PRESERVATION
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HISTORIC INTERIOR SPACES

NUMBER 2

Preserving Historic Office Building Corridors

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National Park Service

The Monadnock Building
Chicago, Illinois

Hailed as one of the finest expressions of the "Chicago School" of architecture, the Monadnock Building was one of the country's first skyscrapers and the largest commercial building in the world at the time of its completion. Built in 1892 and expanded in 1893, the Monadnock Building is individually listed in the National Register of Historic Places and also located in the South Dearborn Printing House Row Historic District.

The north half of the Monadnock Building, designed by the architectural firm of Burnham and Root, is notable in many respects. Its engineering is significant still today in that it is the largest and tallest masonry load-bearing building in the world. Burnham and Root, used a "grillage" foundation to deal with the problem of erecting such a large structure on the clay and soft sand in the Chicago area. The building's wind-bracing system, terra-cotta fireproofing, and flat-arch construction system were among the earliest used.

The south half of the building was designed by the architectural firm of Holabird and Roche and was completed in 1893. It used a combination of masonry-bearing elements and a steel frame structure. Although the design of the south half reverted to the use of European ornamentation, it complemented the north half of the building in scale, color, and plan. The interior of the south half was similar to the design of the north with double-loaded corridors and office partitions featuring marble wainscot, oak trim and feather-chipped glass.

When rehabilitating historic office buildings, significant corridors should be preserved whenever possible, and new mechanical equipment should be installed in such a manner so as to preserve significant interior spaces, features, and finishes.

Burnham and Root's design for the interior was to bring light and air into the building through large one-over-one windows and projecting bays. Light entered the double-loaded corridors and public spaces through feather-chipped glass office and corridor partitions, and skylights over open stairwells and elevator shafts. The narrowness of the building gave occupants good access to natural light (See figure 1).

