Museum Profiles:

The Museum of Transportation & The Children's Museum, Boston

Susan E. Schur, *Editor, Technology & Conservation*

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"You can't miss the entrance to the Museum of Transportation and the Children's Museum — just look for a huge white milk bottle, several stories high." This structure may seem to be a strange choice for an identifying beacon for the new home that opened in July 1979 for two of Boston's cultural/educational institutions. In fact, however, the milk bottle is quite fitting, both symbolically and functionally . . . . The structure is not some pop art sculpture carried to wretched excess, but rather is an authentic 1930's roadside stand – an appropriate artifact for a museum devoted to social history as related to the evolution of different transportation modes. For a museum with programs and exhibits geared toward youngsters, the large milk bottle supplies an image that its audience can readily recognize and identify with, a slightly campy image that holds out the promise that the museum will be an unstuffy "fun place" to visit. In addition to being a meaningful identification sign, the milk bottle is a productive part of the landscape. After it was restored, refurbished, and transported to the site, the structure was opened as a snack bar, providing revenues to the museums and to the city.

In a broader sense though, the milk bottle really is representative of the whole approach that was taken to create a Museum Wharf complex. That is, a neglected commercial property was rescued from oblivion, perhaps destruction, and recycled into a viable entity. More specifically, the Museum of Transportation and the Children's Museum, working together, undertook a development project that would convert an almost abandoned 1889 warehouse and its waterfront site into a facility which would serve as the prime quarters for these two separate organizations. By careful planning, innovative financing, and close cooperation among the museums' professional staffs and boards of trustees, the architect, the builder, and the construction manager, this goal of the rehabilitation/conservation program was achieved.

An Old Warehouse – Some Quirks But Otherwise an Ideal Structure

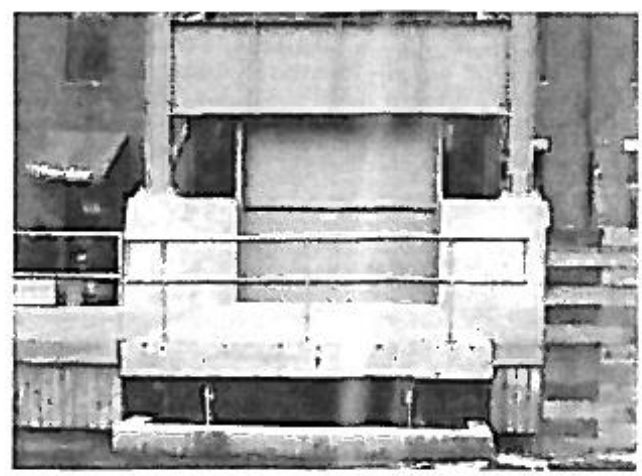
By the early 1970's, both the Museum of Transportation (MOT) and the Children's Museum (TCM) had outgrown their facilities.

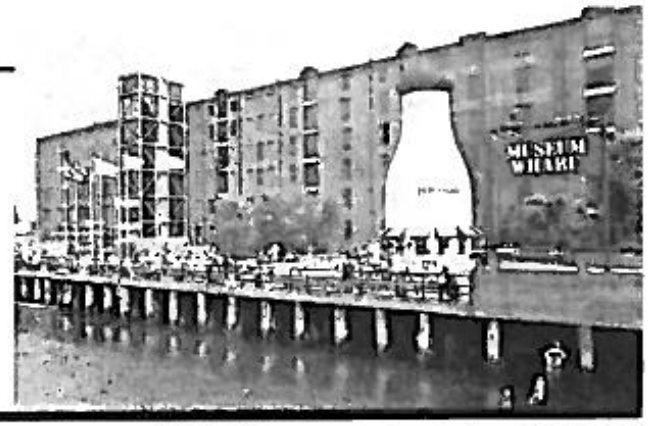
The Museum of Transportation had been located for 30 years in the Larz Anderson Carriage House in Brookline, a town adjacent to Boston. Starting with the collection of carriages and automobiles that Mrs. Larz Anderson had given to the Town of Brookline, the Antique Auto Museum, as the museum was originally known, began collecting and conserving a wide variety of vehicles and artifacts relating to transportation history. In 1970, when the name was changed to the Museum of Transportation, a commitment was made to extend the scope of activities to include educational programs on an in-house and out-reach basis. The volume occupied by the collection at this time was doubling at the rate of once every five years, with the result that much of the collection was being relegated to storage, not easily accessible. Thus, the size of the facility was becoming increasingly inadequate for MOT's exhibition and educational purposes.

