Museum storage practices: evidence in textile and costume collections

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Museum storage practices:
Evidence in textile and costume collections

by

Teresa Ann Heard

A Thesis Submitted to the
Graduate Faculty in Partial Fulfilment of the
Requirements for the Degree of
MASTER OF SCIENCE

Major: Textiles and Clothing

Iowa State University
Ames, Iowa
1992

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INTRODUCTION

Justification

Museums and collections store and interpret important objects that document human life, cultural values, production processes, technology, and artistic creations. Historic textiles and costume are irreplaceable records of our past requiring care, preservation and conservation in order for them to survive (Harris, 1977; Keck, 1974). Museums have many purposes; including, caring, preserving and maintaining objects in the safest and most accessible manner possible (Bandes, 1984; Warhurst, 1984). Additional functions are to research and interpret the objects and their use, function, style, aesthetics, and other aspects from the focus of the culture in which they originated in order to educate the public (Coleman, 1978b; Denford, Lewis & Viner, 1984; Warhurst, 1984). When the object is not being used, it is stored.

For most objects in museums and collections, the majority of time is spent in storage. Since this is the case, collection care and management should begin with facilities that house the objects in the safest and most secure way possible (Bandes, 1984; Burcaw, 1975; Hilberry & Weinberg, 1981). Appropriately designed, organized, and maintained storage facilities are necessary to stabilize the condition of objects (Bandes, 1984).

Current storage practices vary according to existing conditions in museums and collections. Ideal conditions provide an
environment that is free of chemical and physical alterations (Stolow, 1987). In ideal conditions, a special room is utilized. It provides uncrowded conditions; controlled temperature, light, and humidity; and freedom from pests, including insects. Curators attempt to provide storage facilities and develop methods that support the objects as well as minimize additional deterioration or degradation. However, what they are able to do does not always meet the ideal as described by Stolow.

Storage of textiles depends on the nature of the object. Currently, various storage containers, units or devices are used including wood or metal shelves, drawers, racks, or rods. Methods in the literature specific to storing textile and costume objects include horizontal orientations, such as flat, rolled, folded, or mounted, and vertical orientations, such as hanging or mounted.

If storage facilities do not meet basic climate-control requirements and objects are not stored in the safest manner possible, degradation and deterioration may occur unchecked. Thus, objects that represent history would be lost and unavailable for future generations (Keck, 1974). Dunn (1963) states that poor storage facilities put valuable objects at risk. Although almost 30 years have passed since he made this statement, it applies almost equally today; few studies have been undertaken to provide solutions to the problems of museum and collection storage. The expertise and judgement of the staff needs to be applied when storing objects (National Park Service, 1990).
Over the past 30 years, these staff members have begun to look for solutions to the many problems related to storage of textiles and costume objects. Staff members have developed solutions to the problems based on their own experience and education and have published case studies and recommendations to guide others. These guidelines are often examples of ways to address a specific problem or store a particular object.

In a 1990 study of needs in textile conservation research Kadolph reported that storage was identified as the second most important priority by 213 professional curators and conservators who work in textile and costume collections. Included in this general priority were 15 issues related to methods, techniques, storage of specific objects or types of objects and materials used to construct the storage unit or in the preparation of objects for storage. Thus, professionals recognize the need for work in this area. However, with rare exception, reference articles report what was done; they include no evaluations or follow-up discussions of processes or materials. No other research specific to storage was found in the literature.

Purpose and Objectives

At present there is no research-based method for evaluating current storage practices and determining how textiles and costume objects should be stored to minimize the process of aging. The purpose of this study was to identify past and current
recommendations for ideal storage methods; evaluate current methods of storing textiles and costume objects for their effectiveness and usefulness, and recommend storage methods to minimize deterioration of textile and costume objects.

Objectives of the study were to:
- identify and categorize methods specific to storing textile and costume objects in selected collections,
- assess current conditions of selected textile and costume objects in these collections,
- describe storage practices recommended by museum and collection staff members for the objects examined,
- compare the researcher's assessed condition of the objects with museum and collection staff members' recommended practices, and
- develop a decision making model for storage of specific textile and costume objects.

Definitions

Archival
Materials used in storing textiles and costume which will not cause damage to, or harm the object in any way; materials in which any harmful products are removed in processing or other treatment.
Collection

Used to refer to museums and collections used in this study and to the individual textile and costume collections in these institutions.

Degradation

The loss of desirable physical properties of a textile material as a result of some process or physical, mechanical or chemical phenomenon.

Deterioration

The process or state of gradual worsening or depreciation.

Dye or finish transfer

The movement of dye or finish from the object where it was applied onto another object.

Footcandle

Unit of light intensity.

Lux

Abbreviated as Lx, S.I. unit of measurement for light intensity on a surface.

Non-archival

Materials which have not been treated to remove any harmful substances that may damage textile or costume objects.

Object

Textile and costume objects within museums or collections.

Out-gassing

A term used for chemical vapors and gasses which are released during aging from petroleum-based manufactured materials such as paradichlorobenzene, insecticides, fungicides, varnishes, and paints.
Relative humidity
Percent of moisture in air based on the amount it will hold when saturated at a given temperature.

Storage
To leave in a place for preservation or retention.

Ultraviolet
Wavelengths of light beyond the visible spectrum which may cause cumulative irreversible photochemical damage to textiles.

uW/lumen
Unit of light flux.
REVIEW OF LITERATURE

Information in the literature regarding storage for textiles and costume relates to many aspects. The type of textile or costume object, such as flat table runner or bodice, is one aspect. Another is the object's fabrication: woven, knitted, or other process. Two additional and critical aspects include the materials, fabrics or fibers and the stable or unstable condition of the object.

Articles from refereed journals, professional and consumer magazines; books on conservation, curatorship, display and exhibition; workshop notes; conference proceedings; personal communications; conservation course materials; and technical supplements and leaflets were reviewed for subjects that related to storage of textiles and costumes in collections. The materials reviewed date from the earliest located reference on storage in 1962 until 1991, with the majority of information written between 1973-1983. No information dated 1992 was located. Information seldom reflects research findings and is based primarily on logic and on what has worked for authors within their museum or collection or what they have seen work well at other institutions. Generally, these articles report conditions and perceptions at one time; there are rarely follow-up articles evaluating storage methods reported earlier.

This chapter compiles the reviewed authors' suggestions, recipes, practices, and recommendations for storage of textile and
costume objects. Issues to be discussed include general storage factors, object considerations, and criteria for evaluation of object storage. Under general storage factors, primary storage types, methods, and processes of and materials used in storage will be discussed. Object considerations will include type of textile or costume object, its basic structure, material used to make it, and its condition. Each issue will be discussed under the general discussion of storage or under horizontal or vertical storage.

This compilation summarizes storage practices in the field. It groups general comments by practice, recommendation, and expectation. It reflects differences of opinion concerning particular objects and storage methods. It presents not only what was found in the literature, but also identifies conflicting recommendations, raises questions, summarizes general practices, evaluates past and current practices, and identifies issues and concerns that have not been addressed in the literature. All citations for each aspect are included to document the overall understanding of the impact of storage on conservation of objects.

At the end of this chapter, a summary of storage, an organizational chart of storage methods, and definitions developed from the literature review are presented. Decision-making theory and recommendations related to collection storage also are discussed.
General Storage Factors

Collection storage consists of a dedicated room with one or more units, cupboards or other furniture in or on which objects are placed (National Park Service, 1990). The room and furniture should be convenient, safe and secure and protect the stored object (Bandes, 1984; Finch & Putnam, 1977; Glover, 1984; King, 1985; Lambert, 1983; National Park Service, 1990; Perlingieri, 1981; Price & Marko, 1976; Solving storage problems, 1962; Stolow, 1987). Objects are stored when they are not on display or exhibit, receiving conservation treatment, on loan, or being used in research.

Ideal conditions

Storage practices vary according to existing conditions in collections. Ideal storage provides an environment free of chemical and physical conditions that alter objects (Glover, 1984; National Park Service, 1990; Stolow, 1987). Specifications include controlled temperature, ranging from 65°F to 70°F; minimal light, ranging from 25 to 1000 lx depending on object type; a maximum level of ultraviolet of 75 uW/lumen; and relative humidity ranging from 45 to 55 percent (Blum, Date unknown; Campbell, Nickols, Raheel, Fisher, Sozen, & Funkhouser, 1988; Dirks, 1976; Glover, 1973; Kajitani & Phipps, 1986; Mailand, 1980; National Park Service, 1990; Rice, 1969; Shelley, 1987; Summerfield, 1980; Tucker, Hersch, Kerr, Berry, & McElwain, 1978). The most important objective is to provide stability to textiles by avoiding changes or

Specifications also include freedom from pests, including insects, rodents, spiders, and other creatures capable of directly or indirectly damaging textiles (Dudley et al., 1979; Giffen, 1970; Glover, 1984; Harris, 1977; Lambert, 1983; Landi, 1987; Mailand, 1980; National Park Service, 1990; Perlingieri, 1981). Storage requires uncrowded conditions for units and objects. Storage units should protect from dust and light. Further, objects need their own space in storage (King, 1985; Landi, 1987; Shelley, 1987).

Persons in charge of storage of textiles and costume include curators, conservators, assistants, collection managers, storage specialists, museum specialists, and others. Hereafter, persons responsible for or working with storage will be referred to as staff or staff members. Staff attempt to provide storage facilities and develop methods that both minimize deterioration or degradation to objects and support objects (Finch & Putnam, 1977; Glover, 1973; Lambert, 1983; National Park Service, 1990; Stolow, 1987). Staff members determine an object's condition by visual inspection before beginning work and use that information in determining the most appropriate storage method (Lambert, 1983; National Park Service, 1990). Staff members' expertise and professional, educational and
practical experience determine the basis for their storage decisions (Lambert, 1983; National Park Service, 1990).

Ideally, objects should not be moved during inspection or when retrieving other objects (Harris, 1977; Landi, 1987). Each time an object is moved, physical or chemical degradation is likely to occur (Glover, 1973). Compaction and abrasion of fibers within the object and from other objects cause weakening and deterioration (Harris, 1977; National Park Service, 1990). Storage should provide access and availability for examination with minimal handling (Dudley et al., 1979; King, 1985; Lambert, 1983; National Park Service, 1990; Price & Marko, 1976; Renshaw-Beauchamp, 1983; Waddell, 1971). Waddell (1971) cautions that if these criteria are not addressed, objects may not receive appropriate and periodic maintenance checks resulting in deterioration and degradation.

Lambert (1983) identifies dyes, soil, finishes and insects as possible sources of deterioration, but does not explain why this is so. Staff members should be aware of the probable reasons for these precautions. Color could transfer to others object if dyes are not fast. Soil may stain other objects, attract insects, or abrade the object and other objects with which it comes in contact. Finishes may out-gas or transfer from one object to another. Insects may ingest fibers or finishes or eat through one textile to get to another.

