THE CONSERVATION ASSESSMENT: A PROPOSED MODEL FOR EVALUATING MUSEUM ENVIRONMENTAL MANAGEMENT NEEDS

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Preface and Acknowledgements

The Conservation Assessment: A Proposed Model for Evaluating Museum Environmental Management Needs is the result of ideas and experience gathered over the course of the eight years since the GCI published, with the National Institute for Conservation (NIC), its precedent *The Conservation Assessment: A Tool for Planning, Implementing, and Fundraising*. The present version of *The Conservation Assessment* has drawn on the lessons of this and other earlier models, as well as on the practical experience of colleagues in the museum and architectural fields. Undoubtedly, future versions will be shaped by the experiences of the architects and conservators who take up the present version and apply it to various types of museums. While the goals will remain unchanged, future users should feel free to adapt the material to particular circumstances. For example, the present version was created to serve museums in regions of the world where mechanized building-wide climate control systems are not a practical option. Therefore, architectural assessors in temperate regions where such systems are frequent may find that the materials do not guide the range of inquiry that they would wish to pursue in assessing a building with mechanized control. These materials are meant to guide, not prescribe. The user is encouraged to expand the materials where appropriate, or to eliminate portions that may not be relevant to a particular situation.

The Conservation Assessment may be revised periodically either by the GCI or another institution. We believe this assessment model is one that must evolve as museums, and the functions that reside within them, also evolve.

It is impossible to assign authorship of these materials to any one person or group of people. Instead, acknowledgement must be given to the following people, all of whom have played a substantial role in the evolution of the goals and methodology of a conservation assessment: Special mention must be made of the work of Michael Henry who has contributed significantly to the present version of the materials as well as to promoting greater collaboration between architects and conservators.

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I. OBJECTIVES AND METHODOLOGY FOR A CONSERVATION ASSESSMENT

An essential first step in the establishment of an environmental management strategy for a museum is an assessment of the various factors that may affect the preservation and care of the collections. Such an assessment should focus on the museum environment in its broadest sense, taking into account both the physical and the organizational aspects of a museum. The physical environment is the actual set of conditions in which collections are housed, exhibited and used. The organizational environment includes a museum's mission, functions, resources, and institutional activities. Both these environments are to a large extent inter-dependent and play a role in the preservation of museum collections.

The guidelines for undertaking a conservation assessment of a museum collection and its building reflect a broad view of the museum environment and encompass an analysis of both management and technical issues. The aim of this approach is the development of appropriate and sustainable solutions to environmentally-induced problems affecting collections. Sustainability of proposed solutions for improving the environment of collections will be highly dependent on good management practices that take into account the museum's collection, building, and organizational policies and activities.

Background

The methodology proposed here for a conservation assessment has evolved from several earlier models and prior experience-- both on the part of the GCI and others-- in carrying out assessments of museum collections. The GCI first developed an assessment strategy, intended for museums in the United States, in collaboration with the National Institute for Conservation (NIC). This project resulted in a set of guidelines entitled *The Conservation Assessment: A Tool for Planning, Implementing, and Fundraising* which was published in 1990. Since then, the GCI has been developing refinements to the assessment process. The underlying philosophy of the revised GCI assessment methodology is a more thorough integration of building, collection, and organizational issues. This revised methodology has been used in a number of GCI courses on

preventive conservation (*Conservación preventiva: Colecciones del museo y su medio ambiente*, Oaxaca, 1995; and the GCI - U.of Delaware/ Winterthur Museum preventive conservation blocks, 1994-97), and in an assessment of a museum in Tunisia.

Objective and Methodology

The principal objective of a conservation assessment is to assist a museum to

- assess its environmental needs
- identify and prioritize problem situations
- establish appropriate maintenance and management regimes
- implement sustainable and appropriate technical solutions, where necessary.

Museum collections may experience deterioration through a number of environmentally-induced risks which often co-exist in complex interrelationships. Contributing to these inter-relationships are:

- the inherent sensitivity of collections due to material, fabrication, or condition
- climate, both regional and local
- response of the building and systems (if any) to the climate
- policies and procedures for the management of the collection and the building
- natural disasters
- human threats

These guidelines for a conservation assessment reflect a recognition of this complex interrelationship of factors. The assessment attempts to characterize:

- collections sensitivities
- building performance
- risks from the environment and use of the collection and building
- risks from policies and practices relating to management, operations, or visitation

The effects of environmental factors and threats such as natural and man-made disasters on museum collections are a function of the vulnerability or sensitivity of the collections, the history of exposure to these factors and threats, and institutional policies and practices for use and management of the collections. Identifying collection sensitivities and understanding their importance is crucial to forming a strategy for environmental

management. Understanding the inherent performance of the building in protecting the contents from the detrimental effects of the environment, is essential to identifying possible modifications or operational measures that may improve performance.

The collections form the basis of the museum; there is therefore little opportunity to effect risk reduction through changes to the collections inventory. Likewise, the climate in which a museum is situated also cannot be changed. Building response to climate and to natural disasters and other threats is a function of building location, configuration, construction details, materials and assemblies, history of maintenance and use of spaces. Building performance can be modified through alterations or manipulated through operations. Building performance may also be compensated for through interior environmental control systems which sustain a desired interior environment. Strategies for dealing with building performance will, however, need to be adapted to the nature of the building which may limit the options available. This would be particularly true in the case of historic buildings.

Institutional philosophies, policies and procedures, especially those pertaining to use and exhibition of the collections, also affect collections risk. These institutional factors may increase or reduce collections risk as the institution balances the need to allow access to its collection (through exhibitions, loans, research) and the need to assure the optimum conditions for the conservation of the collection.

Because of the multi-faceted nature of a museum, the methodology for a conservation assessment as presented here reflects a strategic approach to environmental management. It encompasses a wide range of conservation issues affecting both the museum's collection and building, and considers the institutional mission, functions, activities, and resources. This methodology will help to establish patterns and relationships that exist amongst the institution's organization, its collections, site and structure, and internal and external environmental conditions.