The Children's Museum, likewise, was located away from the downtown Boston area and was experiencing growth pains. Since its founding in 1913, it had been in the Jamaica Plain neighborhood, with one move in 1936 to a larger facility in the same locale. TCM originally emphasized the natural sciences, but gradually expanded its educational programs and exhibits to include the study of cultures, the man-made world, and the processes by which children grow and learn. In the early 1960's, the museum amplified its community-based projects and curriculum development and training programs. It also began replacing many of its traditional glass case displays with interactive exhibits in which youngsters directly participated, such as using a computer terminal and making their own movies. As more and more of these efforts were undertaken, there was an accompanying need for more space.

Each museum, therefore, was actively looking for a site that would solve its requirements of more space and easier accessibility to residents of the Greater Boston area and to visitors to the city. Finding a centrally located existing building that was affordable and that could be adaptively re-used and rehabilitated into a structure suitable for a museum was each's goal. Neither investigation, however, had uncovered a desirable property. By chance, the directors of the two museums — Duncan Smith of the MOT and Michael Spock of TCM, who were neighbors — were discussing this dilemma and the idea that their institutions jointly develop one site was born. The concept was an attractive one. The museums would remain independent organizations, but would be able to achieve substantial capital and operating economies by sharing basic services such as environmental control systems, security,

The dock area outside the elevator can be lowered to street level to allow vehicles to be driven straight into the huge elevator cab. When loading is not taking place, the dock is level with the boardwalk.





In 1975, the Museum of Transportation and the Children's Museum, Boston, jointly purchased an old warehouse building to convert into their new home. A rehabilitation program was undertaken which included interior and exterior cleaning, addition of a free-standing outside elevator, structural improvements, and installation of HVAC and protection systems. Moving from their previous sites in spring 1979, the museums reopened at the harborside location on July 1, 1979. A tax-exempt corporate entity, Museum Wharf Inc., had been created, authorized to lease to commercial tenants who now occupy ground level space. (Photo courtesy of William Litant.)

admissions, lobby, building management, cleaning and maintenance, information services, and reservation system.

When the brick and timber warehouse on a wharf on Congress Street became available, the museums were ready to act. The purchase and sale agreement was made in three weeks. This structure, purchased for $1 million, neatly dovetailed the museums' criteria. The building, constructed in 1889, was conveniently located in downtown Boston near the major expressway. (With the gasoline shortages that have arisen since the time of purchase, the central location of the site has become even more desirable, i.e., it is also only a few blocks from a subway station and from the city's major train terminal, thereby making the museums accessible by public transportation.)

A centrally located computer terminal permits a security guard to quickly obtain a status report on conditions within the building.

The spatial configuration was an optimum one — large bays with minimal obstructions to the floor plan. Six stories in height with six segregated bays per floor, the building offered the museums 36 basic divisions for program development. The four bays of approximately 4,500 gross sq. ft. and the two bays of approximately 3,500 gross sq. ft. on each floor provided a total building area of 150,000 gsf. (This building met the museums' needs at the time of purchase. However, a variation of Parkinson's Law that material expands to fill the available *and* planned for space seems to apply here. Not only has attendance increased greatly since the new facility was opened, but also interest in the museums has grown. And this interest has translated into more contributions to the museums' collections. The very size of many of the artifacts donated to the MOT has already necessitated its acquiring more storage space, far in advance of what had been anticipated.)

Equally important, the building was in excellent condition. It had experienced practically no settlement. The building is constructed on fill, some of which came from harbor dredge from the Great Boston Fire of 1842, and is supported on pilings with granite caps, the caps being below the working water level of the harbor. (The foundation bearing study had been done previously by a person who had unsuccessfully tried to turn this structure into Boston's "Decorator's Building.") The brick-bearing walls which formed the exterior and party walls, except for a few isolated areas, were sound and needed only some simple surface treatment. In addition, the structural properties of the southern yellow pine framing were more than adequate — the loading capacity was 150 lbs./sq. ft.

The building, however, had no mechanical systems, except for a whip (a single hoist cable) outside of each of the six bays. (Three of these have been saved for a planned exhibit section on machinery.) Development of the building, therefore, had to include installation of heating, ventilating, and air conditioning systems. Proper electrical, vertical communications (emergency staircases, etc.), fire, and security systems also were lacking. (There was an open elevator in the interior of the building, but it was unsuitable and was removed. A new closed elevator was installed, making use of the shaft from the previous system.)