Many storage areas, units and methods are far from ideal (Glover, 1973). Make-do storage is in attics, garages and basements among water pipes and building generator units (Burcaw, 1975;
Idiens, 1973; Johnson & Horgan, 1979; Mailand, 1980; National Park Service, 1990; Price & Marko, 1976; Solving storage problems, 1962; Stolow, 1987; Smithsonian Institution, 1971). Storage in these areas are potentially disastrous (Hilberry & Weinberg, 1981; Stolow, 1987). Potential problems with basement storage include dampness, poor ventilation, and flooding (Johnson & Horgan, 1979). Coating walls with a sealant or moving the collection to another floor in the building minimizes problems from dampness and flooding (Hilberry & Weinberg, 1981). However, some advantages exist for basement storage: weight of mobile compaction units is not a problem for basement floors, basement walls may not require a vapor barrier, and collection access is controlled (Johnson & Horgan, 1979; Price & Marko, 1976).

If storage is located in the top-most floor of a building, an improperly sealed roof or ceiling may leak water, may cause fluctuations in temperature and humidity, or may allow dust particles to filter down onto objects (Hilberry & Weinberg, 1981). Textiles and clothing objects should not be stored in these areas (Hilberry & Weinberg, 1981; Johnson & Horgan, 1979).

When it is not possible to move storage to a more desirable location, there remains the need to provide the best available storage for collections (Renshaw-Beauchamp, 1983). Many collections continue to locate storage in basements and top-most floors (Rodee, 1978). If the staff is content with the location of storage, then so be it. However, when these locations are recognized
as unsuitable, other actions must to be taken, ranging from providing a protective piece of furniture and archival material to lobbying administrators for a more ideal and safe location.

Within a single storage area, a variety of objects may be housed, including furniture, textiles, costumes, decorative arts, ethnographic materials, farm implements, zoological specimens and firearms; each has different storage requirements (Stolow, 1987). One object may present an identifiable hazard to other objects; zoological specimens may attract insects harmful to textiles.

Security becomes a problem when objects are stored in one large room since more staff members have access (National Park Service, 1990). Another problem related to large storerooms is the dust produced by the traffic, thus causing added deterioration or degradation to objects (Hilberry & Weinberg, 1981).

An increasing concern regarding storage of historic textiles and costume has developed in recent years (Kadolph, 1990). Storage recommendations are based on fiber content, construction, shape, condition, finish, dye or pigment, and possible presence of other components. Thus, each object should be considered individually in order to select the appropriate storage (Harris, 1977; National Park Service, 1990). Additional concerns related to storage include how to store objects and what materials and techniques to use. For example, technique concerns include creases developing in rolled storage, use of padded hangers and their impact on objects; and the effect of folding on flat objects (Kadolph, 1990). Finally, the
criteria or decision-making process used to select a storage method for any specific object is not identified.

For Stolow (1987), the primary objective of storage units and methods is to provide a physical and chemical environment to preserve objects for today and the future. Proper storage equipment and methods should lengthen the object's useable life-span (Lambert, 1983; National Park Service, 1990; Stolow, 1987). For many objects, most of their museum life-span is spent in storage (National Park Service, 1990). Hence, storage equipment and methods are major concerns of staff and administrators. An appropriate selection of storage equipment, materials and method of storage is critical (King, 1985; Lambert, 1983).

Thus, for storage to contribute to the conservation of an object, textiles and costumes should be stored in a separate, climate-controlled room in neither the basement nor top-most floor of the building. Units should be inert, uncrowded and convenient. The room should be free from dust, light, insects and other pests. Staff should have sufficient training and experience to select appropriate storage for objects within the collection. Objects in storage should be padded and supported to prevent damage from within the object or other objects.

**Storage units**

Storage units include new, old, stationary, mobile, simple, complex, sophisticated (Johnson & Horgan, 1979), custom-made, and
generic, commercially manufactured ones. Storage units may be adapted to make them physically inert and as chemically safe as possible (Johnson & Horgan, 1979).

Storage units may include cardboard boxes and trunks (Harvey, 1963); industrial steel, metal, or wood shelving; drawers; racks; or rods (Allgrove & Allan, 1977; Johnson & Horgan, 1979; National Park Service, 1990; Price & Marko, 1976). Some older units have been modified to provide more ideal conditions, more appropriate dimensions for specific objects, or easier access by staff. Regardless of the unit, a safe environment for the object remains the primary objective.

Storage units of wood are not ideal for textiles and costumes since they are generally acidic. Acids, vapors and resins leach out onto objects in direct contact or in close proximity causing degradation or deterioration (Basic principles, Date unknown; Blum, Date unknown; Campbell et al., 1988; Hatchfield & Carpenter, 1986; Kadolph, 1991; King, 1985; Mailand, 1980; Miles, 1986; Renshaw-Beauchamp, 1983; Stolow, 1987). Some staff prefer not to use wooden units because of their harmful qualities (Watson, 1976), especially plywood and particle board (Hatchfield & Carpenter, 1986; Kadolph, 1991; Leveque, 1986). Woods to avoid include acidic woods: oak, red oak, basswood, sweet chestnut and beech (Craddock, 1986; Kadolph, 1991; Miles, 1986). Woods that may be suitable are mahogany and composite board with a veneer construction (Craddock, 1986; Kadolph, 1991; Leveque, 1986; Miles, 1986).
Phenol formaldehyde may be used to cure wood used for outdoor purposes and urea formaldehyde for indoor purposes. Either type may be used in museum storage units (Hatchfield & Carpenter, 1986; Kadolph, 1991; Leveque, 1986). These formaldehydes out-gas, resulting in brittle and desiccated fibers with low elasticity. Some dyes and pigments may shift hue when exposed to these gasses (Hatchfield & Carpenter, 1986; Kadolph, 1991). Recommendations are either assess formaldehyde emission (Bell & Wolf, 1976; Hatchfield & Carpenter, 1986; Kadolph, 1991; Lambert, 1983; Leveque, 1986; Miles, 1986) or avoid use of products that may incorporate formaldehyde (Hatchfield & Carpenter, 1986).

When unavoidable, well-aged and coated woods may be adequate; however, this practice is questionable (Johnson & Horgan, 1979; Kadolph, 1991). A protective coating of an inert latex paint or a moisture-cure urethane enamel product and an additional barrier of muslin or acid-free paper should be used (Mailand, 1980; Ordonez & Slinkman, 1981). Wood or metal units should be sealed with a protective material or other archival materials to buffer objects from any harmful substances that may be emitted (King, 1985; Lambert, 1983; Mailand, 1980; National Park Service, 1990; Waddell, 1971).

Shelves provide air circulation around objects and alleviate unnecessary movement of objects. Visual observation is possible, especially if spacing can be adjusted to accommodate a variety of objects. Shallow drawers accommodate small, lightweight single-
layered objects and can be modified with moveable partitions or spacers for multiple various sized objects. Drawers are more accessible when they are on tracks with easy slide rollers that eliminate excessive jarring of objects. Since all objects within the drawer become visible, inspection is enhanced (Waddell, 1971).

Waddell (1971) suggests that moving parts be minimized and units be no higher than eye level to eliminate accidents and provide safety for the staff. Although storage units that are higher than eye level are efficient (Johnson & Horgan, 1979), they pose some problems; access, retrievability, and periodic checks for condition are hampered (Waddell, 1971). For tall units, aisles should be wide enough to accommodate a ladder; many ladders are equipped with locking rolling casters to prevent accidents. However, accidents could occur from the weight of moving components, storage units or objects (Johnson & Horgan, 1979).

Boxes or individual containers accommodate matted or mounted objects that need special care. Acid-free boxes for storage eliminate acid leaching from regular cardboard boxes (Johnson & Horgan, 1979; National Park Service, 1990; Summerfield, 1980). Storing objects in boxes or individual containers requires movement of objects during retrieval (Johnson & Horgan, 1979; Waddell, 1971), but these objects are protected from deterioration or degradation due to light or dust (Dunn, 1963; Dunn, 1970; National Park Service, 1990; Price & Marko, 1976). Any box should be lined with acid-free paper or muslin prior to insertion of the object (Glover, 1973;
Glover, 1984). Objects should be cushioned and wrapped to prevent damage to other objects or separated by acid-free tissue to prevent dye and soil transfer (Fall 1964; National Park Service, 1990; Tarrant, 1983). Once the object has been placed in the box, additional tissue or padding prevents shifting when the box is moved and buffers the object (Harris, 1977; Tarrant, 1983). Boxes may be tipped or jarred during retrieval from a shelf or cabinet causing objects to shift within the box (King, 1985). Stacking boxes or dropping boxes during retrieval may crush or damage objects within (King, 1985). The weight of the boxed contents and height of the box should be considered before stacking (National Park Service, 1990).

When collections have limited space to hang costumes, they use drawers in storage units, open or covered shelves, and boxes. Although boxes may be acid-free, Summerfield (1980) suggests also packing costumes in acid-free paper or tissue.

Compaction or high-density storage units use existing space while providing more storage for objects (Johnson & Horgan, 1979). Compaction units can be made of wood, metal, enameled steel, and aluminum. Initially, these units were industrial units, modified to accommodate objects. Units are moved, manually or electronically, via a stationary track in the floor. Compaction units produce a tremendous weight in a small area and are usually placed in basements or ground level rooms. These units do not always provide freedom from vibration because of their design (Lambert, 1983;
Stolow, 1987), but vibration should be minimized to reduce stress on objects (Johnson & Horgan, 1979; Stolow, 1987; Waddell, 1971).

Storage that utilizes all available space should be planned carefully so that staff members have easy access and are able to retrieve objects in a safe manner (Lambert, 1983; National Park Service, 1990). The Chicago Historical Society worked with industry producers of storage units to develop a compaction unit for their new basement, climate-controlled storage space for women's, men's, and children's costumes and accessories and furniture (Jachimowicz, 1977; Johnson & Horgan, 1979; Myers Larsen, 1978; Watson, 1976). The unit has space allocated for both vertical and horizontal storage (Jachimowicz, 1977; Johnson & Horgan, 1979; Watson, 1976) and moves electronically along tracks built into the floor. When completely closed, the unit is secure; when open, only one aisle can be accessed at a time (Jachimowicz, 1977; Myers Larsen, 1978; Price & Marko, 1976; Watson, 1976). The units have racks for hanging in open-front areas (Jachimowicz, 1977; Johnson & Horgan, 1979); only outside or periphery units have venetian blinds over the front of the case to act as a buffer from light (Jachimowicz, 1977; Johnson & Horgan, 1979; Watson, 1976). Below the 3' 9" to 5' 9" hanging areas for accommodating different sized garments are 3' 10" wide 12" deep drawers (Jachimowicz, 1977; Johnson & Horgan, 1979). Each drawer has two 4" trays for flat storage of fragile costume, shoes, hats, and other accessories; trays may be removed when storing bulky items (Jachimowicz, 1977).
Trays use the space effectively by accommodating up to three separate layers of costume or accessories (Johnson & Horgan, 1979; Watson, 1976). A museum in Germany has found compaction units suitable for basement storage (Price & Marko, 1976).

