N ARCHITECT CANNOT build in Pittsburgh without feeling the no-nonsense, gritty, hard-working spirit of Pittsburgh’s built environment. The Historical Society’s mission as a repository of Western Pennsylvania’s heritage perhaps naturally led its search for new headquarters to a warehouse. After all, museums and archives are places to store the collective memory of people and culture. But great museums are more than storehouses of time; they must also be vibrant reflections of the region’s hopes and dreams, making the past relevant to future generations, and keeping pace with developments in the museum field.

Bohlin Cywinski Jackson, an architectural and planning firm with offices in downtown Pittsburgh, was chosen to plan and implement the renovations to the ice warehouse. As architects, it was our challenge to support the Historical Society’s mission through a careful reworking of century-old brick, steel, and timber. As planners, our role was to analyze the circumstances of the project. Whether it be a surprise in the old foundations or a wrinkle in the fundraising schedule, the project benefited from the collaboration of HSWP staff, architects, engineers and contractors who went the extra yard to see this project through. Meeting every week for almost four years, we all learned to be quick on our feet and to adjust the construction program accordingly.

The architectural profession bridges many disciplines from engineering to the arts, but the art of compromise is at the heart of our efforts. How do we translate the often conflicting needs of budget, function, and design into a building that serves as an appropriate place for a museum and archives, yet does not compromise the resources needed for content and operations? Working with a number of specialized consultants, architects are facilitators for consensus. However, consensus is not always enough, for translating a need for space into reality is not a matter of stuffing things into an old (or new) box. Rather, it is often a sometimes intuitive process of looking for opportunities to exploit.

Robert Pfaffmann was project manager for the Pittsburgh Regional History Center. During his 13 years with the Pittsburgh Office of Bohlin Cywinski Jackson Architects, he was also project manager for numerous award-winning projects, including The Software Engineering Institute, The Intelligent Workplace, and the Carnegie Mellon Research Institute. In May 1996, Pfaffmann will establish an independent practice of architecture, planning and preservation/adaptive reuse.
A new state of the art museum can cost in the range of $150-200 per square foot — renovating the warehouse at under a $100 per square foot presented great challenges as well as opportunities. We believe good design is directly related to a client’s desire for it, so the design process for this building began (as it would for any building) with a strategic plan.

Conceptualization

Bohlin Cywinski Jackson is organized around a strong project manager system to allow the full breadth of the firm’s experience to be utilized. Among the tasks we must undertake are assessing the existing building, planning the design presentations, interpreting the building and zoning codes, developing internal and external project budgets, coordinating consultants’ work, and assigning tasks to the project team. Each has a different set of talents to utilize. The interconnected sets of demands of budget, space, and time require a series of design phases (as we call them): schematics, design development, and construction documentation. Each has an important role to play in satisfying the needs of the project, and the sequence of this process is important: one does not worry about the specifications of a door knob on Day 1.

Soon after the selection of the site, we began our process of programming and analysis of the existing structure. As anyone has who has renovated an old house knows, the process of rebuilding is littered with challenges. Phase I, for example, involved 160,000 square feet. As architects, we often need to remind ourselves that many of our clients have not experienced the repeated struggles with the process of defining and prioritizing a building program. In this case, we were fortunate to have the dedicated Historical Society staff led by John Herbst and Bill Keyes as our points of contact during the design phases to help us facilitate the many points of view within the organization.

John Herbst wisely saw the need to address the full possibilities of this site with its collection of four buildings of varying ages and configurations. Our preplanning study created a master plan for the building and site. The document was often summarized in a schematic section of the building showing what went where and when. Many hours were spent adjusting and fine-tuning the fit of program to building and budget. “Listen very carefully to what the building has to say!” was the rallying cry.

As we tested the program and budget, it was clear we had to find ways to manage conflicting needs. The task of finding a balance and place for everything in such a way that addressed the ups and downs of the fundraising effort was long and difficult. We had to make sure that we didn’t cut off future opportunities for expansion or create inefficiencies in a very complex reconstruction process.