The building did have a dry pipe sprinkler system, but to conform with the city's current building code requirements for fire protection, a wet pipe system was necessary. In addition, the floor was pitched, arching downward to the exterior walls. This was perfectly reasonable for a warehouse where wool was stored and where water could easily run along the floor and drain off the edges if the sprinkler system had to be activated. But this design feature was to cause some change in the museums' plans for floor finishing.

Conservation Enters the Program At the Planning Stages

Once the wharf warehouse was acquired, a comprehensive study was conducted to analyze the environmental conditions external to and within the structure, the protection strategies necessary at this site, and the storage, display, and usage requirements as they related to collection conservation. (Funding assistance, in part, was provided by a National Endowment for the Arts grant.) The evaluation was to establish the planning guidelines and technical criteria for recycling the structure into a suitable museum building.

This master plan was prepared by Cambridge Seven Associates, with the assistance of the museums' staff members; William Young, Emeritus Head of the Boston Museum of Fine Arts' Research Laboratory, who acted as consultant on developing environmental criteria and collections handling procedures; Joseph Chapman, who served as security consultant; and R. G. Vanderweil Engineers, Inc., consulting engineers.

The main cause of immediate concern was the environment. Although not many environmental risks were pinpointed, those that were found held the potential for much damage to the collections unless protective steps were taken during the first stages of the building's rehabilitation. The

Included among the functions of the Resource Center are the display of educational materials and activities in ethnic study, science study, child study, and Asian study.

installation of the proper building operating systems was essential.

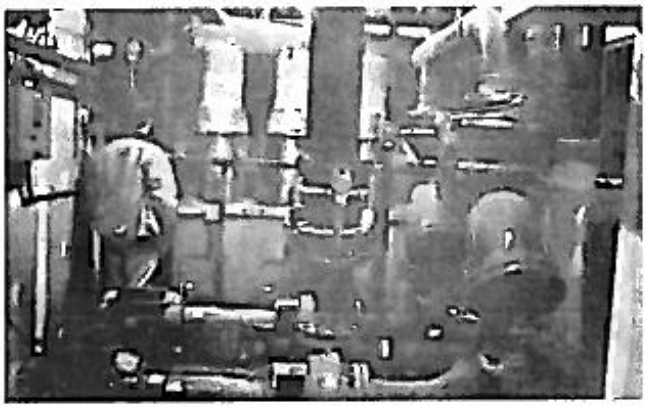
The three major problem areas identified were: (1) the site was only 600 yards from a major urban artery, giving rise to sulfur and particulate contamination; (2) with Logan Airport nearby, tons of soot were rained down on the structure from planes passing overhead; and (3) the building's closeness to the water results in salt-laden air being blown in. (With this harbor location, air quality has still another dimension — during the summer low tidal conditions, objectionable odors are produced.)

Since the building was unheated and had no ventilating or air conditioning equipment, there were no built-in constraints on what type of mechanical systems were to be employed. The HVAC system could be designed to address the museums' specific environmental control/air filtering needs. The strategy that was adapted also was able to consider economy of equipment and the practicality of installation, including flexibility to do it in stages.

Putting the Heat On . . . and Cooling Down — The Protection Considerations

The first step toward controlling the museums' environment was to obtain a degree of regulation of temperature and humidity. What type of fuel, what type of power, and similar questions were raised. Oil was considered. However, the site itself, and not the price of the fuel, eliminated the feasibility of this type of heating. More specifically, it is not practical to put oil tanks in the ground where there are potentially high tides. The oil tanks would have to be balanced, and an enormous amount of concrete would be required to keep them under water.

The HVAC system that was installed utilizes individual air handling units for each bay. Each unit is equipped with a heating coil, a cooling coil, a humidifier, a filter bank, and a fresh air intake. This centralized small boiler plant supplies all of the heat required for the whole building.



Solar heating also was looked into. However, because of the building's north-south orientation, along with a time constraint and structural considerations, this approach also was deemed unsuitable. At some time in the future, solar energy may be used for the museums' domestic hot water.

The system selected was a decentralized air handling system. This design allows the separate exhibit areas to maintain their own requisite climate conditions. Each bay has its own individual computer-regulated air handling unit which can temper the air. A central plant for this heat pump system — natural gas-fired boilers, located in a small room on the sixth floor, and a simple chilling unit on the roof — provides heat and chilled water to the air handling units.

