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## A SET OF CONSERVATION GUIDELINES FOR EXHIBITIONS

Toby Raphael and Martin Burke

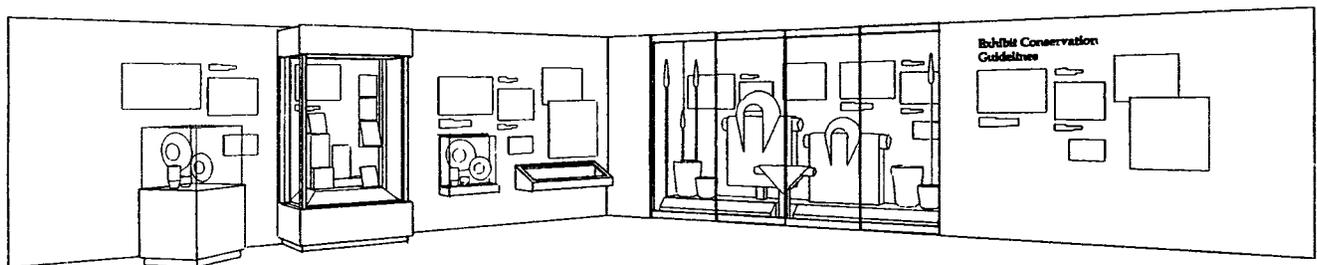
Exhibit conservation focuses on practical techniques that protect museum collections from unnecessary damage while on display. The National Park Service has recently completed a technical resource intended to assist exhibit specialists achieve preservation-responsible exhibits. The document is called the Exhibit Conservation Guidelines and has been produced as an electronic publication, presented in a CD-ROM format. Exeprts are included below.

Improperly designed and poorly fabricated exhibits are a significant source of damage for museum collections. Several years ago the Department of Conservation embarked on a major preventive conservation project to develop a set of practical, exhibit guidelines. The objective was to create a “user friendly” technical resource for both NPS personnel and exhibit specialists in general.

The *Exhibit Conservation Guidelines* establishes a methodical approach for the inclusion of conservation in the often-confusing processes of exhibit development and production. It defines the critical areas of involvement for conservation specialists, includes the baseline information known in the field and adds what we at the NPS have learned from many years of producing exhibits.

Only by involving conservation early and throughout the process, can we ensure preservation-responsible planning, design and production. Years of experience have taught us that successful exhibits require a close, constructive working relationship between exhibit, curatorial and conservation specialists. A sense of shared responsibility for collection preservation and trust are invaluable parts of the equation.

The technical resource includes over 300 pages of guidelines, technical notes and drawings. Information on obtaining the *Guidelines* may be obtained through the National Park Service’s exhibit web page: [www.nps.gov/hfc/conservation/exhibit](http://www.nps.gov/hfc/conservation/exhibit). The following is a summary of the narrative section of the *Guidelines*.



## **A. Exhibit Planning**

### **A.1 Integrating Conservation into the Exhibit Process**

- ✓ Integrate conservation early in the exhibit planning phase. Make a commitment to preserving objects placed on exhibit by including conservation concerns throughout the development and production of the exhibit.
- ✓ Provide adequate time and resources. Build in enough time for development and review of technical designs, case prototypes, lighting mockups, and the testing of proposed materials. The schedule must allow for safe handling, exhibit mount making, and installation of objects. Include the costs of addressing preservation issues, such as treatment and special casework, in the budget.
- ✓ Search for balanced conservation solutions. Employ solutions that are appropriate for the specific exhibit circumstances and balance conservation criteria with other exhibit requirements.

### **A.2 The Exhibit Team**

- ✓ Work cooperatively. Each team member should take responsibility for understanding basic conservation issues and working with other members to achieve preservation-responsible displays. The search for balanced and appropriate solutions often requires compromise.
- ✓ Hire supportive design staff. Use designers who are experienced in working with exhibit conservators and firms that have a history of producing preservation-responsible exhibits.
- ✓ Demand high construction standards. Develop drawings and specifications that clearly articulate the intended conservation features; consider including performance criteria. Oversee production contractors to ensure that conservation components are built as specified.

### **A.3 The Role of the Exhibit Conservator**

- ✓ Include an exhibit conservator on the exhibit team. Select a conservator who is qualified in the specialty of exhibit conservation. Often, a part-time consultant is sufficient.
- ✓ Involve the exhibit conservator in the earliest stages and throughout the exhibit planning, design, fabrication, and installation process. An exhibit conservator should set conservation criteria, participate in planning and design meetings, review conservation-related decisions, and assess prototypes and exhibit work after installation.