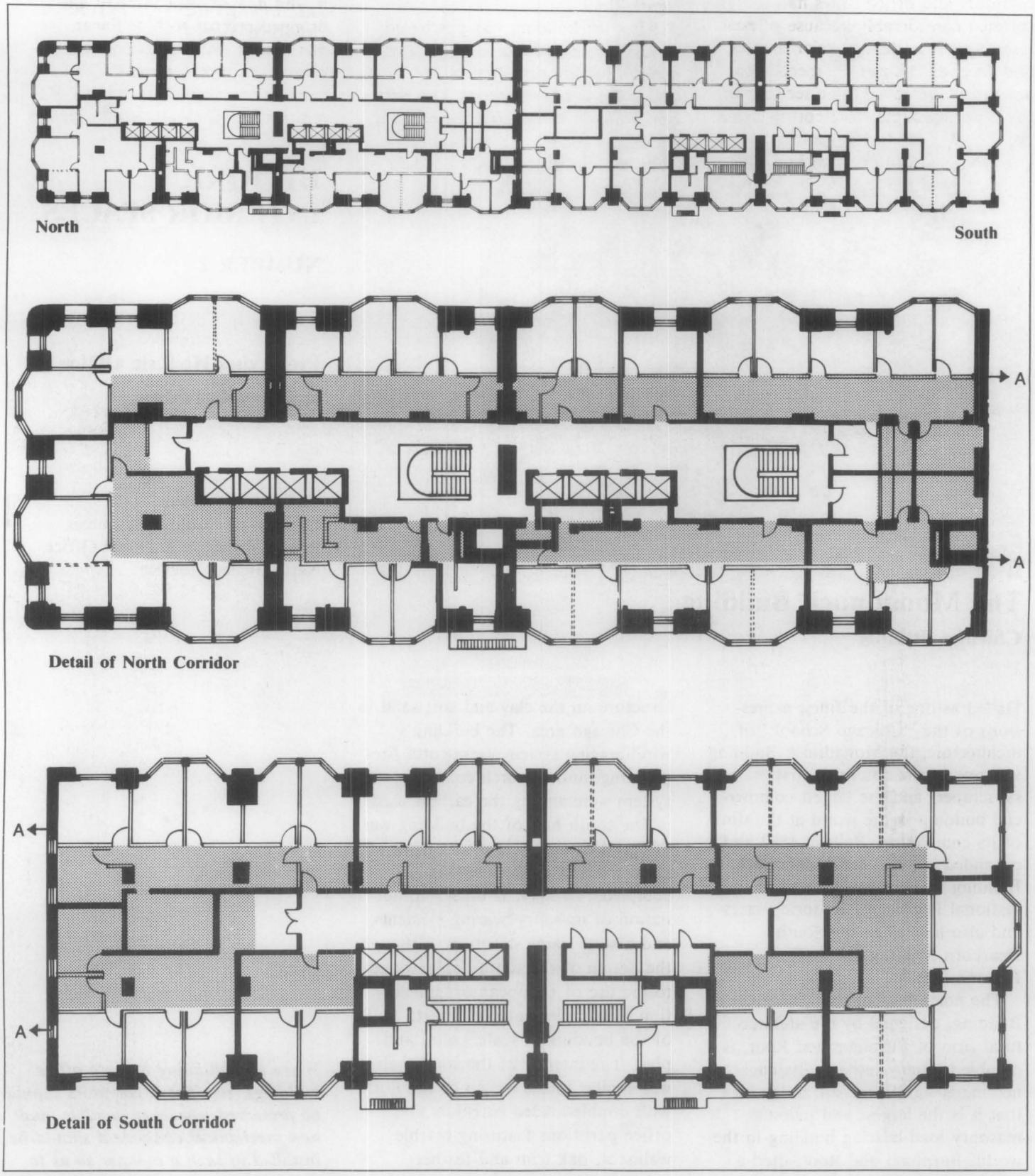

Figure 1. Both north and south building floor plan, showing double-loaded corridor system. Shaded area indicates dropped ceiling for mechanical chases in the non-public anterooms. Public corridors and private offices retain full ceiling height. Drawing: Neal Vogel

REHABILITATION DESIGN PROBLEM

The Monadnock's historic interior corridors and office suites had suffered considerably because of past insensitive remodeling. Prior owners had dropped ceilings for mechanical equipment, removed large sections of the historic marble wainscotting, and painted over the ornamental cast-iron staircases and bronze door hardware. Almost all of the feather-chipped glass partitions, oak trim, and glass office doors and transoms had been removed or covered over. On several floors the corridors had been entirely removed or shortened to accommodate open floor plan offices. (See figure 2).

After the building was purchased by the present owners in 1979, several options for its rehabilitation for office use were considered. The first option involved vacating the building of tenants and removing interior walls and finishes to accommodate an open floor plan. This would require the demolition of all remaining corridors, enclosing the open ornamental staircases with fire-rated glass, and replacing existing elevators. A second option explored keeping the original corridor plan, but upgrading it with new drywall surfaces and dropped ceilings to hide linear mechanical systems. The spaces behind the corridors would be left open to suit individual tenants. Both options are frequently seen today in various forms and are popular, though in the case of historic office buildings, such treatments may either be inappropriate or unnecessary.

Figure 2. Typical condition of public corridors prior to rehabilitation. Glass and oak corridor partitions and much of the marble wainscot was either removed or covered. Ceilings were suspended and sections of the corridor plan were shortened or removed. Photo: William S. Donnell

DESIGN SOLUTION

A third, more historically sensitive option was chosen. This option involved retaining the existing historic corridors and re-establishing corridors to match the historic ones on floors where they had been removed. The plans also called for smaller individual offices with a basic office module of about 600 square feet, which was close to the size of the historic office suites. (The marketing plan targeted lawyers and other professional businesses requiring smaller office spaces).

Historic drawings were used as the basis for reconstructing the missing corridors according to Burnham and Root's original design. Rehabilitation plans also included the repair and rebuilding of missing sections of the ornamental iron staircases. A few existing corridors, though missing some historic features, were left intact with plans to replace the missing historic elements sometime in the future. This allowed the building to remain occupied during the rehabilitation.

This design solution was chosen for several reasons. The building's long, narrow plan and bay window construction lent itself to smaller individual offices served by a double-loaded corridor. The building could be rehabilitated without a major disruption and loss of tenant revenues, and construction could continue on an as-needed basis as tenants leased the reconditioned floors. The owners recognized that the Burnham and Root design, with its double loaded corridor and use of high quality materials, could provide a "timeless environment" suitable for today's office market and would not be quickly outdated and needing further renovation within a few years.