Vertical supply air shafts in pairs adjacent to interior masonry walls provide freshly treated air to the air handling units in each bay. (The building is kept at a slight positive pressure.) Each intake unit, located at the roof level of the building, contains a washable metallic prefilter to remove the saline, dust, and soot particles, and an activated carbon filter to remove sulfur dioxide, nitrogen oxide, ozone, and odors. A sulfur dioxide monitor downstream of these filters automatically closes the intake if predetermined conditions are exceeded. Also installed in these ducts is a smoke detector which will immediately shut down the intake if a fire starts in an adjacent structure; only internal recirculation will occur until the external smoke hazard has been eliminated.

The environmental conditions planned for were 75-78°F summer cooling and 63-68°F winter heating (74-78°F summer cooling and 68-70°F winter heating for collections storage). However, because of the current 68°-78° energy policy, there is enough excess capacity to heat-cool the entire building, rather than just the two-thirds of the building that the system was originally designed for. (Approximately 51,000 gross sq. ft. of the building remain to be developed when additional capital is raised.) The relative humidity, which affects these collections more than the temperature level (if the rate of change of temperature is not quickly raised or dropped to the 68°-78° boundaries), was specified for 50% R.H. At the present time, although the sections where this is vital are highly controlled, this condition cannot be maintained throughout the building. Some of the control equipment that is part of the HVAC design still has to be obtained to make close regulation throughout the facility possible.

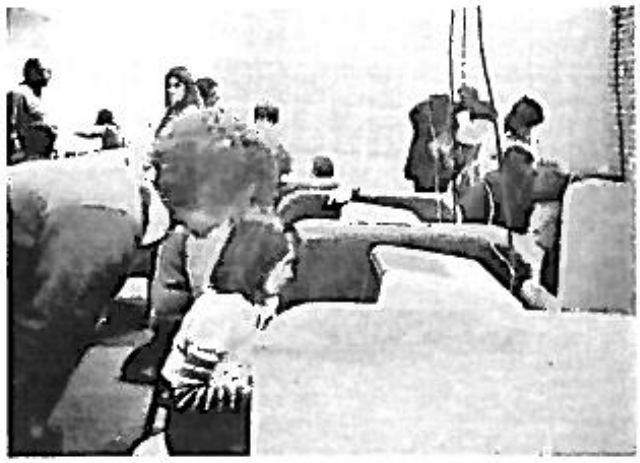
The year-long evaluation study also influenced the design and selection of the building's other protective system. For fire protection and life safety, rate of rise and ionization detectors are located throughout the museums. Fire, therefore, can be sensed in its incipient stages, with an alarm immediately indicated on the building management display panel, the building evacuation alarm sounded, and the fire department notified. There are also manual alarm pull stations.

The sprinkler system was converted to an alarmed wet system. This mainly required putting larger size pipe on all end runs and the heads, since the piping of the existing dry

The carpeted sections of the MOT include in-floor graphics for direction and other information.

system generally did not have to be replaced. The sprinkler system while detecting which bay has a fire problem, automatically activates that bay's smoke exhaust fan. In addition, the four fireproof stair towers become automatically pressurized, with air being pushed out, not drawn in.

The electronic components of the security program include perimeter intrusion detection. A card reader system will be brought on-line in a short while, thereby providing access control of any interior bay door and of the use of the elevator. During the hours that the museums are open to the public, there is only one guard. However, the education staff members who are working in most of the exhibit areas also have surveillance responsibilities.



TCM's computer system is used not only for business operations, collections cataloguing, and protection purposes, but also for one of the more popular interactive exhibits. A youngster's progress in using one of the exhibit terminals is checked by Bill Mayhew, who is in charge of the computer system.

The security and fire detectors and alarms are tied in with TCM's computer system. This system includes two Digital Equipment Corp. PDP-11 computers which are general purpose, time sharing units, and five smaller DEC LSI-11 computers. The 34 terminals throughout the building are currently used for several other purposes in addition to security, i.e., exhibits, admissions ticketing, business functions, and other support areas. TCM also provides some computer services to other non-profit institutions in the Boston area. Bill Mayhew, the staff member of TCM in charge of computer operations at the museums, was responsible for all of the system design, installation, and configuration work, including the development of the museums' own data base management system. Two of the smaller units will eventually be used to control the HVAC system and an energy management program. (In addition to building operating and administrative programs, TCM's collection records were computerized, thereby establishing a collections catalog data base.)