#### **A.4 Selecting Objects**

- ✓ Select appropriate display objects. Make the selection in conjunction with a conservator who can establish whether the objects are stable enough to exhibit (with or without treatment) and the ramifications of exhibiting them.
- ✓ Avoid selecting too many objects. Review the number of objects that can be accommodated safely within the available space.
- ✓ Consider the aesthetics of each object. Object selection should include curatorial review of the visual message presented. Incomplete, deteriorated, or dirty objects may require extensive treatment.
- ✓ Avoid permanent exhibit of objects. Consider rotating vulnerable objects, substituting alternate objects, or using reproductions. When possible, use a reproduction to demonstrate the function of an object.
- ✓ Allow enough time and resources to safely prepare, mount, install, or replicate exhibit objects.

#### **A.5 Establishing Conservation Criteria**

- ✓ Review the objects. Examine each object chosen for display to determine its current condition and individualize its conservation requirements. Complete a written condition assessment of the objects.
- ✓ Establish necessary but realistic conservation criteria. Base the requirements on an assessment of the individual objects, the likely environment in the exhibit space, and current conservation research.
- ✓ Address the conservation criteria. Incorporate the conservation recommendations into the exhibit design. The designer, conservator, curator, and other team members must work cooperatively to ensure practical display methods that preserve the objects.

#### **A.6 Collections Management**

- ✓ Ensure safe handling. Provide training for anyone who handles an object during the exhibit process. Dedicate a clean, secure space for temporary storage of objects during exhibit development, construction, and installation.
- ✓ Stabilize all objects. Have a conservator document their condition and provide a treatment

proposal for those that require treatment. Secure the necessary funding for treating unstable objects before display.

✓ Document objects. An exhibit object list should include the accession or catalogue number of each object. Photographs of the objects and floor plans marked with object location facilitate security and condition checks.

✓ Protect objects during photography. Limit an object's total exposure to light, and avoid overheating objects with studio lights. Use a flash system, especially for light-sensitive objects. Always provide appropriate support for objects.

## **B. General Design**

### **B.1 Multilevel Conservation Response**

✓ Design for environmental stability and protection. Choose an appropriate and efficient response from among the multiple options available. Consider what level of protection is obtainable and what kinds of tradeoffs each will impose on the conservation criteria.

✓ Consider both macro and micro approaches. Weigh the benefits and costs of addressing conservation criteria throughout the exhibition against creating microenvironmental solutions using exhibit cases.

### **B.2 Exhibit Format and Layout**

✓ Use enclosed display when possible. Avoid open display except in historic house museums and some gallery settings or when an object's size makes enclosure impractical. Open display should never be a routine exhibition option or one chosen solely for financial reasons.

✓ Allow sufficient room for traffic flow. Design the exhibit to avoid accidents. Provide adequate space through the exhibit and around exhibit cases for the easy movement of individuals, groups, and people in wheelchairs.

✓ Group similar objects. Consolidating the location of collections with similar conservation criteria will make it easier and more economical to meet the design goals. Consider ease of installation, maintenance and object removal.

### **B.3 Temperature and Relative Humidity**

- ✓ Know the environment. Monitor an exhibit space for one year to obtain baseline information about the temperature and relative humidity. Review these environmental data for each exhibit to determine if existing conditions meet the conservation criteria.
- ✓ Control the environment within the entire exhibit space. In general, keep temperature between 60 and 70° F (15.5 and 21° C) and relative humidity between 40 and 60%, eliminating rapid cycling of temperature and relative humidity. Requirements for special objects and certain geographical areas may vary.
- ✓ Locate sensitive objects in the most stable locations. Do not place moisture-sensitive collections in the path of direct sunlight, near heating or air-conducting ducts, against external walls, or in damp locations such as basements. Avoid putting cases and framed works along exterior walls.
- ✓ Provide additional control for sensitive objects. Use sealed cases where appropriate to slow air exchange and thus stabilize environments inside cases. When called for, create a microclimate by incorporating silica gel or other climate control products within cases that contain moisture-sensitive materials.