One disadvantage of this system is swaying of hanging costumes. Access to more than one aisle at a time is not possible, making retrieval time-consuming (Myers Larsen, 1978; Watson, 1976). Drawers can accommodate many small objects but not dresses and larger flat textiles (Myers Larsen, 1978). Advantages include its space-saving aspect and its versatility for both vertical and horizontal storage within the same unit. Objects can be seen with a minimal amount of handling and are not compressed or maneuvered to fit the space. When a costume is fragile or requires special needs, it may be stored by itself in a drawer with acid-free tissue to pad-out folds (Buck & Leene, 1972). Thus, compression and abrasion of objects while in storage are minimized.

**Storage materials**

Clear plastic bags have been recommended for many years to protect stored objects from dust and insects and to provide ease of examination (Dunn, 1963). However, plastic in storage is a controversial issue. Dunn (1970) states that polyvinyl chloride bags should not be used because they emit harmful salts. Plastic bags used to wrap or cover objects can create problems with moisture inside the bag when the air is stagnant, even if it is not tied on the
bottom (Campbell et al., 1988; Dirks, 1973; Dudley et al., 1979; Glover, 1973; Littrell & Farrell, 1980; Tarrant, 1983). Poor air circulation with an increase in humidity, even under climate controlled conditions, promotes the growth of mold or mildew, attracts insects or other pests and emits harmful gases resulting in damaging reactions with dyes, fibers, and finishes (Basic principles, Date unknown; Dirks, 1976; Dudley et al., 1979; Finch & Putnam, 1977; Glover, 1973; Glover, 1984; Kadolph, 1991; Ordonez & Slinkman, 1981). Because of static, dust and soil may cling to the outside of plastic (Finch & Putnam, 1977; Glover, 1984; Ordonez & Slinkman, 1981; Tarrant, 1983). When an object is handled or moved, floating dust particles may find their way to the object (Harris, 1977; Landi, 1987; Tarrant, 1983).

However, plastic protects against air-borne dirt and soil and infestation of insects and other vermin (Tarrant, 1983). Clear plastic allows for visual examination of objects with minimal handling. Polyethylene bags decreases problems with fasteners and other decorative materials on objects causing tears or other damage (Lambert, 1983; Tarrant, 1983). Air-filled bags may cushion hanging costume and minimize crushing or creasing from compaction in crowded storage units (Tarrant, 1983). Little is known about the long term effects of some plastics, especially plastic hangers, support systems, and covers to predict the impact of these materials.
To protect objects from potential water damage, Harris (1977) suggests covering objects with tissue, muslin or other expendable material before using plastic (Basic principles, Date unknown; Conservation Analytical Laboratory, 1979; Glover, 1973) to provide air circulation around objects and minimize mold and mildew growth (Shelley, 1987). Landi (1987) suggests using woven fabric such as pillow ticking or heavy calico for dust covers since they can be washed easily. Some authors recommend never storing costume in plastic bags (Finch & Putnam, 1977; Glover, 1984; Mailand, 1980).

Lambert (1983) suggests a buffer of a suitable or comparable fabric between the object and storage unit. All buffer fabrics should be unbleached and washed to remove any finishes before use in storage (Lambert, 1983). Cotton or other fiber batting may be used to cushion or pad-out costumes or folded textiles (Lambert, 1983). Chemically inert, archival products, or natural fiber products of cellulosic, silk, or other fibers are used as buffers (Johnson & Horgan, 1979).

Acid-free, neutral, lignin-free, and other non-acid papers and tissues are some of the types recommended for padding. Lignin is a fiber binder in wood and, if not removed from the paper, will cause damage to cellulosic textiles (King, 1985). Papers provide a buffer between objects, storage units, or other devices.
Collection function and organization and its impact on storage

Storage planning should be based on the function and organization of the collection (Jachimowicz, 1977) and is essential in maintaining access to and retrievability of the objects for the current and projected future, i.e., 20 years from now, and for planning their care (Dunn, 1963; Hilberry & Weinberg, 1981; Johnson & Horgan, 1979; Lambert, 1983; National Park Service, 1990). Some examples of organization include chronological by decade, used in some historical societies that focus on local history and by designer, used in some university collections or art museums. Dunn (1963) found collections had not allocated sufficient space for storage, nor was space used in a productive manner inhibiting collection use.

Location of objects in storage units by using cross references in card catalogs, computers, books, or lists in or on units or other devices is essential to object safety, access and retrieval (Burcaw, 1975; Dunn, 1963; Hilberry & Weinberg, 1981; Johnson & Horgan, 1979; Lambert, 1983; Mailand, 1980; National Park Service, 1990). Some professionals suggest that access to collections be dependent on their function and limited to specific staff members (Coleman, 1978b; Dudley et al., 1979; Jachimowicz, 1977; Johnson & Horgan, 1979; Kadolph, 1991; Lambert, 1983; National Park Service, 1990). If the collection is stored safely, but ease of access is not provided, care of objects is inhibited (Buck & Leene, 1972; Lambert, 1983; National Park Service, 1990).
Visitors should be supervised by a staff member while working in the collection, or the object should be brought to the visitor to eliminate excessive handling (Allgrove & Allan, 1977; Glover, 1973; Jachimowicz, 1977; National Park Service, 1990). When visitors use the storage area for examination of objects, additional security and staff time is required. In addition, dust is produced from work occurring in the collection (National Park Service, 1990). However, if the object is brought to a work area for individual use, there is potential for damage from handling or dust (Hilberry & Weinberg, 1981).

Good documentation eliminates excess handling by reducing searching the collection to find a specific object (Bandes, 1984; Coleman, 1978b; Johnson & Horgan, 1979; Lambert, 1983; Landi, 1987; National Park Service, 1990; Summerfield, 1980). Documentation may provide information for which the researcher is looking, negating handling of the object. With thorough documentation and cataloging, objects needed for research, study, exhibition or other purpose can be determined prior to going into storage (Bandes, 1984; Coleman, 1978b; Dunn, 1963; Dunn, 1970; Hoffman, 1978; Jachimowicz, 1977; National Park Service, 1990).

Storage methods refer to the object's orientation while in storage. There are two primary types: horizontal and vertical.
Horizontal Storage

In horizontal storage, the object is stored on a horizontal plane; stress from gravity is distributed uniformly throughout the object (Lambert, 1983; Mailand, 1980). Horizontal storage includes flat, flat-folded, rolled, suspended (Craft & Vitale, 1979), and mounted flat and stored horizontally.

Flat storage

In flat storage, the entire object is level against the storage unit or archival material. Additional moving, repositioning, or smoothing may be required to align the object in a flat and unwrinkled position (Giffen, 1970; King, 1985; Lambert, 1983). Most professionals consider flat storage the ideal method for textile and costume objects (Allgrove & Allan, 1977; Buck & Leene, 1972; Campbell et al., 1988; Dirks, 1976; Dudley et al., 1979; Harris, 1977; Mailand, 1980; National Park Service, 1990; Perlingieri, 1981; Renshaw-Beauchamp, 1983; Tarrant, 1983; Smithsonian Institution, & Division of Textiles, 1977). Lambert (1983) states that horizontal storage supports the object and provides a means of visual inspection without manipulation if it is in its own unit (i.e., map drawers).

Units for horizontal (flat) storage that are used include drawers, trays, or shelves of various depths, heights, and widths. Map drawers in a separate unit or drawers within a sectional unit with external doors often are used (Ontario Museum Association &
Toronto Area Archivists Group, 1985). Shallow trays may be placed in larger drawers, a separate unit, or drawers within a sectional unit with external doors. Shelves may be open units with no doors or protective cover or may have fabric or acid-free tissue dust covers (Lambert, 1983), or may be in closed units with external doors (National Park Service, 1990).

Flat unfolded storage requires a substantial volume of three-dimensional space to accommodate the range of sizes and shapes of objects without folding them (Harris, 1977; Lambert, 1983; Tarrant, 1983). In order to minimize wasted space, grouping objects by general size and dimension is suggested (Johnson & Horgan, 1979; Lambert, 1983; National Park Service, 1990). For example, small square and rectangular objects would be stored together in one unit. Other units would be used for large three-dimensional objects or those of other shapes and sizes. Ideally, each object would have its own unit or storage space, so that no other objects touch, crowd, or compress it (Lambert, 1983; Mailand, 1980). Also individual units minimize impact from out-gassing or other alterations in the environment due to presence of other objects. However, practical limitations to individual storage units are presented by floor and building space, budgets, staff time and other restrictions.

Recommendations for flat storage include storage units with drawers one and two inches deep and with dust covers in each drawer. This shallow drawer eliminates layering of objects on top of one another and the additional stress, weight and degradation due
to compression (Harris, 1977; Harvey, 1963; National Park Service, 1990). Drawers used in horizontal storage may vibrate when opened stirring up dust and causing movement of objects (Lambert, 1983; Shelley, 1987).

King (1985) and Landi (1987) recommend shallow drawers and shelves to discourage piling flat textiles on top of one another. Layering up to three objects is acceptable if the drawer or unit is large and deep enough, if acid-free tissue paper or washed muslin is layered between the objects, and if they are protected from catching on the drawer above (Mailand, 1980; National Park Service, 1990; Price & Marko, 1976). Each time an object is placed on top of another, weight, condition, and fiber content need to be considered.

Some authors fail to state the implications of layering several objects on top of one another in a storage unit (Lambert, 1983; Price & Marko, 1976). When layering objects, the one that is heaviest and most stable in condition should be placed on the bottom of the unit (Dirks, 1976; National Park Service, 1990). Layering of objects in this manner eliminates excessive compression of those on the bottom layers (Dirks, 1976). Since fragile and lighter weight textiles and costumes may be damaged by added weight, they should be placed on top of heavier and more stable objects (Finch & Putnam, 1977; Mailand, 1980; National Park Service, 1990; Shelley, 1987). Glover (1984) suggests that layering of objects contributes to excessive handling and results in poor ventilation because of compaction.
An additional risk exists when objects are removed from layered storage. When a staff member does not remove the top-most layers from a unit, but rather lifts up objects and pulls out a specific object, many objects could be damaged from tearing, abrasion, compression and wrinkling. Even when care is taken to remove objects carefully from the top of the object being retrieved, objects are handled and exposed to light, dust, movement, and other types of degradation (Lambert, 1983).

When layering textile and costume objects is necessary, lining the drawer or shelf with archival material of Ethofoam®, acid-neutral paper or muslin is recommended (Dirks, 1976; National Park Service, 1990; Smithsonian Institution, 1971; Smithsonian Institution, 1976; Zrebiec, 1978). A layer of acid-neutral or acid-free tissue is placed on the top of the bottom-most object with subsequently lighter or less stable objects layered or placed on top of one another. On top of each layer, another layer of the special tissue paper is used to prevent abrasion, transfer of dye, fiber, or other material, and, in essence, protect each object from another.