Documentation

Over 250 computer-generated drawings of 30 inch x 42 inch were produced by a staff of over 20 architects, engineers, and other consultants to document the project for construction. This does not include the many prelimi-
The ground floor of the new building had a wood, dirt, and Belgian block floor, brick vaulted ceilings, and iron beam supports.
Construction begins on the first floor. The loading dock doors to the left are now the main entrance; the curved wall to the right is behind the Admission Desk.
nary drawings produced for internal review within the Historical Society. To plan, design, and document those 250 drawings exceeded 15,000 hours. When you add in the uncounted hours of HSWP staff, exhibit designers, and construction workers, one truly gets an understanding of the achievement this project represents. But even with this massive amount of information, daily adjustments and judgments in the field were required.

Turning our drawings into reality required the judgment of many individuals on the construction team like John Zang and George Mooney of Jendoco, or Bob Lemon of Ferry Electric. Each of us learned to anticipate the other, creating a true team effort that is mandatory for such a complex and sensitive project.

Early on, it was quite apparent that the structure was a sort of architectural palimpsest. A palimpsest is a manuscript from which the original writing has been partially erased to make room for a second writing, and in essence, we were looking for the right places to erase and the right places to let alone. This approach is one that results in buildings that are rich with layers of their history rather than only one layer artificially preserved. The prime advantage of a warehouse is that the architectural fabric could be more readily manipulated for new uses while preserving its integrity.

The photographs taken before renovation give a sense of the visual character we needed to preserve even after the highly technical and demanding needs of a museum and archives were met. As we walked around the building time after time, we were struck obviously by the strength of the building’s ‘bones.’ But more often it was little things: decades-old initials cut into columns, the smell of the timbers, the textures of the old lime and sand mortar, and even the sound of footsteps on the heavily planked floor. In his influential book, “What Time is this Place?” author Kevin Lynch recognized the idea of preservation by exposing continuing layers of history to view: “Layering is used as a deliberate device of aesthetic expression — the visible accumulation of overlapping traces from successive periods, each trace modifying and being modified by the new additions to produce something like a collage of time.”

The organizing principle: A Great Hall...

A rchitects look for cues for the organization of a building, whether it is new or old. The clues can come in the form of a client’s need or a unique aspect of a site or structure. We were fortunate to find both. As we worked with HSWP staff, it was quite apparent that the first floor was a special place that needed preservation while still accommodating the high visitor load on its way to the upper floors of the building.

A large, open expanse on the first floor evolved into what we came to call the Great Hall. It will serve a number of functions from everyday to special events, in effect becoming a town square for the museum’s community of visitors. After entering through openings that once served horse-drawn wagons, visitors will be able to visit the museum shop, and after passing the ticketing desk, proceed into the hall. A circular orientation area, a theme cafe, and various exhibits ease the transition to exhibits on upper floors.

Beyond the addition of the new stairs and accompanying structural glass walls forming vestibules, the original structure was left as it was a century ago. The floor of the original warehouse was either wood, dirt, or Belgian block. Because the old wood loading docks that served the rail cars prevented general circulation, especially for the disabled, they were removed. In its place is a new floor laid out on the old structural grid and exposing the bases of the steel columns as they meet the rustic stone foundation blocks. The structure of the first floor is fortuitous in that the bays are larger because of the steel construction used throughout. The heavy riveted steel construction was relatively new to buildings at the time of its construction and also presented new challenges from the point of view of fire protection. The mixture of heavy timber on the upper floors and steel on the lower reflects the need to bring railcars directly into the structure for loading and unloading while providing for fire-prevention and space requirements. It’s interesting that wood, in the form of large heavy timbers (not lightweight dimensional lumber), is actually more resistant to fire than equivalent unprotected steel. Illustrations in Kidder Parker’s Builder’s Handbook, in common use at the time the building was constructed, show how the design of these structures evolved from experience in major mill fires and was driven by the demands of the fire insurance companies.