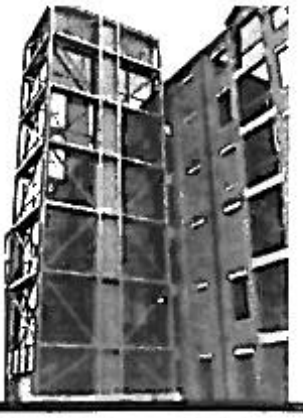
A Construction Program to Fit the Museums' Needs

Before any of these plans could be translated into reality, however, a major hurdle had to be overcome — the financing of the construction work ($4.2 million) and of the installation of exhibits, programs, furnishings, and fixtures, and related expenses ($3 million). Perhaps the most interesting aspect of the funding was the issuance of tax exempt industrial bonds for the renovation project.

After the master plan was completed, a construction manager, CDM, Inc., was hired. G. Daniel Prigmore of CDM functioned more like an owner's representative than as a CM whose sole responsibility was the construction aspects of the building's rehabilitation. Working with Duncan Smith and Michael Spock, he interpreted the museums' physical needs in dollar terms. This effort led to the museums getting the site declared a Commercial Area Revitalization District (CARD), a procedure that requires both city and state action. (To qualify as a CARD, an organization must be enhancing the value of the site or increasing the number of jobs at that location.) With the CARD designation, the museums qualified for tax exempt industrial bonds. This meant that they were able to take out a long-term construction mortgage of $3.2 million at an 8½% interest rate, which obviously saves the museums a tremendous amount of money. This part of the financial package was concluded within a four-month period.

As the financing was being secured, the general contractor Beaver Builders, Inc. embarked on the construction program. The master planner, Cambridge Seven Associates, Inc., and the architect, Dyer/Brown and Associates, Architects, had developed a design that would work well with the historic fabric of the building. However, what had originally been scheduled as a 12-month construction project followed by a six-month exhibit move-in was compressed to a 10-month construction cycle with exhibition installation being carried out concurrently. Building construction got underway in September 1978, exhibition construction began in January

One of TCM's exhibits demonstrates to the sighted what it is like to be blind, to the ambulatory what being confined to a wheelchair means, etc. Both museums are accessible to the handicapped.



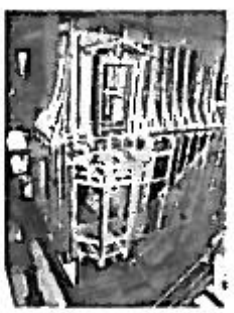
A visit to the Museum of Transportation includes a ride in the new exterior elevator. Because of the design of the elevator's hoistway and cab, passengers are afforded a vista of the Boston skyline.

1979, installation of exhibits started in late May, and the museums reopened in July 1979.

The Exterior Motive

The outside of the building did not require much work. The decision had been made to keep as much of the original facade as possible. With a $100,000 grant from the George P. Henderson Foundation, Boston, the exterior masonry was chemically cleaned. Most of the signage that had been painted on the building over the years was removed, although some remnants can be detected on the back face of the building. The exterior metal fire shutters over the windows on the back side were repaired, patched and painted, and fixed in a closed position over the weather-proofed openings.

The front loading doors on each floor of each bay were replaced with double-glazed tinted thermopane windows. These new windows on the five exhibit floors were greyed down 50% to limit the amount of natural light falling on exhibits and artifacts. (All of the interior fluorescent fixtures are sleeved to filter out UV radiation.)



As part of the "Grandparents' House" exhibit, the attic is furnished with trunks of old clothes which can be tried on. These clothes are either replaceable or not original, and are not part of TCM's permanent collections. (Photo, courtesy of Ted Goodale.)
Cases provide protection from handling as well as from dust. The doll house does not have to be touched to be appreciated.

The only major alteration to the building exterior was the addition of a six-story, free-standing elevator to the front facade. The elevator has an exposed steel frame and glazed hoist-way, a design appropriate in scale and in visual appearance with the surrounding industrial area. This elevator was specially designed with an 8 ft. wide x 20 ft. long x 8 ft. high cab to permit the MOT's large antique vehicles to be transported to the upper floor exhibit areas. (The MOT exhibits are on the 4th, 5th, and 6th floors. TCM's are located on the 2nd, 3rd, and 4th floors.) It also functions as a passenger elevator, capable of carrying up to 80 people at a time. Placing the elevator outside the building allowed the maximum amount of interior space to be retained for exhibits and also avoided any structural or construction problems that a structure of this size and weight (22,000 lb. capacity) would involve. However, keeping water out while installing the cab presented its own set of problems. As a result, the elevator took longer to erect than was expected. Operation of the elevator proved to be one of the critical factors in keeping the timetable, since this was the means for moving in large building supplies as well as for transporting exhibits into the building. (Stanley Elevator Co. was responsible for the elevator's construction and installation, Dover Elevator supplied the hydraulics.)

