



SMITHSONIAN INSTITUTION

Arts & Industries
Building Revitalization

restored. revitalized. reborn.

The Arts and Industries Building (AIB) was the first building erected solely to house the United States National Museum in Washington, DC. It was the second building the Smithsonian Institution constructed, beginning in 1879. The building has been listed on the National Register of Historic Places since 1971 and subsequently was declared a National Historic Landmark. Over the years, the museum fell out of use as exhibit space, and began to serve primarily as office space. By 2003, it was closed to the public entirely due to deteriorated interior conditions. Funds for restoration were appropriated to restore the condition of the building and return to its original character.

The project team has been working closely with the Smithsonian Institution on the revitalization of this landmark since 1999. The revitalization work was divided into three phases. The first phase encompassed exterior stabilization of the brick and stone. The second phase undertook major renovation of the exterior and shell. The most recent phase completed caretaking project in the building's interior.

Overall, the goal of the revitalization was façade restoration, replacement of the existing metal and slate roofs and code upgrades to meet current requirements for snow, wind, seismic, and blast criteria. In addition, all non-contributing construction added over the years was removed to expose the 17 historic interior spaces. The challenge was to provide these repairs and modifications while preserving the maximum amount of historic fabric and details possible.

Modifications included the repair, reinforcement, and partial replacement of the iron roof truss structure; installation of new steel and masonry structural elements for new loading; replacement of replica profile windows with new insulated windows; masonry façade and ornamental metals restoration; and installation of new roof drainage, snow melting, lightning arrest equipment and fall protection systems. All work was guided by the “Secretary of the Interior’s Standards for the Treatment of Historic Properties.”

This historic landmark is now in a stable, protected condition and prepared to return to its original grandeur. In recent months, Smithsonian Institution has been able to re-open the facility for special public events, including *A Night at the World’s Fair* and programming for the upcoming *Folklife Festival*.



Before Aerial photo prior to beginning construction shows severe site limitations and complex roofscape. The North entrance, at the bottom of the image, faces the National Mall.



Before Existing condition of a representative roof quadrant looking northwest towards the National Mall.

All roof assemblies were removed down to structure and replaced. Decorative metal elements were repaired, refinished, and reinstalled, and replacements were replicated.

The decorative tower louver provides ventilation for the attic. It was discovered to provide air movement from the East Hall below via brick chases. Historic ventilation continues to serve the building after the revitalization phases have been completed.

Technology as Preservationist

The project team began its work on this important and very challenging building with extensive analyses and investigation of the building's history, construction methods, materials and systems. This included moisture migration, window analyses and an analysis of the historic brick and stone.

In consultation with the Smithsonian, the team established the design approach based on the condition of the historic fabric, sun exposure and the requirements for ventilation and air movement. There were no construction drawings or as-built drawings of the building so the team had to measure and record all spaces, elevations and details. Historic photographs were extensively used to make sure that lost details or materials were accurately interpreted and replicated.

Computer modeling was also used to supplement hand-measurements in developing roof and gutter details. Specialty tests were ordered to assure that each material was accurately assessed and could be replicated if necessary. The team maintained an ongoing dialog with the Smithsonian to review decisions that affected the removal or replacement of significant elements.

The analyses and computer models revealed a number of solutions that otherwise would not have come to light. For example, the snow load analysis performed allowed the team to very precisely determine historic and non-historic structure to ensure both the longevity of the roofing system and restore the original roofing installation.

Another revelation was the need for greater insulation in the roofing system. To achieve this, the team documented the existing profiles around gutters and eaves, and then designed a proportional replica so that the appearance is the same as the historic but provides the required added insulation.

The original structure itself was rather advanced for a building of its time. Through historic documentation and photography, the design team was able to locate and reutilize the building's internal rain conductors. This in turn allowed for the removal of the non-historic downspouts on the building's exterior.

Overall, advanced building technology allowed the team to devise solutions for restoration and revitalization that were appropriate for the historic structure, but would avoid the failures of the past.



Circa 1879-1880 View of the northwest quadrant under construction, looking east.