OFFICE CORRIDORS

Many technical, economic and aesthetic considerations influence the design of a corridor system in an office building. In the case of the historic Monadnock where the intent was to retain the historic corridors and replace missing features, the work was influenced by decisions concerning the mechanical and electrical systems, stairs, wall finishes, and door hardware. If not handled with sensitivity, these building elements could have compromised the design and features of the historic corridors.

Historic drawings microfilmed by the Historic American Buildings Survey in 1954, together with physical evidence uncovered during the rehabilitation, provided a basis for the reconstruction of the missing historic corridor and office partitions. Where typical drywall construction would have cost around $25 per linear foot, the cost of replacing marble wainscotting, oak trim, and glass partitions cost approximately $400 per linear foot. This more expensive treatment was economically feasible because of the overall savings realized by using the building's existing heating system; by maintaining rather than rebuilding existing intact serviceable corridors; by using an efficient decentralized air conditioning system; and by receiving specific building code variances given to historic buildings.

Typically, the ceilings in office building corridors are dropped to allow for mechanical chases to run longitudinally through the building. Retention of the Monadnock's historic plaster ceilings in the corridors was possible by locating mechanical systems above dropped ceilings in the non-public space adjacent to the corridors. These secretarial anterooms are located between the corridors and private office bays (See figures 1, 3, and 4).

Approximately one-third of the corridors were missing before the rehabilitation began. Such areas were rebuilt to the historic configuration. Another one-third required some remodeling of existing wall finishes and floor plans, while the remaining one-third required minimal work such as repairing and replacing office doors and door hardware, removing paint, and refinishing wood trim.

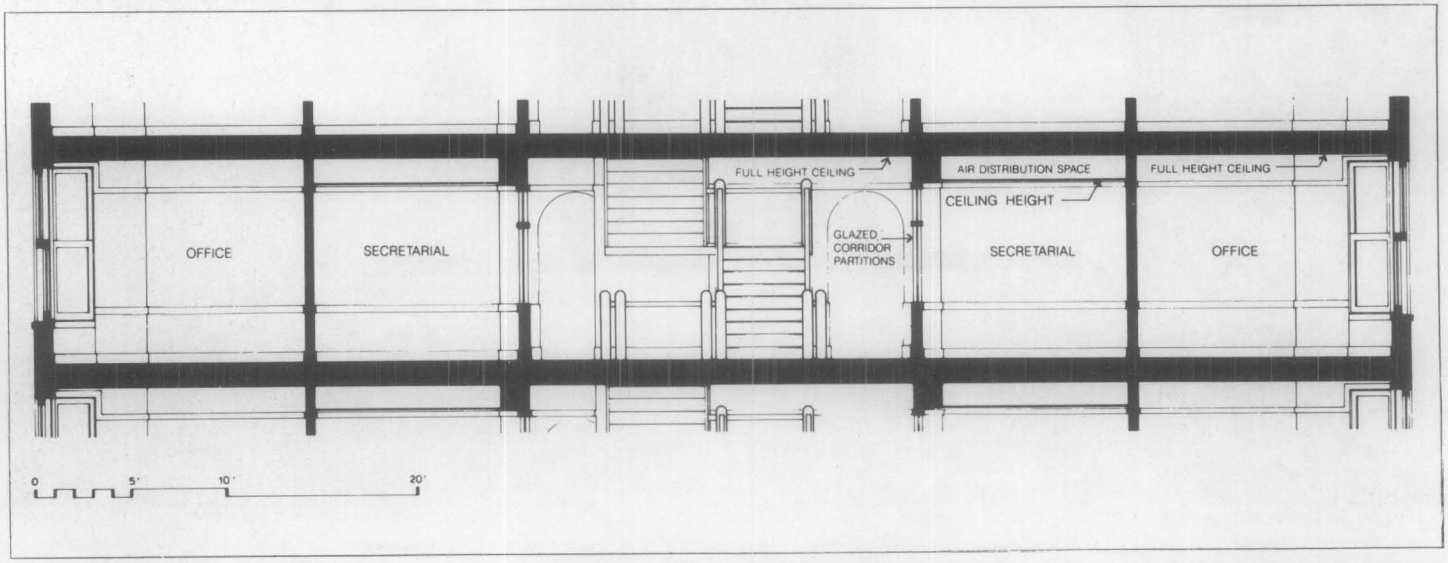

Figure 3. Building cross section showing open stairs and full height ceilings in corridors and private offices. Glazed corridor partitions are feather-chipped glass. Drawing: Montauk Company

