PROTECTING MUSEUM COLLECTIONS IN STORAGE

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Museums that exhibit all their collections and have none in storage are exceptions to the general rule that exhibits represent only the tip of the iceberg of a museum's collections. Most museums maintain many items such as paintings, objects, textiles, furniture, ethnographic and archaeological materials, and natural history specimens in storage for purposes of research, exhibit rotation, educational programs, and other activities that draw upon comprehensive, or at least, representative collections in certain subject areas.

Collections in storage are a valuable and often irreplaceable resource. Unfortunately, collections are sometimes maintained in conditions conducive to deterioration rather than preservation. Far too often, collections have been stored in out-of-sight, out-of-mind places, resulting in years of neglect, deterioration, and sometimes complete loss of important cultural material.

It is not unusual to find collections housed in the harshest environments within the museum--basements and attics. In these locations, climate-sensitive materials are exposed to intense heat, damp or dry conditions, fluctuating temperatures and relative humidity, all with disastrous results for the long-term preservation of artifacts. Meanwhile, replaceable resources such as janitorial equipment, office supplies, and sales items may reside in climate-controlled splendor. Our profession demands that we take notice of this important discrepancy.

Climatic Conditions

Deterioration occurs as objects respond and adjust to the combination of environmental conditions--temperature, relative humidity, air quality, and light. Organic materials expand and contract in response to fluctuating relative humidity which can cause warping, cracking, and detachment of component parts if the object is of composite materials (made of more than one material). High relative humidity promotes corrosion of metal and growth of mold and mildew, whereas low relative humidity encourages embrittlement and desiccation of organic materials such as paper, basketry, and textiles. As the temperature fluctuates, materials also expand and contract, resulting in damage. Moreover, heat accelerates the aging and deterioration process of all materials.

Because of the reaction of museum materials to these environmental variables, attempts should be made to remove extremes of climate, especially sudden changes. Consider reassignment of available space within the museum to place irreplaceable museum collections in an area with moderate environmental conditions. For instance, objects are stored in a damp basement, purchase a dehumidifier and connect it, if possible, to a main drain to avoid overflow from the collection pan. Within the room, a fan to circulate the air is also needed for successful dehumidification. To increase the efficiency of dehumidification, walls may be covered with polyethylene plastic sheets attached to a stud framework mounted against the walls.

The need for humidification usually arises only during winter heating. If the operation of the heating unit--whether electric, closed water, steam, oil, or gas-- permits, try to turn off heat to the zones where collections are stored. If they cannot be closed, an evaporative humidifier (not an atomizer which sprays moisture) can be used to raise relative humidity to the acceptable winter levels of thirty to thirty-five percent. Higher levels can damage the building by encouraging moisture buildup within the walls which may freeze and thaw, causing spalling and fracturing. This can be particularly damaging to structures of historic brick or masonry.

Evaporative humidifiers require weekly maintenance to keep scale that builds up during the boiling process from clogging up the machinery, and to keep microorganisms at bay. Equipping the humidifier with a continuous flow device will slow down the maintenance schedule, and water movement will lessen the possibility of organism growth. Make sure that the water reservoir never dries out.

Controlling the environment in defined locations by means of mechanical equipment can be difficult, and if conditions cannot be maintained with some consistency, it is probably best not to attempt it. More damage might be done to climate-sensitive materials by rapid changes produced by erratic climate control systems than would have occurred if conditions remained fairly steady over a long period of time. To solve some problems, move climate sensitive-collections, such as wood veneer or wood/shell inlay, musical instruments of composite materials, paper, panel paintings, paintings on stretched canvas, and ivory, to an area naturally capable of maintaining a steady climate. Then assign materials that are virtually climate--insensitive, such as high-fired ceramics, stable stone and architectural materials, to inhospitable areas such as next to the boiler room in the basement or under the eaves in the attic.

Lights Out

As compared with other destructive factors, lighting is more easily controlled. Light provides the energy for chemical processes of deterioration to occur--textiles fade, paper darkens, and wood bleaches. All organic materials are weakened when exposed to high levels of light. All visible light is destructive, but the invisible spectrum of ultraviolet radiation (UV) is particularly damaging. Ideally, storage areas should be kept dark unless museum staff is in the room. This means covering windows as well as turning off lights and making sure that when the lights are on the UV component has been screened out by means of UV filtering sleeves on fluorescent lights, the highest emitters of UV radiation. Incandescent bulbs are not high emitters and generally are acceptable during the limited periods of time that storage areas are illuminated.