The floor is conventional concrete with a twist: it’s tinted a warm gray/brown and was ground smooth with terrazzo grinders to expose the natural aggregates taken from Pittsburgh’s rivers. Along the column lines are the donor tiles made of materials associated with Pittsburgh’s industrial history — glass, stainless steel, aluminum, and iron. In addition to the special concrete floor, we have added an area of Belgian block street around the trolley (ground smooth to allow full accessibility and bring out the rich colors often noticeable after a rain). At the orientation area’s Cooper mural, a wood block floor was made from salvaged timbers. Wherever possible we endeavored to use materials salvaged from the old structure to help maintain the building’s character.

A seven-story atrium

rom the west end of the Great Hall, an opening was cut through the upper floors, creating a spacious atrium. A significant detail in the new atrium was created by the removal of large portions of the 3-1/2 inch yellow pine floor decking. At the cut edges of each floor new handrails are installed. We decided that the new handrails should be designed in the spirit of the old warehouse. We wanted the rails to feel like they had been there a while, allowing observers to realize on their own that they are new additions. Each handrail section is built of heavy steel sections and plating, with a heavy welded mesh sandwiched between the steel sections. The resulting handrails are substantial both in visual and actual weight. They are attached on the timber floors by a series of straps at the floor joists and at each column. This design allowed adjustments in dimension and alignment. The entire process of removing parts (the old floor) and adding parts (the handrails) is clearly expressed throughout the atrium.
The second floor and above is crisscrossed by a latticework of beams in the new building, as seen in the atrium.
The top floor of the "B" building became the Community Gallery. The floor is suspended from the iron poles.
At the top of the seven-story atrium is a new roof structure replacing a portion of the original roof, which was quite low on the seventh floor. The new steel roof is about 7 feet higher, creating a partial clerestory at the perimeter where the old meets the new. This was done to solve both functional and visual problems. First, the atrium was a complex space technically: modern atria are required by code to have smoke control systems that can evacuate smoke from the atrium’s top. The raised roof allows the installation of two large smoke exhaust fans that look like jet engines adjacent to the atrium. The second reason was a visual one: because the seventh floor board room looks out through the atrium, a higher ceiling helps reduce the feeling that the roof is right on top of you and completes the top of the atrium spatially, much like the capital does on a column.

As we explored ways to support this new roof, we identified the opportunity to support the roof at mid-span by using the existing wood column centered in the space. To make the transition, and to keep the roof members as light as possible, we created an “umbrella truss” that springs from the single wood column in the atrium’s center. At the spring point for the truss, we attached a series of support struts that give lateral support to the wind pressures on the great window. The effect keeps the top of the atrium light and delicate relative to the heavy timber and steel structure below.

A Great Window, too...

Because the Chautauqua Lake Ice Co. built the structure for storage of ice, incoming light was undesirable. As a result, the building has very few windows on its upper floors. Unlike the lower floors, where many workers toiled loading and unloading ice, the upper floors were mostly uninhabited. This presented both an opportunity and a constraint for the design team. Since there are many areas of a museum and archives where natural light is undesirable (because of the need to protect artifacts from destructive ultraviolet light), it was clear that the body of the warehouse would adapt quite readily to its new use. This also allowed the building to be preserved on the outside generally as it has looked for nearly a century. While the archival and exhibition needs clearly could be met without natural light, a modern museum that is attractive to visitors and makes connections between the place they are in and the city around them needs more.

In analyzing opportunities to introduce light into the structure, we noticed that the best views were to be had from the western edge of the roof of the Chautauqua building above the four-story buildings below. In addition to the view, a western orientation would allow low sun angles to penetrate deeply into the public spaces of the structure. The western wall of the building was heavily worn “pumpkin brick,” a cheap soft brick intended for interior use only, so it was logical to propose a major opening there. Seen primarily from the inside, it is oriented almost perfectly on axis with Grant Street. In addition to providing great views, the 40-foot tall and 28-foot wide window also helps orient the visitor to the elevators.