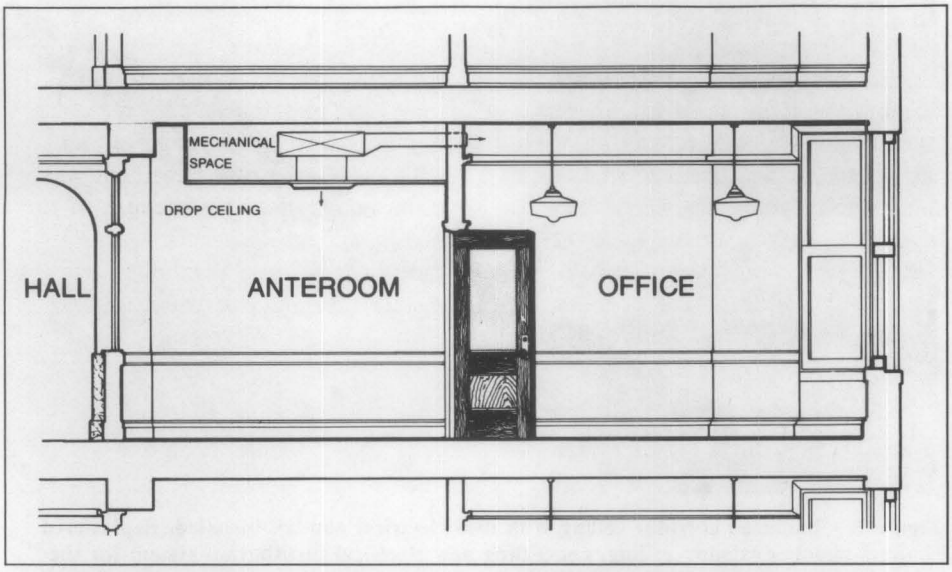

Figure 4. The innovative rehabilitation solution places dropped ceilings only in the anteroom, thus preserving the important historic features in the public corridors and private office spaces. The dropped ceiling area is large enough for future expansion of mechanical and electrical systems. Drawing: Neal Vogel

MECHANICAL AND ELECTRICAL

The Monadnock was purchased in 1979 by the current owners for $5 per square foot. The original one-pipe steam heating system was still in place at the time. Rather then replace the existing system with a more costly forced-air unit, the steam system was repaired for less than $1 per square foot. This included new boilers and controls, asbestos abatement, and new Ammark valves at the radiators. The German Ammark valves are thermostatically controlled and regulate both steam and return condensation in one pipe. Considerable space was saved by using the existing steam system, and avoiding massive forced air duct work or piping for a new steam system (see figures 5 and 6).

Likewise, large volumes of space were saved by installing a new space-efficient air conditioning system. Individual window units were replaced by a central cooling tower located on the roof, featuring four vertical risers through the building at 100-foot intervals. Each office suite is then serviced by individual heat pumps connected to a riser on each floor. Duct work to supply the conditioned air is concealed by the dropped ceilings in the anterooms.

By breaking the air conditioning system into smaller components of individual heat pumps, and using the existing steam heat system, the amount of required mechanical space was reduced. By reducing the necessary mechanical space and evenly distributing the heating and air conditioning systems throughout the building, smaller mechanical chases could be located in anterooms, thus eliminating the need to lower historic corridor ceilings.

Upgrading the electrical distribution system provided a challenge in corridors that retained the full historic ceiling height. Floor sections in the Monadnock are constructed of 12-inch to 13-inch hollow terra-cotta tiles topped with a cementitious mortar and finished below with ceiling plaster. Running new electrical conduit through the hollow floor sections was explored, but rejected because of misalignment of the terra-cotta sections. An alternative solution proved to be more feasible. A new primary electrical distribution system, together with a backup emergency system, was