Past experience has shown that successful conservation assessments involve technical evaluations and critical judgments that go beyond the observation and documentation of the conditions manifested by the building or collections. Architectural and collections

assessors rely on education, experience, skills, inquiry, deductive reasoning, collaboration and qualitative analysis to arrive at recommended strategies for environmental management. As might be expected, the analytical processes are highly individualistic and may even vary for the same professional when assessing different museums.

What is at the heart of successful assessments, however, is a process by which **conditions, causative factors and risks are analyzed, characterized and prioritized**. This process of problem definition is followed by the evaluation of existing conservation management strategies in place at the museum and the possible recommendation of new ones to augment or replace them where appropriate. This evaluation, along with the development of new strategies, should be undertaken collaboratively by the collection and building assessors, and should be within the realm of practical implementation by the institution. Selecting such strategies includes implicit or explicit recognition of the constraints imposed on the range of solutions by either the climate and the building. Consultation with museum staff is necessary to allow the assessors to recommend actions that are both appropriate and sustainable within the particular institutional context.

The analysis and recommended strategies that result from an assessment should serve as the basis for a conservation plan for the collection that takes into account the requirements of both the collection as well as its building.

The assessment team

The conservation assessment is designed to be undertaken by a team of people which should include:

- A collections conservator (who may or may not be a member of the museum's own staff)
- An architect
- Museum staff whose jobs either directly involve care of the collection or the building (conservation, curatorial, building manager); or whose jobs may affect these areas indirectly (i.e., security, cleaning staff).

The primary responsibility for the gathering and analysis of information required in an assessment will fall to the collections conservator and the architect. These two assessors will be responsible for liaising with other museum staff throughout the assessment process. These two assessors will also have primary responsibility for proposing environmental management strategies for the institution, in consultation with museum staff. In some cases, the assessment may point to problems that will require the advice of other experts— for example, structural, electrical, or mechanical engineers, pest control specialist, or other consultants who can provide more in-depth analysis and advice on particular problems.

Recommended phases of a conservation assessment

First phase:

Preparation: information-gathering prior to the assessment

As part of its preparation for a conservation assessment, a museum will need to gather information in a number of different areas in order to supply the collection and architectural assessors with sufficient background on the institution's mission, building, collection, staffing and activities. The museum staff should indicate if there are any particular problems they would like to see the museum address, what its institutional priorities are, and its expectations for the assessment. Having such information will help the assessors to focus on these key areas.

Second phase:

Information-gathering during the assessment: on-site observations and interviews

During this phase of the assessment, the collection assessor and the architectural assessor each undertake an examination of the various aspects of the museum environment within their respective areas of expertise (see sections below on *The Macro-environment*, *The Museum Building: Characterization,* and *The Collection Environment* .) This is usually accomplished by a walk-through of the museum by each of the assessors, accompanied by relevant members of the museum staff. During this initial phase of the assessment, the two assessors may chose to work independently, in order to gain as much information as possible about the collection and the building. Through observations of existing

conditions, collection and review of additional documentation on the building, the collection and the environment, along with interviews with museum staff regarding the policies and procedures within the museum, the assessors should be able to gather sufficient data on which to base a subsequent analysis of areas of present and potential risk to the building and to its collection.

The Guidelines presented below offers a series of questions organized into the following categories: 1) The Macro-environment, 2) The Building: Performance Characterization, and 3) The Collection Environment. The data gathered in response to these questions-- whether obtained through interviews, existing documentation, or observations-- will form the basis for an analysis and diagnosis of problems, their causes and significance.

At the end of the initial walk-through and set of interviews, each assessor should have gained enough information to be able to identify present and/or potential problem areas within his/her field of expertise. At this point, the two assessors should compare their data and analyses, identifying overlapping areas of concern, particularly where problems with the building and its management may be affecting the environment of the collection. They should identify the most serious areas of threat for the collection from all sources, and plan to review these together in the next phase of the assessment.

Third phase:
Collaborative analysis and strategies

Having identified key areas for further investigation or analysis, the collection and architectural assessors will now review these areas together; diagnose probable causes of current or potential problem areas; establish possible inter-relationships among problems affecting the collection, building, and organization; and propose strategies for addressing them that are appropriate for the institution.

By this phase, the assessors should be able to address three basic questions regarding the collection:

- to what types of risks is the collection likely to be vulnerable both now and in the future?

- what environmental conditions and factors contribute to this deterioration (ie. excessive moisture, light, etc)?
- what causes these conditions? (lack of building maintenance, leaks in pipes, unscreened windows)?

As part of this analysis, the assessors will review existing strategies for environmental management in the museum. They will also develop, where necessary, new strategies to strengthen or replace existing approaches, where the latter are insufficient in providing safe environmental conditions.

This phase should result in:

- Identification of broad strategies for environmental management that address the specific needs of the collection within the limitations of the climate, building, and institutional resources. This will include recommending possible changes in the institution's policies and practices where such changes are likely to reduce risk to the collection.
- Development of prioritized implementation plans for improvements in building performance to ameliorate environmental conditions and threats. These plans should be tailored to the specific conditions of the institution, its building, collections, and climate and context.

In some cases, a particular environmental condition may have causes and/ or ramifications for both the building and the collection. For example, mold appearing on a framed print in a gallery clearly indicates a moisture problem. The presence of excessive moisture may be the result of poor air circulation, moisture traveling through the walls, high visitation, or some combination of these or other causes. Addressing such a deleterious situation for collection material may well require controlling problems within the building, increasing air circulation and/or exchange, and managing visitation numbers and patterns. Thus a strategy for addressing the situation will need to incorporate issues relating to the building, the collection, and the museum organization itself.

Fourth phase:

Preparation of the assessment report

The report that results from a conservation assessment should contain three principal sections: 1) data and analyses, 2) recommended strategies, 3) proposed phases for implementation. The collection and architectural assessors should collaborate in the preparation of a single report, taking care that recommendations for the collection and the building are mutually compatible.

II. *CONSERVATION ASSESSMENT GUIDELINES*

Preparing for a conservation assessment

It is essential that the assessors have as much background information on the museum, the climate in which it is located, its buildings and collections prior to the assessment visit. By obtaining as much of this information as possible beforehand, the assessors be better prepared for a more comprehensive examination and analysis of potential key areas when on-site.