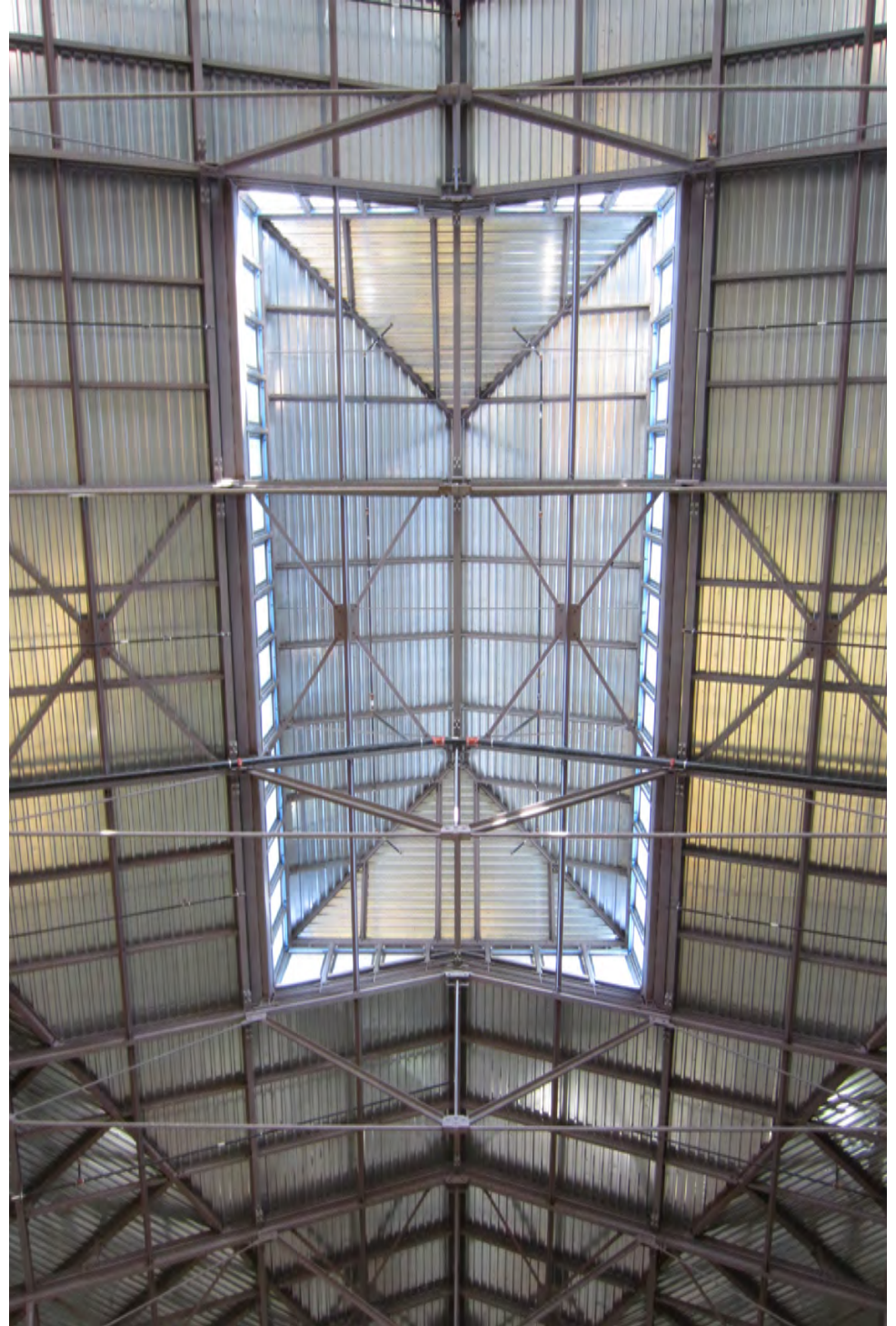
2014 Roof and window installation as seen in the northwest quadrant after construction.



95% Original Roof Structure.
Rotunda after window and roof replacement.

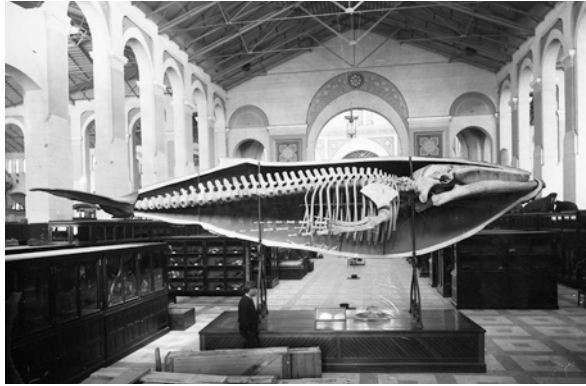


Historic Removal and replacement of Hall slate roof
with metal standing seam, circa 1906-1908.



Underside of Hall and Monitor roof after replacement of trusses and metal deck.

Historic Interior photo demonstrates the original conditions and finishes.



Before Interior photo prior to the start of the project. An example of how infilling between piers/arches compromised the historic spatial character.



After View looking south in North Hall providing an example of the dramatic appearance with infills removed. Environmental work underway in the Rotunda at the far end.



Original Retained

Replacement Member

Southeast Court Looking west during shell renovation. Original gallery construction is visible on all three sides. The new roof structure is dark gray and the original members are light tan. At this location one can observe the monitor in both the Court and South Hall beyond. Truss and purlin pockets are visible at the top of the brick wall.

Replicated Details Full-scale tracings and historic photography provided guidance for restoring the window graphics in North Hall gable end wall. Glass units are insulated and frosted to reduce glare and contrast with preserved colored glass.





View looking southeast of the East and North facades from the National Mall. The photo shows the complex roofscape of this symmetrical building and an appreciation for the polychrome nature of the exterior.



Before & After Closeup views of the polychrome brick and windows.

After North entrance from the National Mall looking southwest showing the various metal work, brick and stone cleaning, and the variety of window types. High performance organic coatings were used for all exterior surfaces requiring painting. The Burbel statue, which was removed, repaired and repainted, sits atop the north pediment.