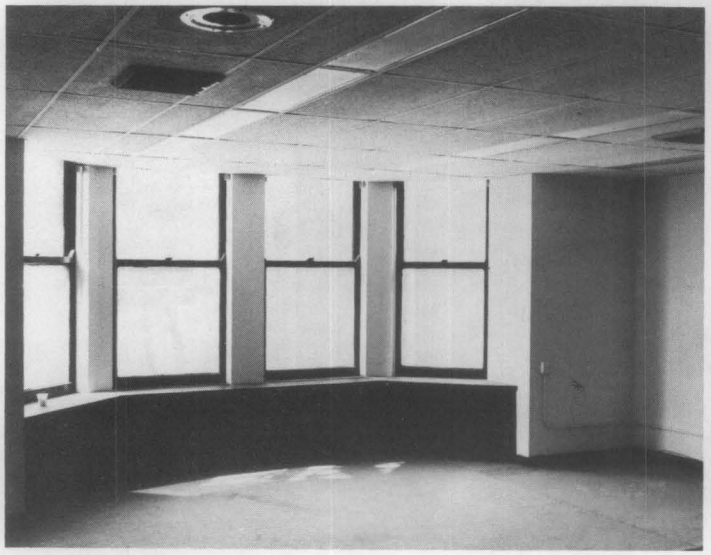

Figure 5. Typical pre-rehabilitation condition in private offices. Approximately 60 percent of all office interiors had suspended ceilings, blocked-down windows and radiator enclosures. Note inappropriate way dropped ceiling abuts windows. Photo: William S. Donnell

Figure 6. Typical 600 square foot office module after rehabilitation, with full ceiling height and one stand pipe radiator heat. Photo: Ron Gordon

installed in the building by carefully channeling the ceiling plaster and attaching 3/4-inch oval conduit to the hollow terra-cotta floor sections. The channels were then replastered to match the surrounding ceiling (See figure 7). Dropped ceilings in the anterooms also provided for electrical chases servicing secretarial and private office spaces.

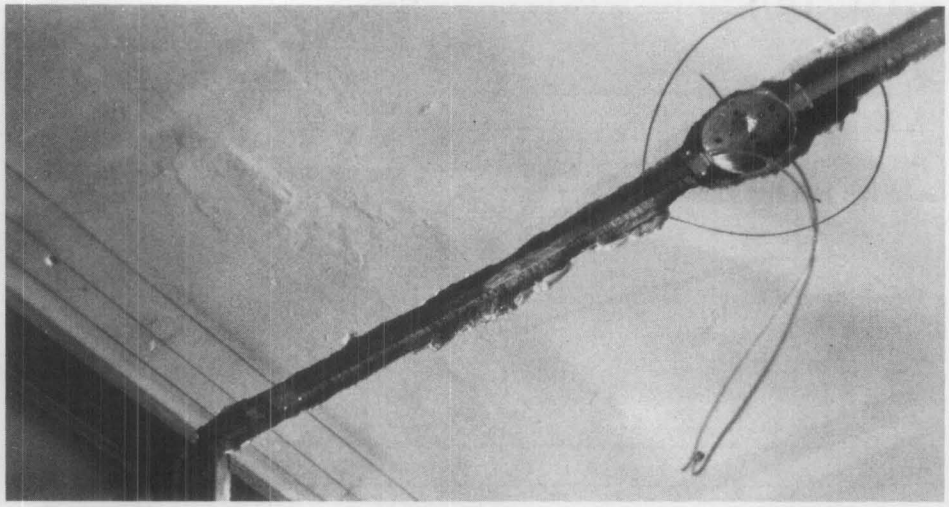

Figure 7. Channeled corridor ceiling with oval electrical conduit installed. Replastered channel matches existing ceiling, concealing new electrical distribution system for the entire building. Photo: William S. Donnell

ORNAMENTAL STAIRS AND BUILDING HARDWARE

The ornamental open staircases are significant architectural features and a major focal point of the corridors in both the north and south halves of the building (See figure 8). Beyond their architectural significance, the stairs in the north half of the building from street level to the first floor are cast aluminum and represent the first use of this metal in a building. Upper flights are made of bronze-plated cast iron. These open stairs were allowed to remain intact under a provision of the Chicago Building Code that waives certain code requirements for buildings where the total new construction costs remain under 50 percent of the estimated cost to reproduce the entire original building. For most historic buildings, the reproduction costs would be staggering, allowing rehabilitation costs to be well below 50 percent of the estimated reproduction costs.

Originally the Monadnock featured Bower-Barff cast-iron door hardware, which is cast iron that has been reheated in the manufacturing process to form a dark corrosion-resistant finish simulating cast oxidized bronze. During the course of the rehabilitation, missing and damaged hardware was replace with actual cast oxidized bronze (See figure 9). As a result, these important historic features remain significant elements within the Monadnock's corridors.