It is therefore recommended that the following information, *wherever it exists*, be compiled and submitted to the assessors prior to the assessment:

- *Institutional background* statement (see below)
- Floor plans and sections for each structure
- Information on the site and surroundings (topography, gardens, adjacent traffic areas)
- Local weather bureau statistics
- Local air quality statistics
- Collections management policy
- Pest management policy
- Environmental monitoring data
- Loan policies/ contract
- Guidelines for handling, storing and exhibiting the collections
- Guidelines pertaining to the storage of collections and/or use of storage areas
- Guidelines for photographing collections
- Lighting specifications for different types of materials
- Guidelines for packing or unpacking objects
- Guidelines for cleaning or repairing collection materials
- Guidelines for labeling objects
- Emergency preparedness plan
- Guidelines for dealing with vandalism
- Copies of period photographs of the building
- Building maintenance records
- Original building construction documents
- Documents reflecting alterations to the structure

INSTITUTIONAL BACKGROUND

Note: This information sheet should be submitted by the museum to the assessors prior to the assessment visit. This information sheet should accompany the information listed under *Preparing for a conservation assessment*.

Name of institution/ museum:
Address:
Phone:
Fax:
E-mail address:
Contact person:

Type of institution:
Museum
Historic house
Library/ Archive
Historic/ archaeological site
Other

Date of establishment of institution:

Governance (i.e., owner of institution and collections):

- Non-governmental non-profit organization: public/ private
- National government
- State/ county/ provincial government
- Municipal government
- University
- Religious organization
- Other

If governmental, please indicate the office/ ministry/ agency responsible for the institution:

Institution's mission or purpose:

Does the institutional mission include collection conservation?

Does the institution have any special concerns with respect to the assessment and its outcome?

Name of museum director
Names, titles of museum staff who will participate in/ contribute to the assessment

THE MACRO- ENVIRONMENT OF THE MUSEUM

CLIMATE CHARACTERIZATIONS

Climate is perhaps the largest, and least controllable, influence on the museum. Climate patterns and changes may also provide opportunities to improve the interior environment. In any event, the typical climate patterns should be well understood.

Temperature

High average temperature limits opportunities for cooling. High temperature implies potential for visitor physiological stress. Small annual drift and small diurnal change limit opportunities for seasonal or daily cooling cycles.

What is the mean annual temperature?

What is the ΔT of monthly temperature averages?

What is the ΔT diurnal?

What is the T maximum?

Relative humidity

High relative humidity limits opportunities for drying and increases chances of mold growth, insect attack and corrosion of metals.

What is the typical relative humidity level?

What is the typical relative humidity range?

How does relative humidity vary? Daily? Seasonally?

Precipitation

Patterns of precipitation are important to understanding relative humidity levels and for developing strategies in source moisture control.

What is the precipitation frequency? Annual (mean / maximum)? Weekly? Daily?

What is the intensity of precipitation? Light shower of moderate duration? Intense cloudburst?

Is precipitation accompanied by winds? Does wind-driven rain enter wall openings?

Wind and air movement

Patterns of wind and air movement are important to strategies for natural ventilation and cooling.

Describe wind pattern. Sea breeze? Trade wind?

What prevailing wind direction and characteristic. Upland? Coastal? Offshore? Moist? Dry? Cool? Hot? Fog?

When do winds normally occur? Morning? Afternoon? Evening? Night?

Solar radiation
Patterns of solar radiation and cloud cover affect the intensity of natural light in the interior as well as heat gain and loss and temperature.

Describe sky (cloud) cover patterns. Clear sky? Broken clouds? Overcast? Mid-day? Afternoon? Night?

Air Quality
Air quality is a critical consideration if implementing ventilation strategies, especially where mechanical filtration is not practical.

Particulates:
What is the source of particulates? Urban particulates - traffic dust, smoke, soot? Agriculture dust and smoke?

Does intensity vary by time of day or year?

Are particulates reactive?

Gaseous Pollutants:
What is the source? Industrial and vehicular exhaust gases?

Does intensity vary by time of day or year?

Air-borne insects (all stages of development):
Describe species, frequency, intensity. Seasonal variations.

Vegetation & landscaping near building
Vegetation & landscaping have important beneficial and adverse implications with respect to interior environment and collections risk. Vegetation & landscaping may facilitate natural filtration of pollutants, provide shading of solar radiation, affect ventilation and wind speeds, retard drying and removal of moisture, elevate local moisture levels, and may facilitate insects and microorganisms if allowed to decay. Landscape maintenance may introduce moisture from irrigation or pollutants and debris from cutting and gasoline powered equipment.

Vegetation & landscaping:
Describe the landscape and vegetation. High canopy, open understory? Dense, building height foliage, close to walls? Grasses?

Describe plant species.

Do plants produce fruit, nuts or flowers, vegetative litter & debris? Are they attractive to insects?

Do plants and plant litter facilitate propagation of microorganisms, mold, mildew?

Surrounding Construction
The context of the museum building may significantly affect the interior environment of the museum. Buildings and pavements may impede ventilation, increase rain runoff or retard surface water removal, reflect light toward the building, retain heat, or elevate local temperatures. Parking lots or adjacent buildings with certain uses may increase local vehicular traffic and hence the amount of vibration and of pollution, especially from idling engines.

Adjacent buildings:
Describe proximity and nature. Distance? Height? Dark colored? Reflective glass?

Describe use and occupancy. Intensity? Benign or hazardous? Vehicular or pedestrian dependent?

Describe influence on the museum and its environment.

Pavements:
Describe proximity, extent and type. Pervious or impervious? Well drained away from building?

Describe parking lots near building and proximity to ventilation openings. Do busses use parking lot? Are busses and taxis permitted to idle engines while waiting for tours or fares?

Describe influence on the museum and its environment of parking areas and neighboring roads. Indicate type of traffic and volume.

Water sources:
Describe proximity, extent and type. Are there fountains? Ornamental ponds? Detention ponds? Sprays or irrigation systems? Drainage system? Sewage system?

Historic context:
Is the museum located in a historic center, rural setting or a protected area? If yes, describe the main planning or governmental restrictions for this area and especially for the museum building.