Walls and other new connections

Because the upper floors of the original warehouse were subdivided by thick brick bearing walls for fire containment, we had to cut new openings to accommodate museum functions and to provide exit corridors. Our design for the lintels (above the door openings) was different than the original openings that were created as the wall was constructed. Often these were shallow flat arches with heavy counterweighted rolling fire doors. To create a new opening in an existing wall, a traditional technique would be to “needle” with a number of small beams. This would allow a mason to remove the brick and construct a new lintel to support the masonry over the opening.

This technique is time-consuming, and as we had many openings to create, we designed a technique with our structural engineer that sandwiches the masonry with two surface-mounted steel channels. These channels are bolted together through the wall. Once this is completed, the opening is created below the channels by removing brick (in two or more sections) for long spans over 4 to 6 feet. A steel plate is welded at the bottom along with two bearing angles to complete the lintel. The result is a visually different lintel that is easy to distinguish from original openings using brick arches. We are particularly pleased with the craftsmanship of the masonry work that had to be fairly precise to maintain square openings for new doors inside the openings.

One of the great difficulties in navigating through an old warehouse is the forest of columns on 16-foot centers. To orient the visitor and create a sense of place for larger assembly areas on the upper floors unencumbered by columns, we needed to create enclosed spaces. We decided that the best shape for this circumstance was a circular drum that extends from the first floor, where the Cooper mural is located, to the second floor, where the orientation theater is located, and finally to a multi-purpose classroom on the third floor. Each of these spaces is 25 feet in diameter and either partially or fully enclosed in a shiny galvanized and riveted skin. They serve as visual cues for the starting point to each floor. The position of the drum was deliberately located off-center to allow a clear view of the great window from all floors.

Inserting modern infrastructure

When one thinks of modern buildings, we often don’t realize the complexity of construction behind their walls of gypsum drywall and acoustic panel ceilings. Structures like the Chautauqua Lake Ice Co. building had no heating or air-conditioning systems. Of course one suspects that being on a floor full of ice was a great place to be in the days before air-conditioning (at least in summer!)

A modern museum is not unlike the high tech laboratories we designed for Carnegie Mellon University. Each requires precise control of temperature and humidity. Each requires sophisticated fire protection systems. In fact, in the Archives, the degree of control exceeds many high-tech laboratories. Putting all this technology into a 100-year-old warehouse presented certain challenges both physically (will it all fit?) and aesthetically (what
will it all look like when crammed between the ancient timbers?). Our philosophy of expressing the new and old honestly became our ally in controlling cost and organizing the systems. Even though the building’s floor heights seem quite high at 12-foot-3-inches on the upper six floors, they are actually low when compared to modern laboratories, which often are upwards of 15 feet floor to floor. Fortunately, the structural layout afforded a few opportunities. Because the heavy timber joist system of the structure runs east/west on top of larger carrying beams running north/south, we discovered we could run our heating and air-conditioning ductwork between the joists almost the entire length of the structure.

Once we determined the most cost-effective mechanical system design, based on independent air handlers on each floor, we set up rules for the location of ductwork, piping and wiring raceways. This generally creates the impression, as you walk out of the elevator, of an uncluttered appearance, leaving the beautiful timber structure visible. We accomplished this by placing all the trunk lines to the east side of the large carrying beams and bearing walls, hiding them from view.

Our intent however, was not to hide but to organize effectively. The result is a highly organized layering of ductwork, heating pipes, sprinkler systems, lighting, communications and electric raceways. On the first floor, which is built of heavy steel and masonry vaulting, we opted for a different approach. Because the first floor contains arched windows along the south and north walls, we felt that the large ducts that serve the space would be better off buried under the floor. To distribute the air, a series of “kiosks” then pop up like giant industrial mushroom ventilators, not unlike those found throughout Pittsburgh’s industrial landscape.