Since most archival materials are white in color, they provide a means of watching for signs of infestation of insects or other pests or other damage. Because most insects and their waste debris are not white, they are visible on the white archival materials. The archival materials provide friction between the unit and the object, prevent it from moving or sliding along the surface, and minimize abrasion and damage to the object.
Flat horizontal storage is recommended for small fragile textiles, padded-out costumes, beaded objects, bias-cut costumes, mounted textiles, three-dimensional objects that do not require additional support (Dudley et al., 1979; Glover, 1973; Harris, 1977; Lambert, 1983; Majewski, 1973; National Park Service, 1990; Smithsonian Institution, 1971), chasubles and dalmatics (Thurman, 1978) and some furnishing textiles (Fikioris, 1973). At the Henry Francis du Pont Winterthur Museum, furniture coverings are stored on open varnished shelves in single layers buffered with Permalife® cover paper. No additional archival materials are used for the storage of these textiles since the author states dust is not a problem (Fikioris, 1973). Additional shelving is used to store other types of printed flat textile pieces and textiles which are pleated, gathered, or have a shaped contour (Fikioris, 1973).

Flat storage is not recommended for highly structured costume, three-dimensional textiles requiring support, and large flat textiles (Lambert, 1983). When stored flat, these objects are crushed; creases develop from their weight. Most large flat textiles, like tapestries or rugs, are too large to be stored flat. Methods recommended for these objects are discussed next.

**Rolled storage**

A second type of horizontal storage is rolled storage. This method is used to store flat objects in a compact, space-saving way when they are stable enough to handle slight strain or stress to

Rolled storage may be used in place of flat or vertical storage when storage space is limited (Bell & Wolf, 1976; Buck & Leene, 1972; Giffen, 1970; Glover, 1984; Renshaw-Beauchamp, 1983). When space is a problem, rolled storage is used for objects for which this method is usually not recommended. However, the risk to the object may not be considered or not recognized fully.

Many units have been developed and used in collections to suspend rolled objects. At several museums, objects are suspended between chains hung from ceiling racks (Buck & Leene, 1972; Craft & Vitale, 1979; Fikioris, 1973; Johnson & Horgan, 1979; Lanier, 1967; Mailand, 1980; Solving storage problems, 1962). Support units of pipes or tubes extending beyond the rolled textile (Fall, 1964) are made of wood (Lanier, 1967), metal, steel, or aluminum conduit and attached to chains with "S" hooks (Fall, 1973; Johnson & Horgan, 1979; Mailand, 1980). Ceiling racks may be attached to a trolley system allowing individual staff members to roll units from side to side (Mailand, 1980; Solving storage problems, 1962). These methods provide access to rolled objects without excessive handling (Bell & Wolf, 1976; Fall, 1973; Fikioris, 1973; Lanier, 1967).

Harvey (1963) finds rolled storage satisfactory for flat objects; this method provides access to and visual examination of objects. Advantages of suspending rolled textiles between chains attached to "S" hooks include: the object's weight is evenly
distributed along the tube; objects do not touch, crush or rub against each other; abrasion, compression, and transfer of dirt and dyes is avoided; and objects are easily handled and examined.

At the Maxwell Museum of Anthropology, rolled textiles are stored on a system of suspended tracks with rolling racks and arm brackets (Rodee, 1978) that accommodate two to three rolled textiles depending on their bulk (Johnson & Horgan, 1979; Rodee, 1978). Rodee (1978) states that rolled textiles hang free of each other, are visible for examination, and are accessible for retrieval. After using the system a few years and adding more rolled textiles, the unit became difficult to move. A track was added to the floor to stabilize rocking when racks were pulled out and prevent rolled textiles from falling off the brackets (Rodee, 1978).

Other special units move on nylon rollers suspended on metal tracks from the ceiling pull out side-ways into a central working area (Harvey, 1963; Johnson & Horgan, 1979). When the units are closed face-to-face, they protect objects from light and dust exposure (Harvey, 1963; King, 1985). Rolled textiles are slipped over hardwood dowels suspended between adjustable wooden pegs (Harvey, 1963; Price & Marko, 1976). This unit provides space for textiles not exceeding five feet in width; but the manner in which wider objects are suspended is not stated. Each of the rollers should support only one textile per length. When narrow textiles are individually rolled, several may be placed on a support (Harvey, 1963; Price & Marko, 1976) which helps use available space
efficiently, but requires movement of objects that are not of interest at the time and limits access to specific textiles (Johnson & Horgan, 1979). Another unit slides sideways on a floor track and compacts to secure objects which are rolled in a similar manner and are suspended and secured between pegs (Johnson & Horgan, 1979; Mailand, 1980; Thurman, 1978).

The Winterthur Museum developed moveable storage cabinets of plywood coated with polyurethane (Craft and Vitale, 1979) for rolled textiles; the entire unit can be moved around the storage room (Fikioris, 1973; Johnson & Horgan, 1979). Wood cleats, with dowel stops, secure and space the wooden dowels onto which the textiles are rolled and between which the textiles are suspended. The textiles are rolled as described earlier. The wooden dowel stops in this unit allow for adjustment for each textile's size and provide space so that they do not touch each other. However, the slant of the cleats does not provide access to all the textiles without moving the outer-most ones. To protect the textiles from light and dust, a black polyethylene film is placed over the rack. A fabric of cotton or muslin eliminates problems from use of polyethylene (Craft & Vitale, 1979; Mailand, 1980).

Large rolled rugs is a storage challenge for staff members in finding space, units, and a safe method. Myers (1965) suggests upright support units attached to the wall every few feet with long upright angled supports extending out from the wall at frequent intervals. The angled supports keep the rolled rugs from rolling
forward and off the supports (Fall, 1973; Myers, 1965). When rolling the rugs, Myers (1965) suggests using poles three inches in diameter of a light weight seasoned wood to avoid sap leakage.

Another recommendation is to roll the rugs onto buffered metal pipes (Thurman, 1978). Other authors do not recommend using metal poles or pipes for rolling textiles since staining or rusting may occur (Fall, 1973; Smithsonian Institution, & Division of Textiles, 1977). Smaller rugs could be rolled onto strong cardboard tubes. Large rolled rugs can be placed directly on the uprights with smaller rugs resting on top. This method provides access to the accession numbers and allows for visual inspection of the outer rolled layer (Myers, 1965). However, other authors do not recommend stacking rolled textiles (Fall, 1973; Johnson & Horgan, 1979). With this method, few objects need to be moved to retrieve any specific rug (Myers, 1965). Disadvantages of storing large rolled rugs this way are: stress and pressure in support areas; materials recommended for rolling are not inert; and no specific acid or oxidation barrier is recommended. Myers (1965) does not address using a dust cover for the rugs.

Rolling textiles maintains the distribution of weight and stress on the textile while it is curved around a center support. The degree of curvature is related to the diameter of the roll. Small diameter rolls result in greater curvature compared to large diameter rolls. Textiles stored in this manner usually are large in at least one dimension, such as long but narrow table runners (King,
1985; Mailand, 1980; National Park Service, 1990; Storing large, 1980). However, both small and large textiles are rolled (Campbell et al., 1988; Glover, 1984; Johnson & Horgan, 1979; McLeod, 1983).

Fikioris (1976b) suggests that each textile should be examined to determine its needs, and method of rolling should be determined from this criteria. Textiles that she suggests should be rolled face in are fabrics with pile, but she does not explain or elaborate on this suggestion (Fikioris, 1976b). Other authors recommend rolling pile rugs and other pile objects with the pile-side out (Landi, 1987; Mailand, 1980). Fall (1973) suggests rolling rugs against the pile; she does not state the reason why.

Once the tube has been prepared, the textile should be rolled in the warp direction (Bell & Wolf, 1976; Landi, 1987; Mailand, 1980; National Park Service, 1990; Price & Marko, 1976; Shelley, 1987). Some authors recommend rolling the textile face in (Dudley et al., 1979; Fall, 1964; Fall, 1973; Giffen, 1970; Shelley, 1987), while other authors roll the textile face out (Campbell et al., 1988; Dirks, 1976; Fikioris, 1973; Finch & Putnam, 1977; Glover, 1984; Landi, 1987; Mailand, 1980; National Park Service, 1990; Price & Marko, 1976; Tarrant, 1983). Apparently construction, fiber content and procedure preferred by the collection staff determines whether the textile is rolled right side in or out.

Rolled storage often incorporates additional materials to support and protect the object. Materials used include aluminum rollers (Majewski, 1973) or cardboard tubes, including regular
carpet, fabric, or upholstery tubes (Bell & Wolf, 1976; Campbell et al., 1988; Dirks, 1976; Dudley et al., 1979; Fall, 1973; Fikioris, 1973; Finch & Putnam, 1977; Johnson & Horgan, 1979; Mailand, 1980; National Park Service, 1990; Rodee, 1978; Storing large, 1980; Tarrant, 1983; Zrebiec, 1978). Acid-free or acid-neutral tubes include brands with an inner core of Kraft® fiber lined on both sides with Perma/Dur Bristol® (Ontario Museum Association & Toronto Area Archivists Group, 1985). Other tubes are acid-and lignin-free (King, 1985). These tubes are made from a tan, bleached-fiber stock (University Products, Inc., 1985) and are specifically designed for use in collection storage. Fall (1964) recommends not using metal poles for storing rolled textiles since staining from tarnish or oxidation may occur.

The tubes should be 2" to 3" longer on each end than the textile to prevent abrasion against the method of support or suspension (Dudley et al., 1979; Fall, 1973; Johnson & Horgan, 1979; Landi, 1987; Storing large, 1980; Smithsonian Institution, & Division of Textiles, 1977; Zrebiec, 1978). Whether this length refers to the warp or filling direction of the object is not clear since the authors did not specify. If aluminum, cardboard or the acid-free, lignin-free tubes are used, recommendations include using a Mylar® film or aluminum foil (National Park Service, 1990; Ontario Museum Association & Toronto Area Archivists Group, 1985; Tarrant, 1983), Permalife® paper, or an acid-free or buffered paper (Craft & Vitale, 1979; Fall, 1973; Finch & Putnam, 1977; Johnson & Horgan, 1979;
Mailand, 1980; Ontario Museum Association & Toronto Area Archivists Group, 1985; Rodee, 1978; Shelley, 1987; Zrebiec, 1978) on the tube to act as an acid, oxidation, or leach barrier between the tube and the textile (Campbell et al., 1988; Dirks, 1976; Landi, 1987; Mailand, 1980; National Park Service, 1990; Thurman, 1978). Additional materials recommended for use as a buffer include single or multiple layers of polyethylene film, acid-free tissue paper, scoured cotton fabric or muslin (King, 1985; Majewski, 1973; National Park Service, 1990), foil, or inert paint such as buffered pigmented shellac of KILZ II or BIN (calcium carbonate) (L. Figg, personal communication, May, 1992).