Interestingly, one aspect of the property is that it extends outward to the harbor edge, making the museums the owners of some 300 ft. of waterfront. As part of their commitment to the public, they have deeded to Boston a permanent easement to the water edge to be used as an open walkway.

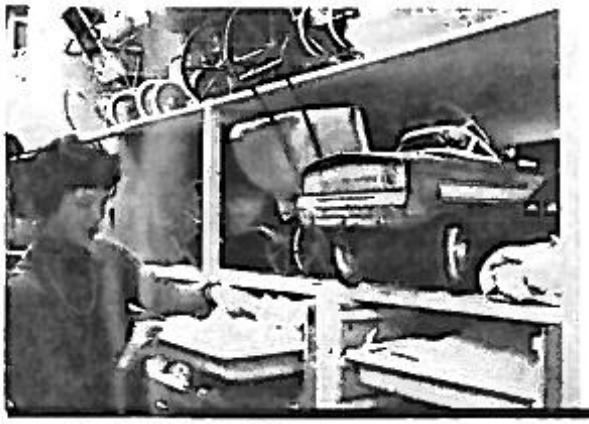
The Interior Facelift

The interior of the building was treated straightforwardly as open space, "to provide a finished shell that would allow the museums' exhibits to be installed with the flexibility necessary for change and growth." The heavy timbers were sandblasted once and left exposed. Since the roof had not yet been repaired when this was done, water leaked in and some of the wood is stained. (The major rehabilitation of the roof involved adding a membrane on top of the yellow pine roof decking, followed by a 2" foam layer, and then dry gravel/asphalt.) The cleaning probably should have been done twice, but this was impossible because of the tight schedule. The interior brick walls had been whitewashed at some time in the past and had a very thin but tenacious coating. Sandblasting also was used here to clean the surfaces.

Both museums feel now that more attention should have been given to this cleaning procedure. There is dust in the cracks and grit in the building from the sandblasting of the beams. Visitor traffic continues to cause a slow dislodgement of these particles. Plus the situation is aggravated by wood drying/shrinkage — this is the first year that the building is being heated. In most exhibit areas, this dust has not presented any problems. In others, the displays have been placed in closed cases. The major storage areas for collections have a new ceiling installed over existing joints.

For insulation and to control moisture and vapor migration, dry wall with a vapor barrier and 3" or 6" fiberglass was installed on the inside face of the exterior walls. The party walls were left uncovered.

A major structural consideration involved bringing the building up to the Massachusetts Building Code requirements for earthquake protection. The first approach contemplated was to pour reinforced concrete slabs on the floors. This would have also given good soundproofing. However, not only was the concrete an extremely expensive solution, but also, because of the sloping of the floors, if a level floor was to be obtained, some parts of the poured floor would have been 8" thick. After much discussion, a ¾" plywood diaphragm was installed on all floors, which acts as a compressive membrane, in conjunction with ¾" steel truss rods running across the building both ways, providing tension members.



Moving TCM's collections involved wrapping objects in acid-free paper, then cushioning them with other material. Specially constructed carts allowed the object-containing trays to be safely transported with their contents. These labeled trays could be immediately put into the correct place in the new storage area. Joan Lester, Curator of Collections, checks one of the trays shortly after it has been moved. The oversized objects are now able to be stored off the floor on the Lundia shelving system that has been incorporated into the tray storage system.

In areas of the building where large sections of the floor were removed to allow installation of multi-floor exhibits such as a 150-year-old Japanese house from Kyoto, the floors below and adjacent to the removed section were fitted with a double-layer ¾" plywood diaphragm, and double-layer plywood shear walls were added around the exhibit to transfer potential earthquake loads.

The flooring also has some notable finishing features. In the MOT areas that are carpeted, a 2 ft. x 2 ft. carpet tile system, developed by Carpets International, is employed. This floor covering system allows the carpeting to be changed overnight if an exhibit area is revised. In addition, in-floor graphics are incorporated. That is, some squares of the floor surface have a literary and symbolic content indicating floor level, facilities, handicapped path, etc. Another aspect of the flooring are the special pavings that were installed – 1" thick cobblestones and ½" thick brick, to allow wheelchair access in the exhibits with simulated streets.