### **B.4 Particulate Contamination**

- ✓ Enclose sensitive objects. Incorporate air filters in ventilated case designs or seal exhibit enclosures sufficiently to prevent particulate entry.
- ✓ Use high-efficiency filters in environmental systems for rooms housing exhibits. HVAC filters should remove particles down to 1-0.3 microns (60-80%). Change filters regularly.
- ✓ Use localized filtration equipment. If improving filtration throughout the museum is not feasible, consider using room-sized units in construction areas or within the exhibit space.

### **B.5 Chemical Pollutants**

- ✓ Monitor pollutants. Assess the air quality within the museum to establish the ambient level of contaminants. This knowledge will point to the measures necessary to meet the conservation criteria for an exhibit.
- ✓ Incorporate chemical filters in the environmental systems. For susceptible collections or in highly polluted locations, include activated charcoal or potassium permanganate filters in the

environmental system.

- ✓ Provide air circulation. Adequate air circulation will lower total pollutant concentrations; high rates of airflow over or near objects, however, increases their exposure. Design the exhibit layout to minimize the objects' exposure to pollutants.
- ✓ Select stable construction materials. Avoid materials known to emit hazardous materials, become acidic, or lose their physical or chemical stability with age.
- ✓ Aerate the exhibition space before object installation. Allow time for initial levels of outgassing from new materials to dissipate.
- ✓ Enclose sensitive collections. Cases that incorporate a chemical pollutant scavenger provide a high level of protection for sensitive objects.

## **B.6 Exhibit Lighting**

- ✓ Develop a lighting plan that responds to the established conservation criteria. Produce the plan early in the process to allow enough time for coordination of the complex issues that determine final lighting choices and levels.
- ✓ Limit total light exposure. Provide separate lighting for security checks, exhibit cleaning and maintenance, object installation, and other routine work. Turn off lights during nonpublic hours so as not to expose objects to light unnecessarily. When possible, use occupancy sensors in the room or at the case to turn lighting on and off during visitation hours.
- ✓ Filter all sources of ultraviolet radiation. Use commercially available filters on all light sources to reduce the levels of ultraviolet radiation to 10 microwatts per lumen.
- ✓ Control infrared radiation. Locate objects at least 24 inches from fluorescent lights and at least 36 inches from incandescent or tungsten halogen lights.
- ✓ Exclude sunlight. Design exhibit spaces to prevent daylight from reaching display objects. Daylight already present in the exhibit space should be filtered for UV radiation and lowered in intensity.
- ✓ Construct lighting mockups to evaluate the amount and quality of light provided by the proposed lighting plan. Measure final light levels and adjust them accordingly during installation.

## **B.7 Biological Infestation**

- ✓ Examine objects for signs of infestation and active mold as part of the preliminary condition check. If signs of infestation are found, consult a conservator about treatment options.
- ✓ Design exhibits to inhibit infestations. Make sure the exhibit area is insect-proof by screening open windows or doors, filling gaps in the building construction, and avoiding gaps and undercuts where dust can collect.
- ✓ Enclose objects. When the risk of infestation is high, place susceptible objects inside well-sealed cases or sealed acrylic boxes to prevent new infestation. Limit the gaps and holes to prevent insect entry.
- ✓ Avoid introducing insects through props and unchecked exhibit materials. Do not use wool carpets and other materials that attract and harbor insects. Avoid using organic exhibit props. Fumigate any organic props or expose them to freezing temperatures before bringing them into the museum.
- ✓ Control human behaviors that encourage infestation. During exhibit production and installation and after the exhibit opens, never allow food in the object holding areas or the exhibit space, even if no objects are in the area.

## **B.8 Physical Security**

- ✓ Conduct a risk assessment. Identify the likelihood of theft and vandalism. Provide protection against human damage. Exhibits in a museum with a history of vandalism and theft may require additional security measures.
- ✓ Provide the appropriate level of protection. Tailor security features to the vulnerability of the objects. Highly vulnerable and valuable objects require more sophisticated protection measures than others.
- ✓ Use tamper resistant hardware. Mount objects to panels or shelves, bolt freestanding cases to the floor, and lock exhibit cases.
- ✓ Facilitate authorized curatorial access to the objects. Each object in an exhibit should be readily removable without having to remove or disturb adjacent objects.