Another suggestion overlaps 2" to 3" of the textile with Permalife® or acid-free paper. While rolling, add tissue between layers (Campbell et al., 1988; Fikioris, 1976b; Finch & Putnam, 1977; Glover, 1984; King, 1985; Landi, 1987; Mailand, 1980; National Park Service, 1990; Storing large, 1980; Tarrant, 1983). This method secures edges and buffers the textile from itself.

A dust cover of Mylar® film or muslin is secured with strips of bias tape or cut muslin (Bell & Wolf, 1976; Craft & Vitale, 1979; Dirks, 1973; Dudley et al., 1979; Fikioris, 1973; Fikioris, 1976b; Glover, 1973; Glover, 1984; King, 1985; Mailand, 1980; Ontario Museum Association & Toronto Area Archivists Group, 1985; Renshaw-Beauchamp, 1983; Rodee, 1978; Storing large, 1980; Tarrant, 1983; Zrebiec, 1978). Once the textile is rolled, the tube is suspended or stored in various ways depending on its size and
weight, usually in some horizontal manner. Rolled textiles should be
suspended, not placed on a shelf to avoid concentrating the weight
on a small area contributing to creasing and damage (Bell & Wolf,
1976; Johnson & Horgan, 1979; Landi, 1987; Ontario Museum
Association & Toronto Area Archivists Group, 1985; Tarrant, 1983).
Other factors that influence storage include the tube on which the
object is rolled, and the material of metal, wood, or Plexiglass®
that is inserted in the hollow center (Bell & Wolf, 1976; Glover,

At the Winterthur Museum, upholstery fabrics and curtains
with the lining removed are stored on rolls (Fall, 1964). Quilts and
coverlets are placed in rolled storage at the Chester County
Historical Society in West Chester, Pennsylvania. Previously, these
items were folded and stacked on bare wooden shelves, cupboards,
drawers and on beds (Craft & Vitale, 1979).

Textiles recommended for rolled storage include quilts,
bedspreads, shawls, lace, and ribbons (Buck & Leene, 1972; Tarrant,
1983). Some authors recommend rolling rugs and tapestries (Fall,
1964; Landi, 1987). Most multicomponent and layered objects such
as costumes, quilts and saddle bags are not suitable since rolling
compresses and stresses the fibers (Storing large, 1980).

Care in rolling textiles is essential so that they experience no
additional stress, strain, or creases (Bell & Wolf, 1976; Dudley et
al., 1979; Fall, 1964; Landi, 1987; Mailand, 1980; Shelley, 1987;
Tarrant, 1983). Creases are created in the rolled textile;
compression also distorts the fabric, damaging creased areas. Challenges in correctly rolling textiles include: unevenly woven textiles, textiles with metallic or brittle yarns, fragile or damaged textiles, pile fabrics, textiles with fugitive dyes or pigments, and textiles with surface elements or applied design (Fikioris, 1976b; National Park Service, 1990). Lambert (1983) suggests that a disadvantage of rolling is the need to unroll the textile for research, conservation, periodic maintenance checks or other work.

Folded storage

Another type of horizontal storage is folded storage. This method is used for objects when sufficient space is not available to store them flat or rolled. Folded storage bends or creases objects in various places which may be in the warp, filling, or diagonal direction. Units are similar to those used in horizontal flat storage: drawers, shelves, and trays (Lambert, 1983) of sufficient depth to prevent abrasion to objects when the unit is opened or closed (National Park Service, 1990).

Folding or creasing is not recommended for most objects (Basic principles, Date unknown; Burcaw, 1975; Dudley et al., 1979; Fall, 1973; King, 1985; Lambert, 1983; National Park Service, 1990; Perlingieri, 1981; Shelley, 1987; Tarrant, 1983). If costumes are folded, creases should follow seams or lines of the costume (Dirks, 1976; National Park Service, 1990; Smithsonian Institution, & Division of Textiles, 1977). Fall (1973) suggests putting the first
fold parallel to warp yarns because it will hang out more easily than a fold along filling yarns.

Additional suggestions are made to refold objects in a different place each time they are unfolded to prevent breakage of yarns or threads (Campbell et al., 1988; Dirks, 1973; Dirks, 1976; Dudley et al., 1979; Dunn, 1970; Fall, 1973; Finch & Putnam, 1977; Bishop Museum, Date unknown; Kadolph, 1991; Littrell & Farrell, 1980; Mailand, 1980; McHugh, 1970; National Park Service, 1990; Shelley, 1987). Perlingieri (1981) states that folding textiles adds stress and compression on creased areas and that creases produce a nice environment for insects and vermin for feeding and nesting.

However, when folded storage is used, folds should be limited and padded-out with crumpled tissue paper (Basic principles, Date unknown; Buck & Leene, 1972; Campbell et al., 1988; Dunn, 1963; Fall, 1973; Finch & Putnam, 1977; Glover, 1973; King, 1985; Lambert, 1983; Littrell & Farrell, 1980; Mailand, 1980; National Park Service, 1990; Ordonez & Slinkman, 1981; Shelley, 1987; Tarrant, 1983; Smithsonian Institution, & Division of Textiles, 1977; Zrebiec, 1978). Other authors suggest using strips of washed, undyed muslin or appropriate fabric (Dudley et al., 1979; Kadolph, 1991; Landi, 1987). The tissue or fabric pads-out and supports the folded fibers and yarns and minimizes strain or bending (Fall, 1964; Giffen, 1970; Harris, 1977; Landi, 1987; Mailand, 1980; National Park Service, 1990; Ordonez & Slinkman, 1981; Smithsonian
Institution, 1971). However, authors do not give directions for folding objects.

**Horizontal mounted storage**

Mounted textiles include textiles that have been attached to a stretched taut fabric of linen, cotton or other suitable fabric or sandwiched between crepaline fabric layers in order to stabilize, secure or support the textile (King, 1985; National Park Service, 1990; Simpson, 1991).

Hemken and Kadolph (1988) suggest that mounted framed textile be stored in drawers or boxes or stacked with other mounted textiles on shelves. Harvey (1963) suggests mounting small fragile textiles that had been stored flat in drawers. Horizontal mounts for small or fragile textiles provide support and stability to the fragile area or to the complete object (Campbell et al., 1988; Fall, 1973; Finch & Putnam, 1977; Glover, 1984; King, 1985; Thurman, 1978).

Authors recommend horizontal storage of mounted textiles to minimize strain and support the complete textile (King, 1985; Mailand, 1980; National Park Service, 1990). Ideal storage of mounted textiles is in a horizontal orientation with no unnecessary stress such as flexing, soiling or abrasion (Hemken & Kadolph, 1988; Mailand, 1980).

Mounted textiles may be stored in drawers, shelves, or boxes, but they take a considerable amount of space in storage units (Mailand, 1980). Mounted textiles also may be stored either
vertically or diagonally to eliminate a portion of the stress from a totally vertical orientation (Mailand, 1980). Depending on the condition of the textile, mounting can be accomplished in many ways using different materials (Dudley et al., 1979; King, 1985). Mounting provides support in storage, minimizes vibration during handling, and eliminates risk during examination (Fall, 1964; King, 1985). Methods of mounting depend on the object itself and the materials used (King, 1985).

One mount uses a piece of hardwood larger than the textile to be mounted. Linen, cotton or other suitable fabric is stretched over the wood making sure the warp and filling yarns are perpendicular to the square shape of the wood (Finch & Putnam, 1977). With the fabric taut over the wood, edges are folded and secured to the back of the wood with an adhesive such as polyvinyl. Once the fabric is secure, the textile is centered and arranged with its warp and filling yarns perpendicular to the fabric base, pinned and hand stitched in place.

Another method uses linen stretched perpendicular between framed sealed wood stretcher bars. The linen is attached to the wood with stainless steel staples placed within a half inch of each other around the frame. The textile is attached in the same manner as discussed in the preceding paragraph except small overcast stitches are used (R. Brandon, personal communication, 1988). This method eliminates the use of unsealed wood or an adhesive both of which could create problems with out-gassing harmful vapors. Finch
and Putnam (1977) do not recommend stretcher frames. Since the frames have a tendency to warp, they alter tension on the supporting or backing fabric and do not provide a stable support for the mounted textile.

A third mount is the sample folder (Craft & Vitale, 1980). This buffered ragboard folder is shaped into a lidded shallow container to hold individual small, uniformly sized textiles. When the textile is fragile or smaller than the folder it can be sewn to net, screen or appropriate weight fabric. The support material is sewn to the back of the folder to provide additional support. Folders can be stacked and placed in Hollinger drop-front storage boxes (Craft & Vitale, 1980). This mount provides an individual space for each textile, protects it from dust and light, and provides support for the object during handling.

Staff at the Metropolitan Museum of Art cover stretcher mounted textiles with a Plexiglass® box and encase the framed textile in a blackout cover during storage (Shelley, 1987). Framing or backing mounted textiles is recommended, otherwise dust and soil may accumulate on the textile or mounting fabric and cause abrasion and deterioration (Finch & Putnam, 1977; King, 1985).

Hemken and Kadolph (1988) have developed a frame that allows the textile to be examined while remaining in the storage mount. This mount is based on McClean's mounting method (cited in Hemken and Kadolph, 1988) which allows examination of the textile from both sides. Hemken and Kadolph's mount provides support and
stability to the textile while preserving and not altering it in any way. Matboard is used to frame the textile and off-white crepaline fabric attached on grain with a water soluble polyvinyl acetate emulsion provides the support. Two pieces of framed matboard are made in the same way, connected with linen self-adhesive tape in order to sandwich the textile between them. The mount frame was closed with self-adhering hook and loop fasteners to allow for different thicknesses of textiles while avoiding compression (Hemken & Kadolph, 1988). To secure the textile in the mount, appropriate size and weight thread was sewn around the textile through the crepaline using a running stitch. This mount minimizes abrasion, folding, crushing, and the possibility of getting caught or snagged on other objects or storage units. A disadvantage to this type of mount frame is the slight restriction of visibility and distortion resulting from the crepaline (Hemken & Kadolph, 1988).

In addition to the various mounts, many materials are used in the process. Fikioris (1976a) suggests using acid-free mat board in four or eight-ply, depending on the textile and the size of the frame. Mailand (1980) suggests using 100 percent ragboard which has a neutral pH. In 1986, Brako suggested using a new, lightweight 100 percent ragboard product called Tycore® to support the textile on a continuous surface. Other authors have used acid-neutral matboard (Campbell et al., 1988; Hemken & Kadolph, 1988; King, 1985). The authors do not address if less weight means less acid. Finch and
Putnam (1977) do not recommend using cardboard unless it is an acid-free material.

Mounting fabric used at the Winterthur Museum is washed unbleached 100 percent cotton muslin of an unspecified weight (Fikioris, 1976a). The on-grain muslin covers wrap the mat board completely and are sewn together in the back. Aligning the fabric eliminates stretching and skew and prevents puckers and unevenness of the mounted textile.