Lighting

The lighting of an old building is often problematic: to provide lighting that is appropriate to an old warehouse, and which meets the technical demands of a modern museum and archives, is difficult in our modern commercial marketplace. Inspiration came from a couple of places: in the last few years we have been working for the City of Pittsburgh on a new streetlight to replace the maligned “lollipops” of downtown. We had chosen a prismatic glass fixture derived from the historic patterns of the Holophane Company in Newark, Ohio. In a tour of their historic factory a few years back, we came upon an old warehouse fixture that was made of two sections of prismatic glass held together with an unusual set of aluminum bands and wires. The wires draw together with a cam lock that is easily removed to change the lamps.

The second fixture is what we have nicknamed “knob and tube lighting” because it reminds one of the early method of wiring buildings using two conductors spaced about six inches apart and attached by “knobs and tubes” at each joist. The system is really a high-tech low-voltage system that uses aluminum aircraft-type braided cable to deliver low voltage to 50-watt high-performance lamps that stretch between the conductors. The beauty of the system is its flexibility; like a track system, the fixtures can be relocated easily with a small set screw and can point up, down, or be used as a wall flood for exhibits. The most spectacular use is in the first floor, where they see duty to provide ambient light on the vaulted brick 20 feet overhead.

In the changing exhibit areas, we have opted for a heavy-duty track system that allows not only lighting to be attached but also other electrical needs for changing exhibits as well. The system also solved an aesthetic problem on the fourth floor. If we used conventional track, the electrical demands would require many feeds of conduit running across the exposed wood joists, distracting from the relative purity of the exposed ceiling on the changing exhibit floor.

Doors and glazings

Like many other new elements for this project, the task was to minimize the visual impact of modern needs such as fire doors and entry vestibules. The entry vestibule walls are constructed of 1/2 inch tempered glass that is used structurally to support their own weight. The result is a transparent glass envelope that helps the building’s form be seen with less distraction.

Where they are attached to steel or wood, a “chunky” black steel bracket makes the connection in the spirit of the wood connectors of the structure nearby. Where modern necessities and budget demanded, we used conventional hollow metal or wood framed doors. Wherever possible, they are de-emphasized by painting them a recessive gray-green color. In a couple of areas, we were able to restore for display the old fire doors from the icehouse. In the Board Room on the seventh floor, a pair have been used for the entrance to a pantry. As with many decisions on this project, the right design decision is often the one of doing less rather than more, both to serve the limited budget and to respect the rough-hewn character of the building.

Treading lightly on the exterior

From the start, everyone saw that the tough masonry shell of the building should be left alone wherever possible. The need to make the building “new” for marketing purposes commonly results in a call for a new facade or some design on the existing facade. Fortunately, everyone involved saw the need to take a more restrained approach and to work to exploit less grand opportunities to maximum advantage.

The most important change to the old shell was primarily a good cleaning. Over the course of a few months, the building’s veil of black soot gave way to the rich red masonry that probably only existed that way at its construction. Although some would argue that, like the Carnegie’s recent cleaning, we are erasing important reminders of the history of Pittsburgh’s air quality, cleaning was critical to the public perception of rebirth of both building and institution.

One added element is a new entrance canopy of finely detailed steel and glass, designed to let the arched windows behind show through. It replaces a poorly functioning loading dock canopy of little architectural merit. The new canopy is suspended
BCJ was responsible for all design aspects of the renovated warehouse. The handrails for the atrium overlooks were designed in April, 1994.
much like the Strip District’s mercantile canopies further down Smallman Street, but with modern stainless steel rigging. The entrance will also feature four pairs of custom designed doors, each pair 8 by 9 feet, clad in bronze.

A new “tower” on the skyline

The old warehouse was designed to transport ice — not people — in its two primitive freight elevators, so a major investment in new “vertical circulation” was necessary. Modern fire codes are quite demanding for museums, and because each floor contains up to 15,000 square feet, an extensive exit system was necessary. On the lower floors, four independent stairways were required. In order to accomplish this without consuming enormous amounts of valuable floor space, a system of intertwined but separated stairs were devised.