Identify landmarks, surrounding main routes and conservation priorities for this context.

THE MUSEUM BUILDING: Characterizations

Thermal Performance and Response

The thermal performance and response of the building greatly influence the interior temperature, and thus both collections conservation and physiological comfort of museum staff and visitors. The thermal performance of the building may lead to strategies for interior temperature management, such as night-time cooling by re-radiation.

Temperature response:

Do the interior air and building surface temperatures closely follow changes in exterior air temperature, or is there a substantial time delay (such as 6 to 12 hours) between interior and exterior temperature peaks?

Is the peak interior air temperature significantly higher or lower than the peak exterior air temperature, or are the two peaks approximately the same?

What is the range of interior temperatures?

Thermal characteristics of construction:

Is the building wall construction massive, such as thick masonry walls, or lightweight, such as wood framing and wood cladding? Indicate materials used in the construction.

Is the building roof construction massive, such as clay tile, or lightweight, such as wood framing and metal sheet? Indicate the materials used in the roofing.

Are exterior walls shaded from solar radiation by vegetation? Trees? Overhanging eaves or porches?

Are exterior walls light or dark colored? What materials are used in the surface treatment?

Is the roof shaded from solar radiation by trees?

Is the roof light or dark colored?

Is the underside of the roof construction exposed to an occupied interior space or separated by an under-roof cavity formed by a separate ceiling construction? Is the under-roof cavity ventilated/ insulated?

Are most of the walls exterior walls?

How much glass is used on exterior walls or in roofs?

What are the dimensions of windows?

What is the height / volumes of interior spaces?

Moisture

Although exterior ambient relative humidity may be characteristically high, moisture management at the level of the building is an important strategy for managing interior relative humidity levels.

Exterior source moisture control - roofs:

Does the roof leak? Is it well maintained? Is it easily accessible for maintenance?

Is the roof constructed of, or clad with, materials that are pervious to moisture?

Are roof coatings and membranes well maintained?

Is the roof well drained? Does ponding occur?

Are roof penetrations or appurtenances such as bell towers or chimneys rain-tight?

Do roof cladding or membrane coverings remain secure and water-tight in wind-driven rain?

Is roof rainwater collected and conducted away from the building by gutters and downspouts? Are the gutters and downspouts of adequate size for the intensity of rainfall and the size of the roof? Do the gutters and downspouts leak? Are gutters and downspouts maintained clear of vegetative litter and other blockages?

Have all potential paths of exterior water entry been accounted for?

Exterior source moisture control -walls:

Are there open cracks, fissures or other opportunities for moisture penetration through the walls?

Are the wall constructed of materials that are pervious to moisture? Are wall coatings, paints, and renderings well maintained?

If roof rainwater is not collected by gutters, are the exterior walls protected by roof overhangs?

Are wall openings protected from wind-driven rain entry by closures such as windows, doors or shutters or by overhangs?

Is collected or uncollected rainwater drained away from the building at grade, or is there surface ponding of water near the walls?

Are there indications of rising damp in the walls? Water entry through subgrade walls?

Have all potential paths of exterior water entry been accounted for?

Are wall opening closures remain secure and water-tight against wind-driven rain?

Interior source moisture control -occupancy:
Are there sources of interior moisture such as active water wells or cisterns? How is the floor made? Are there bare earth floors or under-floor cavities? Interior fountains or basins?

Are there functional spaces for activities that release water or water vapor to the interior, such as kitchens and restrooms? Are the rooms serving these activities equipped with windows and/or exhaust fans vented to the exterior?

Are there housekeeping activities, such as wet-mopping floors, which may release moisture to the interior?

Are there leaks in interior systems and piping which may release moisture to the interior?

Have all potential sources of interior moisture been accounted for?

Symptomatic evidence of moisture problems:
Is there evidence of paint or rendering failure on building surfaces? Are there rust stains or signs of corrosion? Is exterior wood decayed?

Are there accumulations of mold or mildew on building surfaces?

Is there evidence of splashing on the walls or ponding at grade?

Ventilation and Filtration
Ventilation is an important consideration in reducing moisture and growth of microorganisms, especially where climate control systems are impractical. Efficient ventilation is often an attribute of older buildings, although alterations may have diminished this capability.

Cross-ventilation:
Is there cross-ventilation?

Does the arrangement and shape of rooms, the distribution of wall openings and size of the openings allow effective cross-ventilation?

Is cross-ventilation impeded by exhibition cases or other fixtures?

Is cross-ventilation impeded by closed doors between rooms?

Stack-ventilation (vertical):
Does arrangement and shape of floors and vertical features such as stair halls, atria and closed courtyards allow effective stack-ventilation?

Is stack ventilation impeded by alterations?

Ventilation control (cross and stack):
How is ventilation controlled? Shutters? Windows? Doors? Operable skylights?

How are ventilation controls, such as shutters, operated? Are the opening and closing of these devices regulated by procedure?

Mechanical ventilation:
Are fans used to supplement natural ventilation? If so, where are they deployed?

Air filtration:
Are wall openings protected by insect screens? Draperies?

Natural Light
The incidence and intensity of natural light entering a room may affect room temperature. Natural light can have an adverse effect on collections.

Light entry through wall openings:

How are wall openings configured to reduce light entry? Awnings or overhangs? Recessed openings in thick walls? Shutters? Louvers?

How are natural light controls, such as shutters, operated? Are the opening and closing of these devices regulated by procedure?

Are there skylights?

What is the size of the windows? What is their location and distribution in the building?

Are windows glazed? Are they protected from direct insolation? Are UV/IR filters used on glazed windows? How often are these checked/ replaced?

What is the effective day lighting permeability of windows, sky lights and other openings (day lighting access areas / room surface).

Structure
The building construction and arrangement, and their response to the extraordinary loads of excess occupancy, winds and seismic activity may increase or decrease risk to the collections.

Structural capacity for occupancy:
Is floor load capacity adequate for the maximum number of visitors? Special events? Balconies?

Is floor load capacity adequate for concentrations of collections storage? Special exhibits or large objects?

Structural resistance to winds:
Does the main structure, including roof framing, adequately resist wind loads?

Do appurtenances and projections, such as chimneys, towers, awnings, canopies, and balconies adequately resist wind loads?