The mounting fabric should be suitable in weight and texture to support the object and not distract from it (King, 1985; Buck & Leene, 1972). Fragile textiles sewn to a supporting fabric experience minimal stress during handling or while on display (Majewski, 1973). The textile may be attached to fabric with a button-type thread and over sewing stitch (Finch & Putnam, 1977) or other thread suitable for the textile and mounting fabric (Campbell et al., 1988; King, 1985). A fine thread and needle and a few stitches through or around the yarns provide stability and support (Glover, 1984; King, 1985). However, stitching may create problems when done incorrectly or when the textile is not stable enough to withstand the stress (Himmelstein, 1986). Additionally, any process should be reversible (Reeves, 1986). Since sewing through a textile to a mounting fabric creates problems, another recommendation is to sandwich the textile between two pieces of nylon tulle and sew around the textile. This method provides support for the textile without damage, and provides a means of visual
examination without handling (Dudley et al., 1979). Another method mounts a textile with an unidentified hand stitch and matts it with another piece of acid-free mat board before framing (Craft & Vitale, 1980; Fikioris, 1976a).

Framing the mounted textile and inserting glass protects the textile. When glass is used, care needs to be taken to prevent glass breakage which might damage the textile. Plexiglass® is an alternative to reduce the hazard of broken glass (National Park Service, 1990). A fillet, a narrow strip or band of mat board or sealed wood, is placed between the textile and the glass to provide air space so that moisture will not be trapped and provide a breeding ground for mold, mildew and insects, and so the glass will not press against the textile (Campbell et al., 1988; Craft & Vitale, 1980; Finch & Putnam, 1977; King, 1985; Mailand, 1980; National Park Service, 1990). Matting textiles is another way of providing air space between the textile and the glass. The back of the framed textile should be covered with acid-free paper to protect from dust (Craft & Vitale, 1980; Fikioris, 1976a), but then the back of the textile is not visible for examination (Craft & Vitale, 1980).

Vertical Storage

Vertical storage refers to the object being stored in a vertical plane which causes stress in the top-most part of the textile or costume from which it is hung or supported. Vertical storage includes two categories: hanging and mounted flat and stored in an
upright, vertical position. Vertical hanging storage is further subdivided into object type, such as costumes and flat textiles. The decision to store an object in a vertical hanging position or other position depends on its condition and the available storage facilities and space (Glover, 1984; Mailand, 1980; National Park Service, 1990; Shelley, 1987).

Hanging storage

Costumes must be in a condition sufficient to withstand the strain, stress and creasing resulting from hanging (Harris, 1977; Landi, 1987; National Park Service, 1990; Smithsonian Institution, 1971; Tarrant, 1983). King (1985) finds this method adequate as long as costumes are not crowded and the hangers do not strain, crease or distort shapes. Costumes may be supported in a three dimensional manner as originally intended during wear (Finch & Putnam, 1977; King, 1985; National Park Service, 1990). Ideally, hanging provides easy access during retrieval (King, 1985).

Various rods are used for costume if a cabinet with built-in rod is not available. Dunn (1963) suggests using a lead pipe; Price and Marko (1976) suggest a brass bar. Units could be free-standing or hung from ceilings or walls (Dunn, 1963; Mailand, 1980).

The Maxwell Museum of Anthropology hangs costume on metal garment racks with rollers (Rodee, 1978). Mailand (1980) also suggests a rolling rack. Both racks have two shelves above the hanging rod, but the authors do not state if either the shelves or
protective dust covers are used. Other units include open or closed cabinets (Mailand, 1980) and compaction units such as that used by the Chicago Historical Society described earlier (Jachimowicz, 1977; Johnson & Horgan, 1979; Watson, 1976).

For costumes, recommendations include using hangers that either fit or are narrower than the object's shoulder width (Giffen, 1970; Glover, 1984; King, 1985; Landi, 1987; Mailand, 1980; Tarrant, 1983) in a way that does not add stress (Campbell et al., 1988; Fall, 1973; Glover, 1973; Harris, 1977; Lanier, 1967; National Park Service, 1990; Price & Marko, 1976; Tarrant, 1983). If the shape is inappropriate, distortion may occur across the back of the shoulders, top of sleeves or other areas (Glover, 1984; Landi, 1987; Tarrant, 1983). Kadolph (1991) recommends storing costumes on separate, appropriately sized hangers for each costume.

Hanger materials include wire, plastic, or wood. Wire hangers are not ideal since they are flexible; bend easily (Glover, 1973; Glover, 1984; Ontario Museum Association & Toronto Area Archivists Group, 1985); are narrow, concentrating stress on a small area which could tear, crease, abrade, distort (Campbell et al., 1988; Mailand, 1980; Tarrant, 1983); or may rust (Dunn, 1963; Dunn, 1970; Mailand, 1980; Tarrant, 1983). Zrebiec (1978) stated that staff would be replacing wire or metal hangers with padded hangers. Plastic coating around the wire may chip or peel off exposing the wire (Tarrant, 1983).
Plastic hangers wrapped in acid-free tissue or made of inert materials are recommended for hanging costume (Dudley et al., 1979; Mailand, 1980; Shelley, 1987). However, specific hangers that meet this ideal are not identified. Synthetic resins should not be used in the presence of PDB (paradichlorobenzene) since the plastic softens when exposed to PDB fumes which may damage objects in some unspecified manner (Dudley et al., 1979; Fall, 1973). Plastic hangers may off-gas, but neither the type of plastic nor the implications of off-gassing are identified (National Park Service, 1990). Regardless of the type of plastic hanger, periodic inspections guarantee safety of objects (Johnson & Horgan, 1979).

Wood hangers are recommended for hanging costume (Allgrove & Allan, 1977; Glover, 1973; Harris, 1977; National Park Service, 1990; Ontario Museum Association & Toronto Area Archivists Group, 1985; Tarrant, 1983). Padding the hanger with cotton batting or acid-free tissue paper and wrapping or placing washed undyed muslin over the padding also is recommended (Allgrove & Allan, 1977; Dudley et al., 1979; Harris, 1977; Glover, 1973; National Park Service, 1990; Pattern for making padded hangers, Date unknown; Rodee, 1978; Summerfield, 1980; Tarrant, 1983). Most authors fail to explain why this is done other than to prevent excessive stress or strain on the shoulder and neck area of the costume. Padding and covering wood hangers may eliminate other problems such as acid leaching from unsealed wood, splintering which may catch on fibers and yarns and damage or tear costumes, and adjusting for an
improperly shaped neck and shoulder line (Dudley et al., 1979; Tarrant, 1983). A limited number of authors do not recommend using wood (Campbell et al., 1988).

Tissue paper is used to pad hangers for shape, contour, and support (Dunn, 1963; Dunn, 1970; Lanier, 1967; Majewski, 1973; National Park Service, 1990). Dunn (1970) suggests that tissue paper also prevents creasing of the shoulder and neckline area. Some authors include directions for making a padded hanger using polyester fiberfill quilt batting and white or unbleached washed cotton muslin for the cover (Littrell & Farrell, 1980; Pattern for making padded hangers, Date unknown). Small wooden hangers are recommended because the shoulder width and thickness, front to back, of the material would produce less stress and strain in the shoulder area than wire hangers and because they are similar in slope and design line to 19th century garments (Littrell & Farrell, 1980; Pattern for making padded hangers, Date unknown).

Another support system uses loops or straps of heavy twill tape sewn in the waistband of skirts and trousers or in the shoulders of bodices; when placed over the hanger, they help support the weight placed from another part of the garment (Finch & Putnam, 1977; Giffen, 1970; Glover, 1984; Kadolph, 1991; Littrell & Farrell, 1980; Mailand, 1980; National Park Service, 1990; Tarrant, 1983). Landi (1987) states that twill tapes cause strain and distortion at attachment points. She suggests using a rounded end hanger for
skirts; however, strain and distortion may occur where a skirt drapes over the rounded ends of the hanger.


Special hangers are used with specific costumes. Pant hangers that clip or provide pressure may be suitable for skirts and trousers. Padding and fabric buffers can be placed between the clip or pressure device and the costume (Littrell & Farrell, 1980). At a museum in Berne, Switzerland, costumes and ecclesiastical objects are hung on a variety of hangers: half-rounded, smooth, hollow wood ones for costumes that hang freely without compression; straight shouldered ones for copes and dalmatics (Price & Marko, 1976); and triangular ones for ecclesiastical garments such as chasubles. These hangers may require additional shaping and padding to accommodate the slope of the shoulders (Lambert, 1983; Landi,

For clothing that combines a skirt and a bodice, another hanger is recommended. To support the skirt's weight, Lanier's (1967) custom-made farthingale-like hanger of an unidentified wire frame padded-out with a quilted fabric prevents unnecessary handling of the costume (Coleman, 1978a; Fall, 1973; Solving storage problems, 1962). Although the amount of space needed for this type of hanging storage is not identified, it probably requires more space than regular hanging. Additional height may be needed to accommodate this hanger, but no other modifications to the storage unit are necessary. If there is not adequate funding to make or purchase this hanger, a modified version can be made from a wooden hanger and broom handle, stiff wire such as wire hangers, and cotton quilted padding (Keck, 1974). A piece of garden hose on the pole provides a non-slip handle, a weighted base secures the costume when work is being done, and hook and loop fasteners secure the costume on the hanger (Keck, 1974).

An ideal support for costume is a custom-made dummy or mannequin for each costume (Fall, 1973; Finch & Putnam, 1977) dressed as it would be for display or exhibit with undergarments and acid-free tissue padding. This method eliminates folds and creases
while supporting the costume on a three-dimensional form (Finch & Putnam, 1977).


Colonial Williamsburg hangs quilts, bed-hangings, curtains, draperies, and other large flat textile objects individually on wooden poles (Johnson & Horgan, 1979; Solving storage problems, 1962). The poles are covered with several thicknesses of acid-free paper (Lanier, 1967) and are suspended on moveable pull-out racks (Johnson & Horgan, 1979). The Winterthur Museum stores their curtains and bedroom sets on drapery tracks suspended from the ceiling (Fikioris, 1973). Textile objects are hung on copper tubing covered with a buffer of acrylic or acryloid plastic and acid-free paper (Fikioris, 1973; Johnson & Horgan, 1979). A cotton backing, a felt interlining, and a cotton finish lining support the textile and provide a support for rings attached to drapery hooks while in storage (Fikioris, 1973). A pulley and rope system is used to remove and replace the textile from storage (Fikioris, 1973; Johnson & Horgan, 1979). This method eliminates folds and creases and maintains the object's usable shape (Buck & Leene, 1972).
Bed-spreads at the Winterthur Museum are hung over muslin-covered varnished wooden poles suspended by aluminum poles on a ceiling track (Craft and Vitale, 1979). This method provides accessible storage and limited handling. The Winterthur museum rejected flat storage for these objects because it would have required a large volume of storage space, large quantities of tissue, muslin and other archival materials to prevent wrinkling and creasing, and additional handling of the objects (Fikioris, 1973).