Dirt and Dust

Dirt and dust are enemies of museum collections, and the out-of-sight, out-of-mind places used to store collections can be the dirtiest areas. Years of accumulated dust and dirt can require costly conservation laboratory treatment to clean objects selected for exhibit. Dust and dirt contribute to deterioration as well as disfigurement. Dust can act like a saw on textile fibers as the textile moves in response to fluctuating relative humidity. Dust also attracts moisture and conducts heat, both of which exacerbate temperature- and moisture-related problems. Moreover, dust and dirt contain acidic organic material that encourages chemical deterioration and invites insect damage.

Maintaining a clean storage area is a primary responsibility for all museums. Cement surfaces (floors, walls, and ceilings) should be well-sealed and preferably painted with a light or white epoxy masonry paint to eliminate dust produced by powdering cement. Stone and brick should also be painted, and, if possible, uneven brick or stone surfaces should be framed and covered with sheetrock or insulation board to help eliminate dust and maintain a fairly steady climate. All shelving units and cabinets should be raised from the floor on pallets to protect against flooding in basement storage areas, to enable cleaning and inspection under and around storage units or objects, and to eliminate dirty areas suitable for insect harborage.

Shelving Considerations

If possible, shelving units should not be placed against exterior walls because they are often cooler than ambient air temperatures, resulting in conditions ideal for condensation of moisture which could damage objects. Perimeter placement of shelves is also not the best use of space.

Overcrowding and careless handling of museum objects are factors as significant in the deterioration process as poor climate conditions. Overcrowding can be solved by selecting the right type of storage furniture for particular categories of materials. For example, an open shelf containing one tall item and many short or flat items is not an efficient use of available horizontal space. Separate all objects by assigning dimensional requirement considerations rather than provenience (origin) or accession data. Organization of collection by the latter criteria can be done through collection catalogue records. Options for easily movable shelving units include chromed wine racks used in the restaurant industry and compact Storage systems installed on tracks that move easily back and forth to permit access to all units.

Large bulky objects and furniture can be stored on platforms constructed of heavy weight slotted angle iron and five eighths inch plywood sealed on both sides and ends with epoxy paint, acrylic latex paint, or moisture-born polyurethane varnish. If the ceiling height permits, two platforms can be stacked bunkbed fashion to store chairs, trunks, couches, and objects of similar size. Make sure that lighter and less bulky objects are on the top level and that all objects are easily located and retrievable. Ideally, platforms for large furniture items should be constructed as islands with access on all four sides.

Available vertical space can be put to good use for hanging certain objects such as paintings. Custom made picture racks are manufactured by several companies, but they can be quite costly. Home-made versions can be built by attaching cyclone fencing or wire mesh to a stud frame mounted against an interior wall. Paintings with secure frames (check the eyelet screws and strength of picture wire) can be hung by means of S-hooks. Other objects such as scythes, rakes, spears, and other long items can be hung on sealed pegboard, but make sure that the hook supporters are padded.

Anything stored on racks or shelving units in the open must be covered with either muslin or plastic to protect the objects from dust. If possible, try to cover the entire shelving unit like a tent rather than making slipcovers for individual objects. Clear polyethylene plastic has several advantages for this use. It is possible to see the objects without removing the dust cover. The cover is waterproof, which is particularly

important if there is a sprinkler fire suppression system. Moreover, the polyethylene can act as a barrier to help stabilize the climate in the enclosed space, protecting against ambient fluctuations. One note of caution: There is an outside chance of moisture condensation, or green-house effect, within the plastic enclosure if conditions are humid and temperature fluctuations are pronounced. Therefore, in some instances, it is wiser to use muslin or a microporous, nonwoven polyester sheet such as TYVEK (TM) or breathable teflon sheets such as GORETEX (TM) to prevent damage by moisture or heat.

In areas where ambient conditions cannot be maintained at a steady point between forty and fifty percent relative humidity, climate-sensitive objects should be placed in storage-closed cabinets. The cabinets themselves become the storage room, and, if gasketed, could be capable of maintaining the steady climate which is optimum for the preservation of climate-sensitive material.

