and 8433101).


1997: Painted hollow metal frames and doors with glass lights and transoms (ODC, Building #33, Project #973312).

HVAC: 1997: Supply and return diffusers are mounted in the acoustical tile ceiling grid (ODC, Building #33, Project #973312).

Wall Base: 1997: Vinyl (ODC, Building #33, Project #973312).

Flooring: 1881: Flooring did not exist at this level.

1902: Gallery concrete floor with terrazzo was added on three sides of rooms (Hornblower and Marshall renovations)

Post 1950: Gallery added along windows.
Post 1950: Second floor completed with center infill
1997: New carpet installed (ODC, Building #33, Project #973312).

Recommendations:
Restore this range to its 1896-1902 configuration of one large room with the Hornblower and Marshall gallery. Retain historic terrazzo and imitation stone joints (restore where necessary). Locate and restore the pairs of arched windows in the tower, annex and pavilion walls.

2481 Corridor
This corridor was created post 1967 before the 1976 renovation. Very little historic fabric remains in this space with the exception of the gallery floor beneath the carpet and the imitation stone joints on the piers along the east wall.

Recommendations:
Remove corridor finishes and restore this range to its 1896-1902 configuration of one large room with the Hornblower and Marshall gallery.

Additional Recommendations for this Range:

Heating, Ventilating and Air Conditioning: Install new systems concealed behind walls and in any existing voids. Locate piping and conduit concealed in existing chases in walls.

Electrical, Security, Access Control and Fire Safety Devices: Install new systems concealed spaces in existing chases behind the walls, ceilings and floors.

Missing Elements:
The 1881 original configuration does not exist and the 1902 galleries have been concealed by 20th century construction. As mentioned above, there is very little historic fabric remaining in this space.