Vertical storage for curtains and bed hangings provides a way of preventing or minimizing creasing, wrinkling and folding resulting in less degradation (Johnson & Horgan, 1979; Solving storage problems, 1962). Hanging textiles prevents damage from excessive handling since viewing the textile requires minimal manipulation. In addition, the textiles are ready for exhibit without additional preparation.

With this vertical orientation, curtains, bed hangings and other textiles may sag or warp because of gravity. This vertical method also requires a large volume of overhead storage space (Lanier, 1967).

Vertical mounted storage

Mounting small and fragile textiles for vertical storage uses the same attachment methods as in horizontal storage. The difference between horizontal and vertical mounted storage is the orientation in which the mounts are placed. In vertical mounted
storage, the framed, mounted textile is placed in a unit or cupboard so that it rests on an edge of the frame.

In other mounts used in vertical storage, the object rests on a backing fabric stretched on a ridged frame or is sandwiched between transparent fabric or acrylic Plexiglass®. The latter method is a pressure mount (Kadolph & Vesterheim Norwegian-American Museum, 1990; Kajitani & Phipps, 1986; Lambert, 1983; Mailand, 1980). Kadolph and the Norwegian-American Museum (1990) pressure mounted a 17th century tapestry between two layers of UV filtered Plexiglass®. The Plexiglass® support was covered with muslin, polyester fiberfill batting and top layer of muslin. Both layers of muslin were pulled taut and stitched in place. The tapestry was unrolled onto the cushioned support, centered and covered with another piece of UV filtered Plexiglass® and framed in sealed oak (Kadolph & Vesterheim Norwegian-American Museum, 1990). Once the textile is supported by one of the aforementioned methods, it is secure enough to be placed in a slanted or vertical position and it is stable on or between the support surfaces. However, in a vertical position, strain from gravity continues to be a concern.

Slanted or diagonal storage is suitable for mounted or framed flat textiles. Diagonal storage requires more space than vertical storage of mounted objects, but decreases strain from gravitational pull (Buck & Leene, 1972; Lambert, 1983; Mailand, 1980). Interleafing acid-free tissue or cardboard between each mount
protects the textile, frame, and glass (Buck & Leene, 1972; Mailand, 1980). The vertical orientation also may pull at and stress stitching threads and sites (Lambert, 1983), but this method rarely requires additional support (Buck & Leene, 1972).

Accessory Storage

Accessories are stored in many ways depending on the object, available space, units, methods, materials, and staff expertise (National Park Service, 1990). Storage at Colonial Williamsburg for shoes, hats and other accessories is in clear plastic boxes, lined with acid-free paper (Keck, 1974; Lanier, 1967; Shelley, 1987; Solving storage problems, 1962), and stacked on metal shelving (Lanier, 1967). Giffen (1970) finds clear plastic boxes ideal since visual examination can be accomplished without handling objects. However, the clear plastic does not provide protection from light.

A custom-made box of acid-free cardboard with a Mylar® window also provides visual access to objects. This box is made by removing a piece of the acid-free cardboard from the top or side and replacing it with a piece of Mylar®, stapled or taped in place (Keck, 1974). If staples are used to attach the Mylar®, the ends should be covered with adhesive tape. Since the time of Keck’s article, most staff avoid using either staples or adhesive tapes with objects, and now sew the Mylar® window in place with button thread.

In the 1970s at the Chicago Historical Society costume collection, accessories such as purses, shoes and parasols were
stored in compaction units in 4" trays in drawers, thus providing easy access to objects. Trays used space efficiently with up to three layers of objects per tray (Johnson & Horgan, 1979; Watson, 1976). Trays and drawers also were used for fragile costume, shoes, and other accessories (Jachimowicz, 1977).

The Chicago Historical Society planned on storing their hats within cabinets with adjustable shelves, much like the system used at the Metropolitan Museum of Art. This type of storage provides easy visual observation (Jachimowicz, 1977). In 1978 the Society transferred hats supported by plastic cones and acid-free tissue paper into cabinets with adjustable shelves (Myers Larsen, 1978).

Storing hats in their original boxes or containers is not advisable. However, when hats are in any box, they should be padded-out and wrapped with acid-free tissue (Jachimowicz, 1977). Landi (1987) states an internal support is needed when storing hats. Recommendations are to store them on various height cones padded with acid-free tissue paper around the top to provide support at the hat's crown or band (Jachimowicz, 1977; Johnson & Horgan, 1979; National Park Service, 1990). This method minimizes pressure points, reduces handling and protects against dust (Shelley, 1987). The Metropolitan Museum of Art also used and recommended this method for storing hats (Blum, Date unknown; Shelley, 1987).

Another way to store hats is to purchase Styrofoam® or plastic headstands shaped to accommodate the hat (Dudley et al., 1979; Giffen, 1970). A buffering material would be needed to
protect the hat from possible out-gassing. When headstands are not available, Giffen (1970) recommends stuffing hats with tissue paper and boxing them in clear plastic for visual examination. Other materials used for an unspecified internal support for hats may be of cotton and acid-free ragboard (Shelley, 1987).

Costume accessories with three dimensional shaping or additional components such as stockings, gloves and fans are best stored flat in drawers lined with acid-free paper (Dudley et al., 1979; Glover, 1973; Harvey, 1963; National Park Service, 1990). Authors suggest storing fans in a closed position, in single layers in shallow drawers (Dudley et al., 1979; Giffen, 1970; National Park Service, 1990). The authors do not state if the fans are stored flat or on their side. A layer of fabric or Ethofoam® lining the drawer prevents sliding (Glover, 1973; Ontario Museum Association & Toronto Area Archivists Group, 1985; Smithsonian Institution, 1976). Storing fans in the open or flat position requires support of each rib at an appropriate angle (Buck & Leene, 1972; Dudley et al., 1979; Landi, 1987). The mount may be tissue paper (Finch and Putnam, 1977). Storing fans in an open position provides less strain on the leaves and eliminates creasing (Buck & Leene, 1972). Landi (1987) diagrams and provides procedures for making a fan board support.

Handbags and purses may be padded-out and wrapped with acid-free tissue to buffer the metal attachments from other materials (Landi, 1987; National Park Service, 1990). Authors
suggest storing gloves padded-out with tissue paper to eliminate strain and creases (Finch & Putnam, 1977; National Park Service, 1990). Other accessory objects can be stored in shallow drawers or lined shelves (Blum, Date unknown; Giffen, 1970).

For shoes and boots, stuffing to retain their original shape without straining the material is recommended (Giffen, 1970; National Park Service, 1990). Acid-neutral, acid-buffered or unbuffered paper should be used depending on whether the object is cloth or leather. Shoes and boots can be stored in drawers if the height will accommodate them or on covered shelves (Giffen, 1970). When drawers are used, a support should be used to stabilize the heel of some period shoes since they tend to be top-heavy. Shoes and boots may also be lined up along the bottom of a hanging cabinet, cupboard or wardrobe (Dudley et al., 1979). Sufficient space needs to be allowed between the costumes and the shoes so they do not abrade or touch one another. Preferably, the bottom of the unit is lined with acid-neutral tissue paper or Ethofoam®. Glover (1973) suggests alternative methods of storing shoes: using small individual boxes for pairs, securing a tie or wrap around pairs when in a large drawer with other pairs, or placing shoes on slanted shelves within a cabinet. Another recommendation is to pad-out and wrap shoes with acid-free tissue and place them in shallow boxes (National Park Service, 1990). These authors do not state if the shoes are placed flat on their soles or laid on their side.
For Lambert (1983) the positive aspects of supporting textile and costume accessories are ease of access and retrievability of objects and the possibility that the support system may be used in both storage and display. Disadvantages of support systems are the need for added space or special modifications of storage units, time required to make custom supports for each object, and materials available for support which may not be inert (Lambert, 1983).

Summary of Storage Practices

Storage practices vary according to existing facilities within collections. Ideally, storage provides a separate room or environment that is free of chemical and physical conditions that would alter objects. Storage should control environmental conditions by avoiding changes or fluctuations in either temperature or relative humidity and should protect from pests. Storage should provide enough space for units to house objects in uncrowded conditions and protect them from dust and light. Easy access to objects should be provided in a way to minimize handling.

The ability to locate objects in storage units is essential to their access and retrieval. Cross referencing in a card catalog, computer, or book and lists of objects stored in or near each unit assist in locating objects. Good documentation of the collection also minimizes handling and reduces searches to find an appropriate object.
Storage planning should be based on the function and organization of the collection. Storage must be well planned in order to accommodate both current and projected needs. Persons in charge of storage of textiles and costumes include curators, conservators, assistants, collection managers, storage specialists, museum specialists, and others. Staff attempt to provide storage facilities and develop methods that both minimize deterioration or degradation to objects and provide support for the object. The problems they encountered and limitations that exist are numerous.

Based on the review of literature, two primary and five secondary methods of storage were identified. Table 1 organizes these storage methods.

Table 1. Primary and secondary storage methods

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<thead>
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<th>Horizontal</th>
<th>Vertical</th>
<th>Accessory</th>
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<td>Flat</td>
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Each method presented in the table is defined here. These definitions are based only on information from the review of literature. Horizontal storage is a primary storage category. Storage in this method is in a horizontal orientation with the object in or on a horizontal plane. Flat horizontal storage places the
entire object level on the storage surface and requires a surface area equal to or greater than the surface area of the object. Rolled horizontal storage places the object around a tube which is supported in a horizontal orientation in various ways. Rolled storage requires less space than that of the surface area of the object. Flat folded horizontal storage bends and creases objects in various directions to decrease the flat surface area needed for storage while maintaining a flat orientation for each folded layer of the object. Thus, in flat folded horizontal storage, the space needed for storage is less than that of the surface area of the object. Vertical storage is another primary storage category. Hanging vertical storage uses a hanger which may be of a variety of materials, shapes and sizes. The hanger supports the object in some manner depending on the type of hanger used. Space needed for vertical hanging storage relates to the total front to back width of the hanger, padding, and object, and the combined height of the hanger and object. Accessory storage is the final primary storage category. Objects are placed flat or supported, in a manner dependent on the object. Mounted horizontal and mounted vertical storage attaches or places the object on or in a variety of fabrics, mat boards, frames and other supports. The object, once mounted, is either stored in a horizontal or vertical orientation and space requirements for storage are dependent on the orientation. Further refinements of these definitions based on the research are presented in the results chapter.
Decision Making and Storage

There is no research-based documentation for decision-making on storage of specific textile and costume objects. Johnson and Horgan (1979) and Lambert (1983) suggest decision-making procedures for planning general storage space and facilities within institutions. First, the institution's role must be defined; it may be multi-purpose including exhibition, education and research (Johnson & Horgan, 1979). Second, define the storage collection's role within the complete institution to determine the function of the collection (Johnson & Horgan, 1979; Lambert, 1983). Since thorough planning is rarely implemented in museums or collections, Johnson and Horgan (1979) state that these institutions "cannot adequately fulfill their selected roles. Unfortunately, in most cases it is the collection storage facilities which suffer the most" (p. 11). Thus, a comprehensive decision-making plan needs to be implemented for both institutions and specific collections. The decision-making model should address storage for specific textile and costume objects within collections.