Do roof cladding or membrane coverings remain secure and water-tight against high winds?

Are wall opening closures remain secure and water-tight against high winds?

Structural response to seismic activity:
Is the building structure earthquake resistant?

What portions of the building are vulnerable to collapse or severe dislocation in a seismic event?

Are appurtenances and projections, such as chimneys, towers, awnings, canopies, and balconies, braced for ground motions?

Protection against insects, rodents, birds, animals
Describe the pest detection and control program (are traps used for monitoring the presence of insects, what areas of the building are monitored, who has responsibility for the monitoring program, is a log or register maintained of pest problems, does the institution have a history of a particular type of pest problem.

Fire Resistance and Protection
The building construction and configuration, as well as systems for detection and protection against fire, significantly affect the degree of fire risk to the collections. These consideration may influence strategies such as the selection of appropriate locations for collections storage areas or exhibition areas.

Structural resistance to fire:
Are the structural materials non-combustible? Combustible and exposed? Combustible with fire-resistive finishes?

Interior resistance to spread of fire:
Are interior wall finishes combustible or non-combustible?

Are interior floor finishes combustible or non-combustible?

Are interior ceiling finishes combustible or non-combustible?

Can fire travel horizontally between rooms without interruption?

Can fire travel vertically between floors without interruption?

Interior resistance to spread of smoke:
Can smoke communicate horizontally between rooms without interruption?

Can smoke communicate vertically between floors without interruption?

Fire detection and alarm:
Describe the fire detection and alarm system. Smoke or heat detectors with automatic alarm and notification? Manual stations with subsequent alarm and automatic notification? Evaluate the effectiveness of each type of fire/smoke detector and deployment.

Fire protection:
Describe the type of fire protection system. Automatic sprinkler system? Manual hose stations at critical locations? Hand-held portable fire extinguishers?

Are these appropriate to the size and type of fire that may be likely?

How is the system checked and maintained?

Can fire brigades quickly access critical areas of the building to extinguish a fire? How is such emergency access controlled? Does the building configuration impede access after security measures are removed?

Physical Security
The building construction and configuration, as well as systems for detection of security breaches, significantly affect the degree of theft and vandalism risk to the collections, and may influence strategies as the appropriate location in the building for collections storage areas or exhibition areas.

Structural resistance to exterior entry:
Is the wall construction sufficient to resist forced entry? Roof construction? Floor and subgrade construction?

Resistance of wall and roof opening closures to exterior entry:
Are closures in the walls, such as shutters, windows and doors, adequate to resist forced entry? Are roof closures, such as hatches, scuttles and skylights, adequate to protect against forced entry?

Are exterior doors guarded or controlled?

Interior resistance to entry of sensitive areas:
Are interior partitions and doors surrounding collections exhibit and storage areas adequate to resist forced entry?

Interior layout of public spaces and ease of observation:
Does the arrangement of public corridors and exhibition spaces permit visual supervision of visitors by museum docents and guards? Are there "blind spots" created by remote rooms or temporary exhibition panels?

Lock hardware:
Are door and window locks and hardware adequate to deter entry?

Deterrence measures:
Is there low contrast exterior lighting to deter unauthorized exterior access?

Is interior lighting maintained at low levels to permit monitoring?

Security detection systems:
Describe the security detection and alarm system. Opening control? Opening and movement monitoring? Silent or audible alarms? Automatic notification? Video monitors? Glass break detection? Evaluate the effectiveness of each type of security detector and deployment.

THE COLLECTION ENVIRONMENT

1. COLLECTION USE AND MANAGEMENT

Type of collection

What kinds of collections does the institution own?

- Archaeology
- Electronic media
- Ethnography
- Fine and decorative arts
- Graphic art
- History
- Geology/ mineralogy/ paleontology
- Industrial machinery
- Library/ archival material
- Military
- Musical instruments
- Natural history
- Science/ technology
- Sound recordings

Use of collections

How is the collection used?

- Exhibitions (indicate whether in-house and/or traveling exhibitions)
- Scholarly research
- Public education / outreach

Are collection materials used in hands-on, educational activities?
If yes, what percentage? How often?

Collection care policies

Is there someone responsible for caring for the collections in the institution?

Does the person's job description reflect these activities?

Is there a conservator on staff?

Who is allowed to handle the collection?

Does the institution obtain conservation services for the collection through an external provider?

Has the institution ever engaged a conservator to assess all or part of the collections? If yes, elaborate (include date of assessment)

Where does the responsibility for each of the following activities lie (i.e., title of staff member, outside provider, etc.)?

- Maintenance of the collections in storage
- Labeling/ marking of collection materials
- Cleaning, conserving/ restoring collection materials
- Preparing collection materials for exhibit or loan
- Packing and unpacking of collection materials

Is formal orientation or training provided for staff in the following areas:

- Collection conservation procedures
- Handling, exhibiting, storing collection objects
- Labeling/ marking objects
- Packing/ unpacking techniques
- General housekeeping and cleaning

Describe the policies and procedures (written or observed) for handling, management and/or use of the collections. Are there any procedures that place the collection at risk?

Who (1) develops, (2) implements, and (3) has authority to modify this policy?

Does the institution have a long-range conservation plan for the collection. (This plan should be evaluated in light of the findings of the assessment.)

Who (1) develops, (2) approves, and (3) implements long-range plans for collection care:
(1)
(2)
(3)

Are funds regularly budgeted for the conservation of the collections? Has this amount changed over the past five years? Is the amount allocated adequate to meet the needs of the collection/ (Describe how the mission of the institution and/ or its operations should support each other to reflect collections conservation concerns.)

Describe the institution's condition reporting procedures. How is the condition of the collections assessed. Is photographic documentation a part of condition reporting?

Are there any procedures that are unique to the institution's types of collections (i.e., preparation, dissection, sampling).

Does the institution permit objects to leave the premises?

Reason objects may leave the institution:

- Examination/ analysis
- Exhibition
- Research
- Other

Does the institution use a contract or written guidelines that specifies the terms under which objects from the collection may leave the institution? (Include samples of these documents, if available.)

Who in the institution reviews the condition of an object, and approves its leaving the institution?