## **B.9 Emergency Preparedness and Fire Protection**

- ✓ Develop fire protection and emergency response plans. The museum staff should have an emergency plan for each exhibit space. The plans should minimize threats to museum objects, protecting them during a disaster, during their evacuation, and after a disaster.
- ✓ Perform a risk assessment and address potential problems. Anticipate the types of damage that may occur to display objects. For example, avoid placing objects, especially if they are water sensitive, in the path of fire sprinkler heads.

## **C. Exhibit Case Design**

### **C.1 Designing a Conservation-Grade Case**

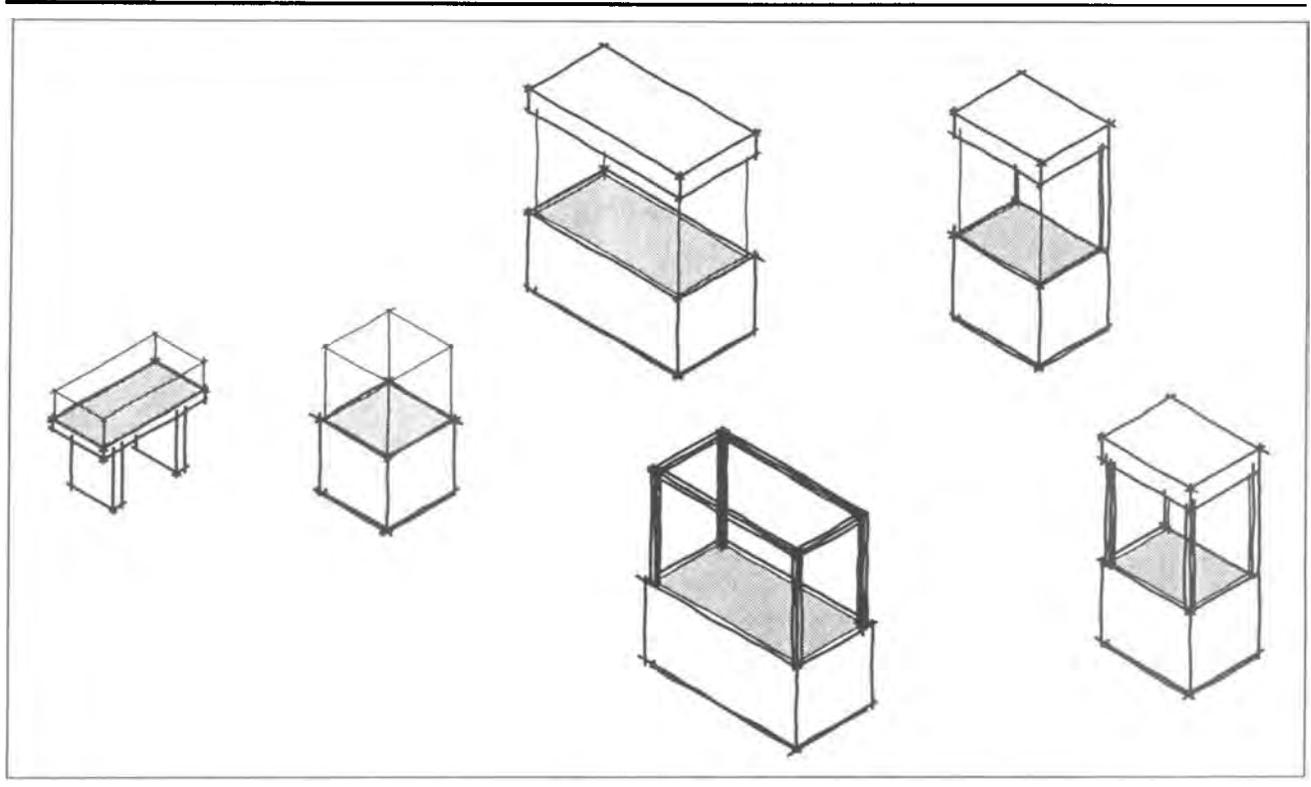
- ✓ Design cases as protective enclosures. Take advantage of a well-designed case to control the microenvironment of sensitive collections. A case designed with the participation of an exhibit conservator is an efficient and often cost-effective way to meet conservation criteria for an object.
- ✓ Establish performance criteria. Determine what conservation features will be built into each case, and clearly identify performance criteria for each feature. Design the case to provide this performance.
- ✓ When possible, build and test a prototype case to decide whether it meets design objectives. Modify the case until acceptable performance is achieved.
- ✓ Provide detailed, explicit drawings and specifications. Inspect cases during fabrication to ensure that the fabricators stick to specifications and construction tolerances.
- ✓ Test the fully assembled case in its final location to ensure that conservation criteria have been met. Such testing should occur before object installation to allow for adjustments.

