Historic Structure Report & Conditions Assessment

Smithsonian Institution Arts & Industries Building

08.31.2009

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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).

Site

Research and documentation of the site and landscape was not included in the scope of this report. What follows is a general description.

The site consists of areas of paving directly adjacent to the building at sidewalk and entrance locations, and soil with grass or plantings at other locations. The site along the north elevation is slightly raised from the level of the sidewalk along Jefferson Drive (See Figure 1). Three white marble steps lead from the sidewalk to the area in front of the entrance, which is paved with red, white, and black marble units (See Figure 6). A

1. North Tower
2. Garden on the east side of AIB
3. Parking in front of South West Range
4. South Façade
5. West Tower
6. Detail of paving at the north entrance
7. Detail of site in front of East North Range
8. Garden on the east side of AIB
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
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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.

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 flaking 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 brick elevations are primarily symmetrical. The entrances into the building are centered on each of the gable ends of the North and South Halls. 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 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).

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.

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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.\footnote{Oehrlein & Associates Architects, Preservation Plan Arts and Industries Building Smithsonian Institution, OPP Project #973316, Prepared for Polshek Tobey + Davis, April 2000, p. 7-2.}

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.
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
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.³

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.⁴ Circular metal louvers decorate each of the slopes of the hipped roof at the towers (See Figure 53).

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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
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63. Clerestory windows at court
64. Skylight at court
65. Window at range
66. Windows at range
67. Window at tower
68. Window at pavilion


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. 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 ¾” space to minimize heat gain and loss. It appears that the interior pane was ground glass while the exterior was insulated glass.

Footnote 10: General Meigs notes that although 1” would have been better, ¾” was “quite sufficient” in Minutes of Proceedings of the Institution of Civil Engineers (Published by the Institution, London, 1883), 174.

Footnote 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.
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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,

Footnote 12: Oehrlein & Associates Architects, Preservation Plan Arts and Industries Building Smithsonian Institution OPP Project# 973316, Prepared for Polshek Tobey + Davis, April 2000, p. 4-6.
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).

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Footnote 13: Daedalus, Inc., Proposal for Treatment Façade Statuary Repair, Arts and Industries Building, ODC Project No. 919922, Facilities projects\913322 – FAÇADE STATUARY\Construction\Submittals, File MISCP4_025328.PDF.

Footnote 14: Sorg & Associates, Project: Statuary Repair, Arts and Industries Building, Drawings dated 02/04/94, Facilities projects\913322 – FAÇADE STATUARY\Design\Submittals, file MISC9_D004325.PDF.

Footnote 15: Smithsonian Institution Archives Record Unit 371, Box 2, Folder December 1977.
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).

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 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.
1.3 – 25
Smithsonian Institution Arts & Industries Building

Physical and Spatial Description

Building History, Description and Significance

1.3 – 25
Smithsonian Institution Arts & Industries Building


Footnote 21: SIA RU 640, Box 3.


Footnote 19:

Footnote 20:

Footnote 21:
SIA RU 640, Box 3.

Footnote 22:


Footnote 21: SIA RU 640, Box 3.


Footnote 21: SIA RU 640, Box 3.


Footnote 21: SIA RU 640, Box 3.


Footnote 21: SIA RU 640, Box 3.


Footnote 21: SIA RU 640, Box 3.

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.

1.3 - 27

Building History, Description and Significance

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).


Footnote 27: No information from this period regarding alterations of the floors in the South East and East South ranges was located.
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.
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.\footnote{30} 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.\footnote{31} 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.32

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

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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.
138. Railing at hall gallery

139. Temporary railing at gallery
(SIA RU 95, Box 43, Folder 1, Neg. No. 11251)

140. Railing at the South West Range

141. Rotunda stairs

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 were 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).
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.

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**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 wainscoting 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.

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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.\(^{40}\) 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.”\(^{41}\)

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.”\(^{42}\) Four of the patterns in the Rotunda were stenciled on the walls, resulting in “perfectly straight lines and uneven paint distribution with buildup around the sharp, cleanly defined edges”\(^{43}\) and for others, guidelines might have been pounced with guidelines appearing as dots of graphite.

The current paints cover several intermediate layers, including the scheme developed during 1902–1903 by Grace Lincoln Temple at the Rotunda, the main halls, and the four courts.\(^{44}\) These intermediate layers remain unknown, as the 2001 interior finishes report was limited to the original finishes.

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Footnote 41: Ibid, p. 16.


Footnote 43: Ibid, p. 13
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


contrast. For example, the original cast iron stairs at the end of the balconies were originally a yellowish gray color, close to the color of the walls, and are now an olive green color, in sharp contrast to the color of the walls.

**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 Hornblower & 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.”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.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.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 workflow 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

Historic Structure Report & Conditions Assessment
Smithsonian Institution Arts & Industries Building
08.31.2009
Building History, Description and Significance

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

08.31.2009
SECTION THROUGH SOUTH HALL FACING NORTH

SECTION THROUGH NORTH HALL FACING NORTH