What are the criteria for allowing an object to leave the institution?

Does someone in the institution perform condition reports before and after an object from the collection leaves the premises?

Does the institution borrow objects from other collections? What is the purpose of borrowing?

- Examination/ analysis
- Exhibition
- Research
- Other

Does the institution adhere to specific guidelines or contractual arrangements when borrowing from other institutions?

Does the institution perform condition reports when borrowed objects are received and returned to their owners?

Exhibition Policies and Systems

What percentage of the collection is on exhibition?

Are there permanent exhibitions? Approximate percentage of objects on permanent exhibition?

Are there temporary exhibitions? Approximate percentage of objects on temporary exhibition?

How often do the temporary exhibitions change?

What percentage of objects on display in exhibitions are borrowed from other institutions?

Who has responsibility for the following activities?

- Choosing objects for exhibitions
- Designing exhibitions
- Installing exhibitions
- Monitoring the condition of collections on exhibit
- Monitoring the environmental condition of collections on exhibit

Are collection materials displayed in areas other than the exhibition galleries (i.e., offices, corridors, outdoor areas, etc.). If yes, where?

Describe the manner in which objects are exhibited:

- enclosed exhibition cases
- frames
- open display

Are there adequate physical barriers for objects on open display?

For what purposes are the exhibit cases accessed by staff? How often are they accessed?

What materials are used to construct exhibition cases? Are these materials tested for possible off-gassing of harmful materials prior to use?

Are the exhibition cases air-tight? If ventilation holes or spaces exist, is screening and/or filtering material used over the gaps to prevent the entry of dust and insects?

Are micro-climates used to control the RH within cases? If so, who constructs and maintains them? How often are the micro-climates monitored and maintained?

Have there been any noticeable problems with them?

Are objects on display monitored for changes of condition?

Are objects on exhibition safely supported and secured? Are proper mounting and support materials and systems used?

How are the galleries spaces (floors, surfaces of cases, other furniture) cleaned? How often?

Are any cleaning materials used in proximity to the exhibited objects that may prove harmful to them?

Has any previous damage been observed from cleaning materials/ practices in gallery areas?

Storage Policies and Systems

Is all of the collection storage located in the same building?
If not, in which buildings is storage located?

How is storage of the collection organized?

- By culture
- By material
- By object type
- By size
- Other:

Is there short-term temporary storage or preparation areas? Under what circumstances are objects brought into these areas?

Where are the storage areas located with respect to other museum functions?

Does the museum have a special storage area for very sensitive or valuable objects?

If not, are any special provisions made for these materials?

Are storage areas used for activities other than collection storage? Can these activities pose a risk to the collection?

How many doors open onto the storage area? Area all of these doors in regular use? Are doors secured and alarmed to protect against unauthorized entry? Are doors gasketed to protect against environmental changes and the entry of pests?

Are storage areas easy to clean and inspect? Can staff clean on top of and under cabinetry?

Is there enough space to allow easy movement of staff, objects, and equipment through storage areas?

Do water, steam, drain, fuel, or sewer pipes run through or immediately adjacent to storage areas?

Is there equipment or building services requiring monitoring and servicing by museum personnel?

Are the storage areas located below grade? Does water drain away from the building, or do storage areas flood in heavy rains?

Are objects, and furniture equipment located at least four inches off the ground to protect from possible flooding?

Are collections stored in places other than designated and secure storage areas? (Attics, offices?)

Are storage areas over-crowded?

Are collection objects placed on the floor or in the aisles between cabinets?

Does the institution need additional space for storage? Is there appropriate space within the institution that can be used for this purpose?

Is space in the existing storage area used well? Should it be reconfigured for better security of the collection/ or better use of space?

Describe the type of storage furniture / systems. Are they appropriate to the materials being stored?

Describe the general condition of storage furniture and equipment.

Are materials which may potentially harm collection objects used in the storage area

Is metal cabinetry free from rust or other corrosion?

Is cabinetry free from splinters, nails, and bolts which may damage objects?

Do cabinets close securely to exclude pests and dust? Are there gaskets? Are cabinets locked?

Are there non-collection objects housed in storage areas that may potentially harm the collection?

Are objects well-supported, padded

Have all objects been assigned locations within storage?

Are the locations of objects clearly indicated on storage furniture

Are objects in drawers, cupboards or shelves readily accessible, or must some objects be moved to obtain access to others?

Are vulnerable objects buffered against contact with acidic materials (woods, papers, boards) when stored in proximity to them?

Who has access to storage areas?

Are access logs maintained?

Are persons who are not members of staff (i.e., visiting scholars) permitted to work in storage areas unaccompanied?

Does the institution have written policies or guidelines covering:

- handling of collections in storage?
- activities permitted in storage?

- moving objects into or out of storage
- other policies or guidelines?

(If possible, the collection assessor should examine copies of written policies or guidelines)

Describe the procedures for moving objects into and out of storage.

Are collection re-locations documented?

Are storage areas routinely monitored for
- building problems?
- evidence of pests and other biodeterioration?
- inappropriate levels of RH?
- condition of collection materials?

Does the institution have policies and procedures for *preventing damage* to the collections in storage as a result of an emergency?

Does the institution have a written plan for *responding* to an emergency affecting the collections in storage?

Other institutional activities with implications for the collection

Photography & Video/Filming

Does the institution have a policy for photography or filming of the collections?

Does the institution photograph the collections?

Are visitors allowed to photograph the collections?

If photography of collections is permitted, what type of lighting is allowed (flash, floodlight illuminated, etc.)?

Are special precautions taken to prevent damage due to photography or filming?

2. SENSITIVITIES OF THE COLLECTION TO CLIMATIC CAUSES OF DETERIORATION

Indicate the **predominant materials** represented in the collection.