A Clean Move

For the Museum of Transportation, relocating its collection did not present any severe problems. A good number of the properties were their own means of moving. In fact, several of the vehicles now serve as a shuttle between the museums and the Faneuil Hall area. (These are not one-of-a-kind autos. In addition, a mechanic keeps close watch on their condition.)

For the Children's Museum, the transporting of its collections presented a conservation challenge. Joan Lester, Curator of Collections, first had to evaluate what protective measures were required to move about 40,000 objects of the cultural collections of diverse size, shape, and condition. These measures then had to be incorporated into a workable plan, suitable to the budget and the available staff.

The move was made in two stages. Transporting the material for the opening exhibitions did not require a special plan. However, one was necessary for handling the bulk of the collections which were to be moved after TCM reopened.

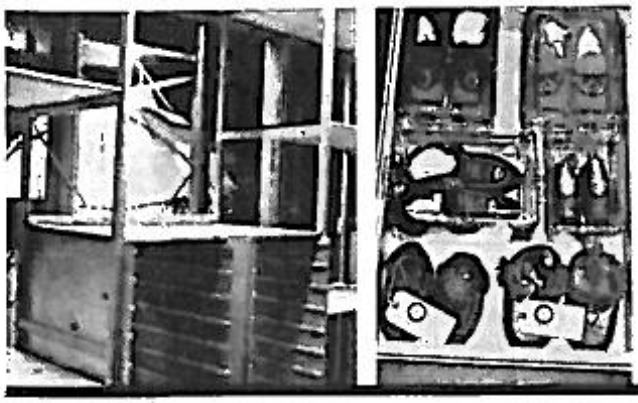
The basic components for the handling system, in a sense, had been formalized some years previously when TCM started a "collections renewal program." Until 1966, all of the objects had been stored in boxes, little had been sorted, and some collections had not been looked at for years. A warehouse was rented at that time, and every object in the collections was laid out, re-numbered, re-catalogued, and sorted by culture and then by function within the culture. Experts were called in to determine what was relevant and what was of marginal value.

A storage system then was designed that would be protective, would provide more ready access to objects, and would be relatively inexpensive to build. A 3" deep x 20" wide x 30" long ABS plastic tray, specially developed by the museum, would hold all but the oversized objects. This tray would fit into a wooden framing system constructed of unistrut channels and texture 1-11 (grooved) plywood side panels with wood guides for tray sliding fastened onto the panels. Objects in the tray would be identified by labeling affixed to the tray front. Funds for molding about one-half of these trays were available. Objects that were not repackaged in the molded trays were put in boxes, the boxes this time being clearly labeled as to culture and function. Thus, prior to the move the collections could be categorized as being in trays or in boxes, or, if oversized, as just sitting on the floor.

Two of the objectives in devising the transportation were conservation commonsense, but nevertheless needed to be clearly defined – the objects were to be handled as little as possible, and the disorder that usually goes with packing and unpacking should be minimized. A third criteria focused on the fact that all of the climate control kinks would not be fully resolved when the collections were moved into storage and some construction work also would be still in progress. Thus, objects should remain wrapped in the new storage areas until the environmental conditions stabilized. This, in turn, meant that objects had to be wrapped in acid-free paper and also packaged to prevent jarring.

The solution that was worked out to meet these goals was sophisticated in concept, but relatively easy to execute. A moving cart was designed that would hold the trays exactly as they had been held in the old storage area. Therefore, the objects would be left in their right trays and simply loaded into the cart. (The sides of the cart were essentially a half-unit of the storage framing system.) The carts fit right onto dollies and could be easily wheeled into moving vans. Twenty-six of these carts were built. (These are suitable for more than just the collections move. Some are being saved to be used within TCM to transport objects from collection storage to new exhibits or used as temporary storage in a curator's office. Others are being dismantled to become part of the general collections storage units.)

Storage of the rock collection is in open wood boxes supported by masonite panels which fit into the grooved sides of the storage shelving. The plastic trays normally used to hold the small and medium sized objects (right) do not have the requisite strength.



Left: The study-storage area, shown here under construction in TCM, will have specially selected objects sorted by material within each functional category. These will be housed in trays which slide in and out of the modular framing system. A printout in booklet form of the catalogue cards entered in TCM's computer will be available for reference, along with books and associated resources on Northeast Native Americans.

Right: A label is attached to every object package in the study-storage room, clearly indicating access, i.e., "Looking Only," "Handling," or "Touching" - by symbol and by color. Space is available for prominently writing in the object's function and number.