Standard museum specimen cabinets with drawers are manufactured by several museum supply companies and are used for storage of small items such as personal accessories, coins, medals, and household utensils, and climate-sensitive materials such as small textiles and baskets. Be sure to line the drawers with a sheet of stable plastic to cushion the objects, and if possible, use flat acid-free box trays to contain individual specimens to promote safe handling of materials. Museum cases are available in a variety of sizes and configurations that will accommodate a wide array of objects. Some provide the specialized storage techniques needed to house the object correctly, such as rolled or hanging storage for textiles and flat storage for oversized paper objects. Deluxe double-wide wardrobe cabinets offer combinations of drawers, shelves, and vertical space suitable for storing many different sizes and dimensions efficiently within one well-sealed cabinet. Some of these cabinets have glass panels that permit visual access to the contents without opening the doors and disrupting the interior climate.

Easily breakable objects, such as glassware and china, although virtually climate-insensitive, should be put into a closed cabinet to protect against accidental breakage. Basic utility cabinets are fine for this purpose because maintenance of a steady microclimate is not a problem with storage of highly-fired ceramics and stable modem glass. All shelves should be padded as well. To avoid tipping and possible damage, use acid free cardboard or matboard instead of foam for placement of stemware or other objects with narrow or unstable bases.

Reconfiguring the layout of storage areas to maximize use of horizontal and vertical space can often relieve over-crowding, but it is important to consider other museum functions when upgrading a storage area. Safe access to all collections is an important consideration for inventory, property accountability, research, and exhibits planning. Aisles wide enough to accommodate a rolling cart for moving objects, and work stations for examination or temporary placement of objects should be included in the floor plan. Storage areas should be on a regular housekeeping schedule for cleaning thoroughly at least once a year.

Conclusion

The goal of long-term preservation of museum collections is achievable by practicing preventive conservation in all aspects of collection management, particularly in the

physical storage of objects. With a strong commitment to the value of museum collections as being irreplaceable cultural resources, the days of an out-of-sight, out-of-mind philosophy governing collections in storage will be numbered, and the objects will survive in good condition for future generations of museum visitors to enjoy.

Listed below are several manufacturers and suppliers of museum storage furniture and packaging supplies. This list is not all-inclusive, but may serve as a starting point for inquiry.

Storage Systems

Delta Designs Ltd.
1535 NW 25th Street
Topeka, KA 66618
(800) 656-7426
Interior Steel Equipment Company
c/o Viking Metal Cabinet Company
5321 West 65th St.
Chicago, IL 60038
(216) 397-0120
Space Saver Corporation
285 Emmet St.
Newark, NJ 07114
(201) 242-6600
Packaging Materials (Plastics)
Dow Chemical Co. (Ethafoam)
14955 Sprague Rd.
Cleveland, OH
(216) 826-6000
www.dow.com
Ailing and Cory (Microfoam)
12555 Berea Rd.
Cleveland, OH 44111
(216) 251-3600
Seaman-Patrick Paper Co.
(Tykek 1422)
2000 Howard St.
Detroit, MI 48216
(313) 496-3131

Acid-Free Materials and Containers; Useful Tools & Equipment

Museum Services Corporation
1107 East Cliff Road
Burnsville, MN 55337-1514
(800) 672-1107
www.museumservicescorporation.com
Conservation Materials Ltd.
P.O. Box 2884

Sparks, NV 89431
(702) 331-0582
Conservation Resources
8000-H Forbes Place
Springfield, VA 22151
(800) 634-6932
www.conservationresources.com
Light Impressions
P.O.Box 787
Brea, CA 92822-0787
(800) 828-6216
www.lightimpressionsdirect.com

Additional Reading

Garry Thomson. *The Museum Environment, 2nd ed*. London: Butterworths, 1986

E. V. Johnson and J. C. Horgan. *Museum Collections Storage*. Paris: UNESCO, 1979.

John D. Hillberry and Susan K. Weinberg. "Museum Collections Storage" in Museum News 59 (5, 6, 7): 7-21, 5-23, 49-60.

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http://www.ohiohistory.org/resource/oahsm/notebook/mayjun1990.html