Figure 8. Burnham and Root's aluminum and bronze plated cast-iron stair remains the most notable architectural feature in the north half of the building. Minor repair work and a few missing elements have been replaced with cast aluminum. Favorable building codes allowed the open design.

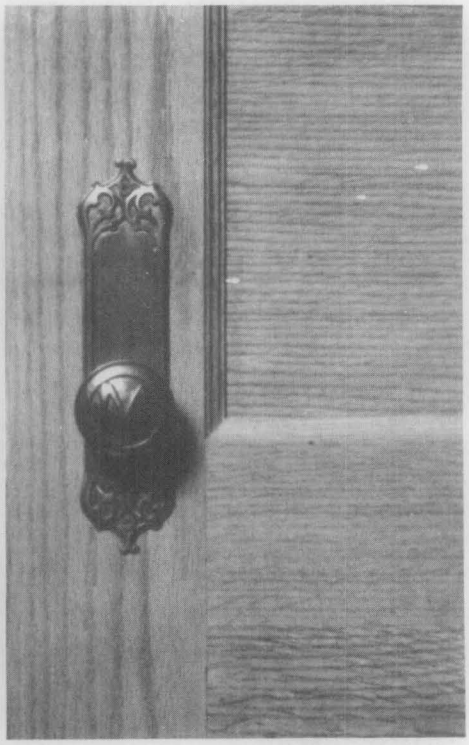

Figure 9. Original cast-iron door hardware retained in corridors. Photo: Ron Gordon

EVALUATION

The rehabilitation philosophy of retaining and repairing historic corridor fabric where possible and replacing missing elements to match the historic plans proved to have an economic advantage over comparable new construction. While typical office rehabilitations in Chicago require an average investment of $100 per square foot, the rehabilitation of the Monadnock cost under $50 per square foot (See figure 10).

The success of the rehabilitated Monadnock building can be measured by its tenant occupancy. Before the rehabilitation started, the average office suite leased for $4.75 per square foot. Today average office suite leases exceed $14 per square foot, with a vacancy rate of less than 4 percent. Compared to new class "A" office space in Chicago with leases averaging $25 per square foot, and a 14 percent vacancy rate, the Monadnock with its historic interior is a competitive alternative to new construction or rehabilitated space that has been stripped of its historic finishes.

The innovative design solutions employed in the Monadnock show that retention of historic corridors in office buildings can be not only cost effective and feasible, but may also be a desirable alternative to more radical and intrusive rehabilitation treatments.

Figure 10. Rehabilitated corridor showing marble wainscot, oak and feather-chipped glass corridor partitions, full ceiling height and open ornamental stairs. Photo: Ron Gordon

PROJECT DATA:

Building:
The Monadnock Building
53 West Jackson Boulevard
Chicago, Illinois

Architect:
John Vinci, Architect
Chicago, Illinois

Project Costs:
The average cost per floor of rehabilitation for the north and south halves of the building is approximately $1 million dollars or $47 per square foot. This includes the cost for repair or replacement of missing historic corridor and office wall components, ornamental staircases and building hardware, new electrical distribution systems, new air-conditioning systems and retrofitted steam-heat system.

Owner and Developer:
Montauk Company
Chicago, Illinois

Project Dates:
1979 to Present

This PRESERVATION TECH NOTE was prepared by the Division of Cultural Resources, Rocky Mountain Regional Office, National Park Service. Charles E. Fisher, Preservation Assistance Division, National Park Service, serves as Technical Coordinator for the PRESERVATION TECH NOTES. Information on the rehabilitation project was provided by William S. Donnell, President, The Montauk Company.

PRESERVATION TECH NOTES are designed to provide practical information on innovative techniques and practices for successfully maintaining and preserving cultural resources. All techniques and practices described herein conform to established National Park Service policies, procedures, and standards. This Tech Note was prepared pursuant to the National Historic Preservation Act Amendments of 1980 which direct the Secretary of the Interior to develop and make available to government agencies and individuals, information concerning professional methods and techniques for the preservation of historic properties.

Comments on the usefulness of this information are welcomed and should be addressed to Tech Notes, Preservation Assistance Division, National Park Service, P.O. Box 37127, Washington, D.C. 20013-7127.

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