### **C.2 Case Stability, Security, and Access**

- ✓ Construct a physically stable, structurally secure case. Limit vibration by using movement dampening devices. When floor or wall attachment is not possible, include space for a weight ballast to prevent jarring and tipping.
- ✓ Provide appropriate security features. Choose from security options to include the level of protection that the design team considers prudent. The case strength, resistance, and security devices should match the projected threat from vandalism and theft.

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✓ Provide for legitimate access. Incorporate doors or other practical access options in the case design. Ensure that a single person can enter the case and remove artifacts with ease and in a short amount of time.



### **C.3 Sealed Exhibit Cases**

✓ Use sealed display cases when appropriate. Determine which objects, if any, require protective microenvironments, and design cases accordingly. Design cases to avoid the risks presented from interior contaminants and from condensation due to exterior temperature change.

✓ Design well-sealed cases with tight joints and with gaskets around all removable panels and entry doors. Choose construction materials that limit air exchange and, for climate-controlled case designs, are not moisture-permeable. Well-sealed cases should allow no more than one complete air exchange every 72 hours.

✓ Use conservation-appropriate sealants. Minimize leaks with adequate gaskets and caulk. Always choose non-hazardous materials.

- ✓ Test case performance. When possible, use leak detection equipment to identify air leaks and determine air exchange rates. Modify the case design or add caulk and gaskets to reduce leakage.

#### **C.4 Ventilated Exhibit Cases**

- ✓ Use ventilated cases for appropriate applications. Select vented cases for use in an exhibit space with a good climate-control and pollutant-control system that functions 24 hours a day.
- ✓ Control the design and construction of ventilated cases. Design well-sealed cases, and place an adequate number of vents to provide for air movement. Filter the vents to prevent dust, insects, and chemical pollutants from being drawn into the case.
- ✓ Use positive-pressure cases when appropriate. Museums with good climate-control systems may be able to use these cases, which are practical and economical to build because they do not have to be well-sealed.

#### **C.5 Lighting Design within Cases**

- ✓ Develop a case lighting plan and specify appropriate lighting equipment. Address lighting issues early as part of technical plan which identifies the best suited light source, fixtures, lamps, light modifying and heat reducing equipment.
- ✓ Isolate lights from the display chamber. Place all lighting fixtures outside the display area of a case. Contain any lights that are integral to the case in a separate compartment. Seal off the lighting chamber to prevent the entry of insects, heat, and dust into the display chamber.
- ✓ Reduce heat gain and temperature cycling. Ventilate the lighting chamber to dissipate heat from fixtures and lamps. In larger cases or cases located in enclosed spaces, electric fans may be required. Heat gain inside the display chamber should be no more than 2° F when lights are turned on.
- ✓ Incorporate heat-reflecting and insulating materials when necessary. Consider heat-reflecting glass or double-glazed construction for panels that separate the lighting and display chambers. To help prevent heat buildup, insulate lighting compartments below the display area and use a non-insulating material such as metal products to construct light attic chambers.

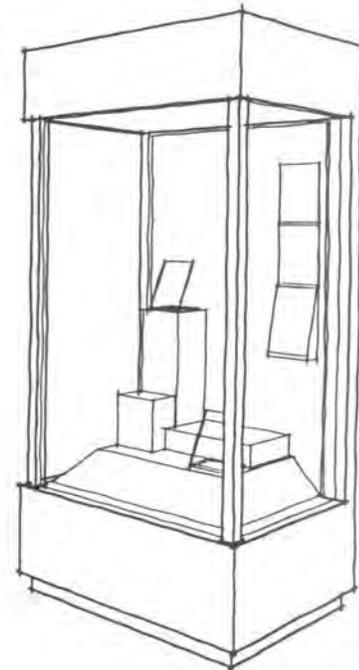
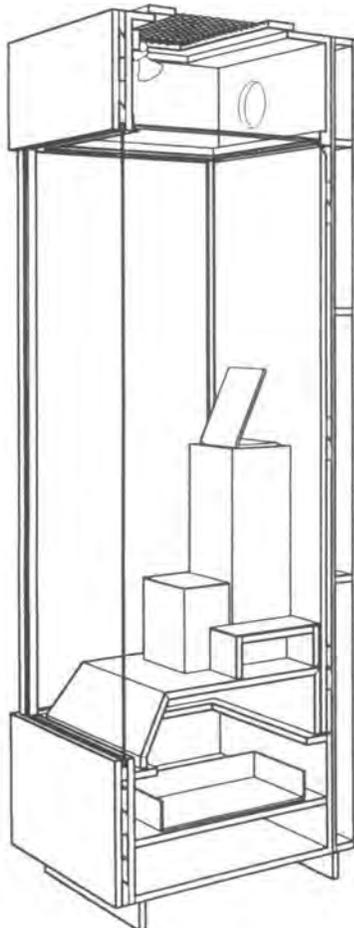
#### **C.6 Humidity-Control Principles**