Inorganic

- Ceramics, pottery
- Clay, unbaked
- Fossils
- Glass
- Metal
- Minerals
- Plaster
- Stone

Organic

- Amber
- Antler, bone, ivory
- Barkcloth, objects
- Basketry
- Botanical materials (dried seeds, grasses)
- Carbonized materials
- Feathers
- Lacquer
- Leather, hide and skin
- Mummified remains
- Paper, papyrus
  Oriental papers
  pastels, charcoals
  stamps
- Photographic materials
  Cellulose nitrate
  Diacetate films
- Shell
- Textiles
- Wood

Collection objects of composite materials

- Books
- Contemporary art
- Ethnographic artifacts
- Costume and costume accessories
- Furniture
- Mosaics
- Musical instruments
- Paintings

- Polychrome sculpture
- Scientific, technical instruments
- Wall paintings
- Other (specify)

Summarize the general condition of the collection.

Are there any collection condition problems presently observable?

Describe the type of problem, collection material affected, and location within the building.

Is the deterioration recent or historic damage?

Is the deterioration active or inactive?

Is there any indication of the cause of the deterioration?

WHAT ARE THE CHIEF RISK FACTORS (BOTH PRESENT AND POTENTIAL) FOR THE COLLECTION?

Relative humidity/ temperature

Inappropriate RH is that which is either a) excessively high or low; b) involves changes or cycles of change in temperature and/or relative humidity.

Which materials in the collection are at particular risk from inappropriate levels of RH and/ or temperature?

Identify collection areas within the museum that may be prone to inappropriate levels/ changes in temperature and RH. Do these areas contain sensitive materials?

Is the institution trying to maintain particular levels of RH and temperature in collection areas? What are these target levels?

Are these levels of temperature and relative humidity achievable year round with present climate control strategies? What are the chief obstacles to achieving these levels?

Does the attempt to achieve or maintain these levels pose a risk to the collection due to the possibility of fluctuations?

Radiation

Which materials in the collection are at particular risk from inappropriate levels of visible/ invisible light?

Have the staff noticed fading of collection materials on display, or fading of wall finishes, fabrics on or near windows or in display cases?

Does the institution have lighting policies which are based on the sensitivity of the various collection materials?

Describe the use of natural light in galleries, exhibition spaces, and storage areas and the types of objects illuminated.

Describe the type(s) of artificial ambient lighting used in galleries, exhibition spaces, and storage areas (electric -- i.e., fluorescent, incandescent, tungsten halogen, fiber optics, neon, etc. -- and non-electric -- i.e., candles, kerosene lamps, etc.)

Describe the type(s) of artificial exhibition lighting used for object/exhibition case illumination. Are lamps/ballast's placed inside of exhibition cases? If so, are measures taken to reduce the build-up of heat within the cases?

Describe any types of filtration used to reduce light intensity (i.e., UV shields on fluorescent tubes, intensity controls, etc.).

Are exhibits designed to limit exposure of light sensitive materials?

If a policy to limit light exposure exists, are the recommended light levels/ periods of exposure regularly followed? If not, what are the chief obstacles to following these recommendations?

Describe any curtains, blinds, shutters, awnings, or other light reduction materials (i.e., light reduction coatings, film, sheet goods, etc.) used to reduce the intensity of the light entering the building through windows or skylights.

If blinds and curtains are used, how are they controlled to ensure that the objects are protected from high intensity natural light?

Have wall surfaces that reflect natural light been treated to absorb ultraviolet radiation?

Contaminants

Which materials in the collection are at particular risk from gaseous contaminants from either indoor or outdoor sources?

Is there any present evidence of damage by gaseous contamination. Describe.

Are there potential sources of additional gaseous contamination?

Describe any sources of or activities producing hazardous gasses within or around the museum which might be dangerous to the collections (i.e., use of certain wood products in storage/ exhibition furniture, paints, custodial cleaners, etc.)

Which materials in the collection are at particular risk from particulate contaminants from either indoor or outdoor sources?

Is there any present evidence of damage by particulate contaminants. Describe.

Are there potential sources of additional particulate contaminants?

Describe any activities generating particulates in or around the museum which might prove a risk for the collection (construction activity, smoking, fuel burning, auto exhaust, agricultural or industrial activity, etc)

Is the collection routinely monitored for gaseous/ particulate pollution? If so, by what means and how often?

Does the museum have at the present time a strategy for dealing with gaseous and/or particulate pollutants (i.e., filtration system, no smoking policy, construction precautions, entry vestibules, sealed cases, dust covers, etc.).
How effective is this strategy?

Biodeterioration: Insects, rodents, birds, animals

Which materials in the collection are at particular risk from attack by insects and other pests?

In which areas of the museum are these collection materials concentrated?

Has there been a history of damage by insects and other pests in collection areas?

Which collection materials and areas have been most affected?

Is there evidence of the presence of insects and other pests (frass, droppings, nests) in or near collection areas?

Does the institution have a regular monitoring program for pest management and control within the collections? If yes, who has the responsibility for this program (staff or contractor)?

Describe the pest detection and control program (are traps used for monitoring the presence of insects, what areas of the building are monitored, who has responsibility for the monitoring program, is a log or register maintained of pest problems, does the institution have a history of a particular type of pest problem. If so, please describe)

Describe measures for preventing the entry of pests into collection areas:

Are there screens on windows?

Are flowers (fresh or dried), plants, or firewood allowed in the structure?

Is food stored, prepared, or consumed in the building? Are special areas set aside for the storage, preparation, and consumption of food?

Are special precautions taken for disposal of food wastes or food storage?

What custodial measures are taken to keep all food preparation and consumption areas clean and pest-free?

Are pesticides used routinely on the structure, around the exterior of the structure or in interior spaces? What is the schedules for application?

If pesticides are used, in what formulations, and on what materials?

Indicate any other measures undertaken to prevent or eradicate pests.

Are incoming collection objects or objects borrowed from other institutions isolated/ examined before entry into collection areas?

Are incoming non-collection materials (paper or wood products, food, etc.) isolated/ examined before entry into collection areas?

Are pesticides used routinely on the collections? What is the schedules for application? If pesticides are used, in what formulations, and on what materials?

Indicate any other measures undertaken to prevent or eradicate pests (i.e., freezing, heating, modified atmospheres, etc.).

Biodeterioration: Micro-organisms: fungi, mold

Which materials in the collection are at particular risk from attack by molds and fungi?

In which areas of the museum are these collection materials concentrated?

Has there been a history of damage by micro-organisms in collection areas? Which collection materials and areas have been most affected?