Once the objects in the trays were wrapped in acid-free paper, the carts could be loaded with the trays, and these loaded onto moving trucks. Oversized objects were wrapped in acid-free paper and then surrounded by protective bubble wrap and placed on top of the moving carts.

The same philosophy of keeping objects in their proper container applied to the objects in boxes. Once suitably wrapped, they were replaced in the correct box. This labeled box was then surrounded by bubble wrap for cushioning and placed in a normal moving box which could then be loaded into the moving van.

The Children's Museum staff worked with the movers (a commercial moving company was used) to acquaint them with the conservation problems involved. The same crew stayed on the transporting job until it was finished, their care with handling growing as time passed. The job took almost two weeks for two main reasons. First, as mentioned, there were only 26 carts. A new batch of objects was not moved until the trays were put in place in the new facility. Second, the elevator could be used only between 7:00-9:30 a.m., before the museums were opened to the public.

In addition to preventing any damage to the collections while being transported, Joan Lester wanted to be sure that the collections were clean, and worked closely with Waltham Chemical Co. to ensure that the objects were insect and vermin free. This was done in two steps.

The first priority were the objects that were to be in the opening exhibits. The metal objects were segregated from the leather objects and placed in different moving trucks. These trucks were then driven to the movers' storage yard where they functioned as fumigation chambers. (The yard was padlocked to prevent passersby from entering.) Methyl bromide, a one-day fumigant, was used for the metal objects, while those containing leathers were treated for three days using phostoxin. (Methyl bromide would have left a sulfur odor with the leather, on the other hand, phostoxin tarnishes metal.) The natural history collection also was treated in the trucks used for moving.

However, the remainder of the collections were treated in the old facility, that entire building being made into a fumigation chamber. The building was sealed, Vapona was introduced into the building, and a guard was posted outside. The treatment lasted five days. In order to test the effectiveness of the fumigation, Richard Berman, entomologist with Waltham Chemical Co., put live bugs in the building prior to its being closed off. The bugs did not survive. (Vapona could be used without adverse affect on any of the materials.)

The new storage area had a rodent and cockroach extermination treatment before any exhibits were installed. Yearly fumigation will be done in the museum, the air handling system making it easy to isolate the storage area and fumigate the section with Vapona. Obviously any object needing care prior to the yearly fumigation would receive immediate treatment.

One further innovation in collection handling/storage is in the study-storage area. This is a section of TCM that will allow more people more access to collections. (At the present time, study-storage is only available for the Northeast Native American objects.) It is a concept that had been tested for three years in the old facility. The basic storage module of wood framing and plywood sides, with sliding trays is used. The tray's contents, however, are sorted into three categories, based upon an object's fragility and irreplaceability. These are appropriately labeled, using words and symbols, as to "Look Only," "Handling," and "Touching." In addition, the familiar traffic colors of red (stop), yellow (caution), and green (go) are used for the label markings. (The label also includes space for the object's function and number.) The packaging of each object takes into account which classification it falls into, i.e., its specific conservation needs. For example, a clear, rigid polyethylene box, with breathing holes, is used for objects that cannot be touched but need full visibility. A clear polyethylene bag, on the other hand, allows an object to be handled but not touched. Within each tray an effort is made to include the range of experiences within any object category.

Multi-Use of a Building - A Complex Situation

The joint ownership (50-50) and joint operation of the building (MOT is responsible for all building maintenance and security, and waterfront development. TCM is responsible for computer services and admissions) is turning out to be somewhat more complicated than the museums originally thought. The lobby is one cause for concern. In the first six months of museum operations, its layout has already been changed three times. The problem here relates to the fact that MOT requires elevator access but TCM can use the central staircase.

Another question arises when one museum has a function in the evening. The other has to be alerted and certain precautions taken. In addition, there are commercial tenants on the first floor. A kitchen exhaust problem and similar ones that arise from this type of usage still have to be sorted out.

Overall, however, both museums have found the building development exciting. The warehouse has been successfully converted into a museum structure suitable for both operations. Plus, many new programs are now possible. The Museum of Transportation, for example, has begun a boat restoration-maintenance skills training program, the first one in Boston. The Children's Museum is now conducting a major study for the government on how the building is working for the handicapped, is expanding its Resource Center, and is holding weekly programs for special education children and adults. Thus, collaboration and recycling not only has clearly made economic sense, but also has allowed both museums to expand their horizons and their audiences. ■