- ✓ Provide a well-sealed case that will support humidity control. Minimize the air exchange

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between the case and the room. To no more than 1 air exchange per 72 hours. Use moisture impermeable construction materials.

- ✓ Ensure adequate air circulation within the case. If the environmental maintenance chamber is located beneath the objects use a perforated deck or a floating deck with a sufficient perimeter gap to avoid impeding the air from circulating throughout the display.
- ✓ Provide separate access to the environmental maintenance chamber. Access panels to the environmental controlling equipment should be as small as feasible and tightly sealed with gasket materials. Large cases may require numerous points of access.
- ✓ Test the case before enclosing objects. Ensure that the humidity inside the case meets the conservation criteria, even when exterior conditions are at projected extremes.
- ✓ Monitor the interior relative humidity for the duration of the exhibit. If identical cases are used, systematic sampling may be adequate.



### **C.7 Active and Passive Humidity-Control**

- ✓ Establish whether the goal is stabilization or control. Stabilizing the humidity inside a case is usually sufficient unless objects require a highly restrictive or specific RH range.
- ✓ Select an appropriate method. Use mechanical systems cautiously, and choose specific equipment carefully. When using a passive system, design the case to include a holding area for the moisture-absorber medium with easy access for maintenance.
- ✓ Provide safeguards for mechanical systems. Locate equipment in a maintenance area that does not transfer heat or vibration to the objects. Provide a constant power supply (including emergency generators), a monitoring alarm to alert staff to equipment malfunction, and adequate water supply, and drain lines.
- ✓ Include appropriate and sufficient moisture-absorber medium for passive control. Carefully calculate the type and quantity of silica gel or cellulosic materials to be used. The better the case seal the less absorber is required; the more surface area of absorber exposed the faster its responsiveness.
- ✓ Test and monitor the case. Evaluate the initial performance of active or passive systems before enclosing objects. Monitor the relative humidity for the duration of the exhibit to alert staff when maintenance is required.

### **C.8 Pollution-Control Systems**

- ✓ Incorporate enough absorber to remove pollutants for six months to one year. Objects must never touch a chemical absorber.
- ✓ Ensure unrestricted airflow. Case design should encourage passive air movement across the surface of the pollutant absorber. Ensure that the case is well-sealed.
- ✓ Provide access to change the absorber. A small access port can serve both moisture and pollutant absorbers.
- ✓ Maintain the absorber. Renewal of activated charcoal is critical to prevent secondary outgassing. To ensure continual filtration, both activated charcoal and potassium permanganate must be replaced when exhausted.

## **D. Installation and Maintenance**

### **D.1 Choosing Conservation-Appropriate Materials**

- ✓ Select conservation-safe materials. Use high-quality, non-hazardous materials to construct case interiors, and case furniture. Avoid materials known to outgas, become acidic, or lose their physical or chemical stability. Consult lists of materials that have been researched, talk with other museum professionals, and test proposed materials.
- ✓ Avoid adhesives when possible. If necessary within the object display area, use a conservation-quality adhesive with a successful track record in exhibits, such as one based on tested resins-- acrylic, polyvinyl acetate, or certain high-temperature heat-activated adhesives.
- ✓ Review the composition of commercial interior finishes. Select 100% acrylic paints with low volatile emissions for wood and metal surfaces; powder coatings can also be used for metal surfaces.
- ✓ Allow sufficient curing time before installing objects. Caulk sealants and finishes require a minimum of three weeks to reduce emissions.
- ✓ Isolate objects from painted or varnished surfaces. Separate objects with a mount or a layer of inert paper, foil, or other acceptable barrier, such as polyethylene or polyester sheeting.
- ✓ Select and attach decorative fabrics with care. Check fabrics for dye stability and fastness; prewash and dry them before installation to preshrink and remove excess dyes and finishes. Use a mechanical attachment method or sew fabric to itself; archival-quality double-sided adhesive tape is useful for temporary exhibits.