What are the probable sources of damage by micro-organisms?

THREATS TO THE MUSEUM COLLECTION AND BUILDING FROM NATURAL / MAN-MADE EMERGENCIES

INSTITUTIONAL PREPAREDNESS

Is the institution located in an area of known risk of natural disasters?

To which type of disasters is the area prone?

Who in the institution is responsible for the security of visitors and staff?

Who in the institution is responsible for the safety of the collection and the building?

Does the institution have a permanent security staff?

Does the institution use an outside contractor either instead of or to supplement permanent security staff?

Are security personnel on duty 24 hours? If not, what are the hours?

Does the institution have an emergency preparedness plan?

What type of emergencies does the plan address?

- Civil emergency
- Natural emergency (fire, flood, earthquake, etc.)

Who in the institution has copies of the plan? Are there copies of the plan located at various points in the building and do the appropriate members of staff know the locations?

Is the plan current? How often is it reviewed and updated?

Does the institution have plans and procedures for **preventing damage** to the building and the collection?

Does the institution have a written plan for **responding** to an emergency affecting the building and collections?

Do all staff members know what to do in an emergency? Are there regular emergency preparedness drills?

What types of local/ national/ private services are available to the institution in case of an emergency?

Does the institution maintain supplies to cope with emergency situations. Are these supplies intended for 1) human needs, 2) building needs, and 3) collection needs? Where are the emergency supplies kept? Are they inventoried regularly?

For institutions in areas of potential natural disasters such as earthquakes or flooding, have special precautions been taken to minimize damage?

Do local emergency preparedness/ response coordinators (fire department, local government) have copies of the emergency preparedness plan? Have they been consulted in the development of the plan? Have they been informed of the special nature and features of the buildings and the collections?

THREAT CHARACTERIZATIONS

Fire

The irreversible and potentially catastrophic effects of fire on the museum, its collections, and possibly occupants, are well documented. The building structural response to fire is considered in the section The Museum Building: Characterizations

Ignition sources:
What are the potential internal ignition sources? Consider electrical systems, heating systems, cooking, visitors, special events or activities, arson and other factors.

What are the potential external ignition sources? Consider lightning, adjacent buildings and occupancies, vehicles and traffic, arson and other factors.

Fire brigades:
What is the proximity of fire brigades to institution? Are staffing and method of notification adequate to respond to museum needs?

What are typical notification times and response times for the off-site security services? Are response times consistent?

Describe available fire fighting apparatus, method of notification, water supply volume & reliability, and other factors.

Does the institution have systems for the detection and suppression of fire? Describe (i.e., sprinkler system, smoke detectors, fire extinguishers, etc.)

How often is the system tested, and by whom?

Which spaces are protected by these systems?

Are the systems adequate for the needs of the building and the collection?

Does the institution have regularly scheduled inspections by the fire department?

Where is the water supply? Does the water come from a city water supply? Are there a sufficient number of fire hydrants near the institution?

Are there supplemental sources of water in case of a fire?

Are sprinkler heads and nozzles located so that they do not pose a threat to the collection?

Wind, Hurricanes, Typhoons

High winds from storms may interrupt the utility infrastructure to the building. High winds may also threaten building structural integrity and water-tightness; the building structural response to storms is considered under 4.5.

Warning systems:

What are the available methods for storm warnings?

What measures must be undertaken to secure the building in advance of the storm?

Utility infrastructure:

What are risks of interruption of primary utility infrastructure to the museum?

What are the effects of interruption?

Recovery:

What are planned responses before or after storm to reduce collateral damage?

Lightning

Lightning can initiate structural fire and can interrupt critical systems.

Risk to structure:

Evaluate lightning risk to structure. Consider location and adjacencies, building height, construction, prior lightning frequency.

Risk to systems:

Evaluate lightning risk to systems. How are electrical, telecommunications, and alarm systems isolated from potential lightning strikes.

Method of protection:

Is the building fitted with a lightning protection system?

Flooding

Flooding may cause structural failure from concentrated surface flows or may inundate building or collections, isolating the building from access. Wave surge may cause structural failure from wave impact. Flooding may interrupt critical systems.

Surface water:

What are risks from upstream or upland flooding due to storms?

Coastal flooding and waves:

What are risks of coastal flooding from tides, waves, storm surge?

Utility infrastructure:

What are risks of interruption of primary utility infrastructure to the museum?

What are the effects of interruption?

Recovery:
What are planned responses before or after flooding to reduce collateral damage?

Seismic

Seismic events may threaten collections in storage and on exhibit due to inadequate response by exhibition supports or collections storage shelving. Seismic events may interrupt the utility infrastructure to the building. Building structural response to seismic events is considered under the section "Building: Characterizations"

Collections storage:
Do collections storage methods provide adequate structural response to ground motion and prevent collapse of supports for collections objects?

Collections exhibition:
Do collections exhibition mounts and cases provide adequate structural response to ground motion and prevent collapse of supports for collections objects?

Utility infrastructure:
What are risks of interruption of primary utility infrastructure to the museum?

What are the effects of interruption?

Recovery:
What are planned responses before or after earthquake to reduce collateral damage?

Security

Note: for obvious reasons communication of security evaluations should be done with confidentiality. Report copies with security evaluations should not be widely circulated. The security provided by the building itself is considered above.

Police or security service:

What is the proximity of police and security services to institution? Are staffing and method of notification adequate to respond to museum needs?

What are typical notification times and response times for the off-site security services? Are response times consistent?

Access control:

Does the institution have a policy to secure against unlawful entry and theft?

Are there exterior and interior areas accessible to unauthorized persons? During operating hours? When closed?

How is access to exterior and interior areas by authorized persons controlled? Is access to collection areas restricted?

Are persons who are not members of staff (i.e., visiting scholars) permitted to work in collection storage areas unaccompanied?

Are access logs maintained?

How are special events, including service personnel, such as caterers, controlled?

Are objects in the collection registered and documented? Do photographs exist of most/ all of the collection?

Are locations of objects checked regularly? By whom?

Security systems:

Describe any systems or devices used to secure the building and its collections, i.e., window bars, security guards, alarms, surveillance cameras, movement detectors, etc.