Three new elevators were also installed at a cost of nearly a half-million dollars. The primary elevators run seven floors and are designed to serve all floors rapidly. In addition, a third elevator with a greater lifting capacity is designed for large artifacts and groups of school children. The elevator towers and stairs together demand a great deal of space; thus it was decided to locate one tower outside the main Chautauqua building in what we call building B, one of the two 4-story structures adjacent to the main structure. We clad the new tower in copper and steel to create an architectural addition that is at once contemporary and compatible with the masonry to which it is attached. The debate about its look was quite representative of a common decision an architect must make about new additions to an older structure — should it look like it has always been there or should it represent “its own time,” as many in the preservation disciplines advocate.

Most architects tend to agree with this latter philosophy. However, the resultant banal additions to historic structures during modernism’s heyday in the 1960s and ’70s motivated some to advocate replication, or “accurate” neoclassical responses. The 1980s brought post-modernism, with its good intentions to make architecture “more humane.” Unfortunately, most solutions were shallow in the shadow of their more substantial neighbors. We were determined not to create a tower imitative of the building’s masonry fabric.

As we began to explore the alternatives, John Herbst noted the Otto Milk Building further down Smallman Street in The Strip. We all agreed it represented an appropriate way of handling a tower and a warehouse composition. However, we still held concerns about being slavish in the reproduction of historic elements. After much discussion, we proposed two alternatives: both were basic tower forms clad in flat seam copper sheathing up to the roof line of the elevator shaft. Everyone agreed that masonry was not the right solution since we all thought the tower should help bring attention to the restored structure below — a beacon, if you will. In fact, one proposal included an old airport beacon or other artifact that could give life to the new tower. Many sketches later, we agreed on a form that terminated in a steeple shape crafted of heavy structural shapes and painted a deep structural “primer” red. Like the interior, we agreed that the
Drawings made by Rob Pfaffmann and other BCJ architects were reviewed by Peter Bohlin, whose comments appear on this June, 1994, rendering of the elevator tower. The tower was one of the last exterior details to be finished.
structure should be prominent but not overwhelming. Its position, set back from the Smallman Street face and integrated into the composition of the great window, provides just the right balance. By day, the copper will shimmer in the sun. At night the lattice-like steeple will be lit as a beacon to visitors arriving at the History Center from all directions.

Over time the tower will turn from the deep red brown copper to an aged green as it becomes part of the tough urban landscape of Pittsburgh. The History Center will change and grow, too, testing our contribution to preserving and adapting the century-old ice house.

Credits
Bohlin Cywinski Jackson Architects

Principal in Charge
Jon Jackson, AIA

Principal in Charge/Design:
Peter Bohlin, FAIA

Project Manager:
Rob Pfaffmann, AIA

Project Team:
Chas Cwenar, AIA
Greg Mottola
Erik Hokanson
Keith Cochran
Maria Keares
Stephanie Jacobs
Becky Boles
David Senft
Rebecca Henn
Jeff Wyant

Existing conditions photography:
Karl Backus

Consultants
Associated architects
Notter & Associates:
George Notter, FAIA
Tom Butcavage
John Mott

Structural
Structural Engineering Corporation
Dennis Roth, PE, Partner in Charge
John Schneider, PE, Project Engineer

Mechanical & Electrical Engineers
RAY Engineering,
Rick Yates, PE, Partner in Charge
George Cannon

Consulting Mechanical & Electrical Engineers
Cosentini Associates
Doug Mass
Marvin Lewin

Programming
Maurice W. Perreault & Associates

Food Service
Gary Hammer

Cost Estimating
Arena & Company
John Frondorf

Illustrations
Stephen Patricia

General Contractor
Jendoco Construction

Project Team
Peter C. Dozzi
Tom Murphy
Fred Fanto
Dwight Kuhn
John Zang
George Mooney

Major Subcontractors
McKamish Chesapeake (Mechanical)
Joe Cummings
Jim Clark
Ferry Electric (Electric)
Bill Pullman
Bob Lemon