### **D.2 Using Less Stable Materials**

- ✓ Use the least hazardous materials available, and isolate objects from them. Apply barrier coatings, foils and laminates to isolate wood and wood composite surfaces that are close to objects such as within display chambers.
- ✓ Aerate the case. After applying coatings and sealants, allow enough time for curing before installing objects. A minimum of three weeks is recommended, with case doors open and vitrine bonnets removed.
- ✓ Isolate objects from problematic surfaces. Wood products, even when coated, must not come into direct contact with objects. Physically isolate objects with safe fabric coverings, acid-free paper or board, foil, or an acceptable plastic barrier such as polyester or polyethylene sheeting.

- ✓ Incorporate a pollutant absorber or scavenger. Both activated charcoal and potassium permanganate absorbers can be introduced to ensure a pollutant free environment.

### **D.3 Design and Fabrication of Exhibit Mounts**

- ✓ Design and fabricate mounts for object installation ahead of time. How an object will be displayed and what type of mount is required are early design decisions. Use a qualified mounting specialist who has conservation training; some objects require the direct involvement of a conservator.
- ✓ Protect the integrity of the object. No object can be physically altered or dismantled to accommodate placement or mounting in the exhibit. Use mechanical designs to lock mounts in place.
- ✓ Support the entire object. The object's center of gravity or originally intended attitude should be considered when designing a mount. Support provided by the mount must prevent physical stress or unbalanced weight distribution.
- ✓ Provide adequate support for flexible objects. Create custom-padded mounts for organic materials that support the structure over its entire contour. Textiles, papers, organic materials, and other susceptible objects should not be creased or folded, nor should heavy objects be placed directly on top of them.
- ✓ Support all parts independently. Fragile objects, including textiles, should be supported over as large an area as practical. Attached parts, such as straps, may require independent support.
- ✓ Stabilize objects from vibration. The mount design should reduce vibration when a case is opened or bumped. A cushioning material is often required. The mount should fit the object with precision to prevent vibration and abrasion.
- ✓ Ensure the security of framed works. Attach them to the wall with appropriate hardware such as “D” hooks and braided metal wire. Anchor the wall fastener firmly to the wall and be sure that it can support the weight of the framed object.

### **D.4 Exhibit Production and Object Installation**

- ✓ Avoid transporting objects into production areas. Ensure the safety of objects during measurement and fitting sessions. Implement techniques to reduce, contain, and collect dust in areas where objects must be transported.

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- ✓ Inspect exhibit assemblages that affect objects. Include several inspections during the production phase to ensure that the preservation elements are built to specifications. Test and approve exhibit cases with conservation features before object installation.
- ✓ Complete construction before object installation. The exhibit area should be cleared of debris and dust.
- ✓ Evaluate the exhibit teams performance. Review the exhibit process and evaluate the exhibit environment to assess how well the final product addressed the initial conservation concerns. Include any improvements and adjustments to the exhibit process for the next project.

#### **D.5 Exhibit Maintenance**

- ✓ Provide a maintenance manual. Document the construction details, lighting, and conservation features for future reference. Outline procedures and schedules for maintaining the exhibit and conservation criteria for the objects.
- ✓ Monitor exhibit conditions. Assign a staff member to inspect the objects daily. Any controlled environment--either in the overall exhibit space or in a case--must be monitored to identify when maintenance is necessary.
- ✓ Perform necessary maintenance. Replenish relative humidity and pollutant control systems as needed. When replacing lamps, refer to the maintenance plan for the lamp type and aim of the beam. Monitor light levels after the new lamps have been installed.
- ✓ Keep the exhibit area clean. A regular cleaning schedule facilitates preservation of the objects and offers an opportunity to assess any change in the conditions of the exhibit or the objects. Consult a conservator for appropriate methods and products.
- ✓ Plan ahead for the safe movement of objects. During object rotations and inspections or at the close of the exhibit, systematic removal of objects is necessary and requires proper equipment. Before beginning demolition of an exhibit, ensure that objects are carefully removed.

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