Johnson and Horgan (1979) suggest a series of questions to determine the role of the collection based on the institution's role or specific to the collection as a whole. Once the role is established, use of the collection is addressed based on function, space requirements, policies of acquisition, and physical relationship to other collections. However, these authors have not developed a plan for determining storage of specific objects.
Lambert's (1983) procedures include analyzing the existing collection by quantity, type, fabrication, condition, size and origin to estimate the quantity and quality of storage needed. She does not clarify whether this is storage space for the facility or for the units themselves. On the other hand, Johnson and Horgan (1979) suggest that the amount of financial, staff and space support for the collection directly effects the amount and type of storage facilities available.

During the analysis of the objects, Lambert (1983), suggests performing a condition assessment of each object to determine any special needs. This comment acknowledges that a condition report is not always available (Lambert, 1983).

Lambert's (1983) next step is to determine the amount of physical space, location, climate controls, and security for the collection within the institution. This is suggested so that resources can be determined for implementing the renovation of old space or construction of new space. This planning step also should consider the collection's continued existence and growth. Growth may be difficult to determine since many institutions have an open collection policy (Lambert, 1983). Again, the function of the collection is a determining factor in estimating storage needs. Since resources usually are limited, a phased plan may be needed (Lambert, 1983).

Planning storage of objects may be determined by the type of objects and the purpose and use of the collection. If the special
storage needs of objects are not met, they will degrade and deteriorate so that they are not useful to the collection or the institution (Johnson & Horgan, 1979; Lambert, 1983) and the commitment to preserve and house objects for research, education and exhibition will not be fully met. However, neither planning model takes an object-specific approach.

Mullin and Roth (1991) state the process of making a decision may be based on normative decision theory, where recommendations are suggested about what choice should be made or how to reach a final outcome. An example related to storage would be the prescription to store a particular object by a certain method to achieve ideal conditions for that object.

Another theory on decision making is empirical decision theory. This theory bases decisions on a process of reality, what actually is, rather than on how things should be. The empirical decision theory is a descriptive model (Horowitz, 1990; Mullin & Roth, 1991). However, normative decision making may be relevant to empirical decision making since recommendations may be based on how a process was accomplished (Horowitz, 1990; Mullin & Roth, 1991). An example related to storage would be recommendations for storing a particular object in a horizontal orientation because that method had worked well in a specific collection. Other collections followed the recommendation, but the outcome was not the same since their circumstances differed. The outcome of the decision was not conducive to maintaining the object.
Although recommendations are that staff expertise and their professional, educational and practical experience be used to determine the basis for storage decisions (Lambert, 1983; National Park Service, 1990), no suggestions, guidelines or models are presented for use in this process.

Recommendations for methods of storing objects are based on fiber content, construction, shape, condition, finish, dyes, and presence of any other components. This set of criteria requires that each object be considered individually in order to select the appropriate storage (Harris, 1977; National Park Service, 1990). Some authors have developed recommendations for selecting a specific storage method. Glover (1984), Mailand (1980), the National Park Service (1990), and Shelley (1987) discuss vertical hanging, flat, or flat-folded storage and Fikioris (1976b) addresses rolled storage.

The decision making process for collection storage involves re-evaluation. The process and the outcome may be equally important, depending on the approach and theory used. The decision made depends on the theory and approach used. In collection storage, the main emphasis must be on the impact to the object. Periodic checking of the object and correction of problems are critical.

The focus of this research is on the impact of decisions which may evolve with time and additional research. The process of deciding how a specific object will be stored is unique to each collection and is not only a problem requiring a decision, but is also
an ethical question. Research is involved on the part of the staff to consult, review, and evaluate past and current storage methods specific to textile and costume objects. Objects need to be evaluated on a case-by-case basis rather than by grouping all objects together and determining a generic storage system. Generic systems may work for many objects, but specific objects may require special storage. Thus, objects should be evaluated for their specific storage needs. Although this may be impractical based on financial, staff and space support, the goal is to provide the safest storage possible.
METHODS

Literature related to current storage practices used in museums, university collections, and private collections of textile artifacts was reviewed as a means of identifying the research topic and the procedure for conducting the research. Literature on commercial products, materials used in storage of textile objects, the deterioration and degradation that occurs in textiles and costume objects during storage also was reviewed. Based on the review of literature, a need was identified for research-based information on methods of storing textile and costume objects in collections to minimize deterioration.

This research includes two major components: interviews of collection staff members who work in a hands-on capacity with textiles and costumes in storage and examination of objects within collection storage facilities. These objects were examined in their place in storage to record any evidence of deterioration or degradation that may have resulted from the method of storage. Two important limitations were recognized in this research. Fiber deterioration may not always be evident. Many factors in addition to storage may contribute to deterioration.

Instruments

Data collection instruments consisted of an interview schedule and an object examination form composed of several parts
(see appendix A for both data collection instruments). The researcher developed both instruments based on needs and concepts identified from the review of literature and personal knowledge developed through internships and other experiences working in museums and collections. Additional questions were suggested by the researcher's major professor.

**Oral interview schedule**

Part I of the oral interview schedule focused on collecting demographic information from specific staff members. The questions related to the individual's name, title at the institution, educational and professional background, and length of time in the current position (see Appendix A).

Part II was collection-specific. It consisted of questions pertaining to function and type of collection, access to objects by the public or the institution's staff, resource support (financial, staff, and space), description of existing storage facilities, type of objects, recommendations for ideal storage procedures, degree of satisfaction with available resources, and awareness of the relationship between storage facilities and the function or use of the collection.

**Object examination form**

Part I of the object examination form consisted of questions pertaining to the organization and function of the museum, current
storage facilities and units, storage methods and techniques, and use of archival materials in storage. These topics were addressed to obtain a basic understanding of how the collections were divided among individual departments within institutions and to determine the amount and type of storage materials used to store the textile and costume collections.

Part II focused on specific textile and costume objects, their manner of storage, current condition, and condition, if identified, at the time of acquisition. Original condition was recorded to evaluate change in condition from object acquisition to the present. In addition, all collection and care records that pertained to objects examined were reviewed and photocopied. Storage methods for these specific objects were examined to assess their effectiveness and usefulness.

During data collection, photographs were taken of the storage units, methods of storage, archival or supplementary materials, and the objects. Photographs were taken to supplement the data collection form and to record in a visual form the specific method of storage. The type of photograph taken of objects was determined by the condition of the object and the decision of the collection staff member. When objects were fragile or light sensitive or when the staff member preferred minimal handling of the object, photographs were taken while the object was in storage. When the object was in good condition, showed little or minimal deterioration, was capable of withstanding handling and light, and permission was granted by
the staff, photographs were taken outside the storage unit. Occasionally objects were removed from storage to avoid light exposure to other objects stored in the vicinity.

Sampling Procedures

Purposive sampling was used to obtain representative examples of collections within the central Midwest that had textile and costume collections. The sample did not focus on one type of collection so that the results of the research would reflect what was found in a range of collection types and could be applied across several collection types. Collections that maintained textiles and costumes were selected to provide examples of general purpose or art museums, university collections, ethnographic museums, and historical societies. Of these types of collections, the researcher purposely selected six collections based on prior contact with collection staff members through professional meetings and previous working relationships. Staff members of collections not known personally were contacted based on a recommendation by a faculty member or colleague. Initial contact with collections was based on the researcher's knowledge that there was a curator, conservator, or collection manager who was responsible for the collection's care and maintenance.

Originally four collection staff members were contacted by phone to obtain preliminary approval to collect data. Staff at all four collections agreed to participate in the study. Once permission
was obtained to collect data at the institutions, a schedule was established to visit the institutions for a period of one or two consecutive days. A visit of two consecutive days was preferred to allow for sufficient attention and time from the staff, and to expedite work with collections when travel to collection site took four hours or more from central Iowa. Following this initial contact, a letter was drafted and sent asking for formal approval and to confirm the two-day appointment for data collection at a time mutually convenient to staff and the researcher. A copy of the letter is included in Appendix B.

Human subject approval forms were developed according to Iowa State University procedures. Once human subject approval was obtained, data collection took place. An extension of time to collect additional data beyond what was initially proposed was granted in early February (see Appendix C).

Preliminary testing of the interview schedule was conducted in the Textiles and Clothing Department at Iowa State University. Staff members responsible for working with the department collection were interviewed. An oral, taped interview was conducted with one staff member; another filled out the interview schedule without being interviewed by the researcher. The interview schedule was not modified after this preliminary testing. Preliminary testing of the object examination form was not conducted. However, the form was examined by professional colleagues who work with storage of textile and costume
collections. Changes in the object examination form were based on discussions between the professionals and the researcher. With these refinements, data collection began.

Data Collection

Data collection took place over an eight week period during January-March, 1992 in the upper Midwest states of Iowa, Illinois, Wisconsin, and Minnesota. Telephone confirmation of the scheduled appointment was done prior to traveling to the institutions. There were no changes in the scheduled appointments. Upon arrival at the institution, security was contacted who, in turn, notified the initial contact staff member. Specific interview schedules with all the appropriate parties were arranged within the two day time period. Interviewees were selected based on the following criteria: had knowledge of the textile and costume collection, worked with the collection or storage facilities, and was a paid employee. These criteria were used so that interviewees were the people most responsible for the condition of objects. The researcher preferred that the interview be conducted prior to object examination so that rapport could be established between the researcher and the interviewee. In addition, after obtaining information on the interview schedule, the researcher had an understanding of the interviewee's working knowledge of the collection. The information on the questionnaire also reflected how the interviewee handled or worked with the collection (see Appendix A).
Individuals were identified for supervising data collection in the collection work and storage areas. Data collection in the textiles and costumes storage areas and access to documentation was conducted at the staff's convenience.

**Interview**

During data collection, 11 of the 14 interviews were conducted prior to examining objects in the collection; 3 of the interviews were conducted after examining objects in the collection. The interview was conducted in a setting that was comfortable for the interviewee, usually in a private museum office or within the storage area. Five of the interviews were conducted with no interruptions, four were interrupted at least once, and five were interrupted two or more times. Interruptions may have contributed to questions not being thoroughly answered or to disruption of the interviewee's train of thought. The interviews ranged from approximately 30 minutes to 2 hours, with an average interview length of approximately one hour. The interview schedule was used to ask questions in a similar order and manner to all interviewees. Interviews were taped and notes were taken to supplement the taped interviews.

**Object examination**

Method of storage was the primary factor addressed when selecting specific textile and costume objects for collecting data.
Vertical and horizontal storage were the primary storage orientations examined (see Table 1, page 60).

Changes in the predetermined protocol occurred when a collection did not have examples of all primary storage orientations or had developed specific secondary storage methods. Storage categories were eliminated, substituted, or added as needed. Policy at all collections required that a staff member attend the researcher during object examination.

Six interviewees assisted the researcher during object examination. Other staff members who assisted the researcher during object examination were not interviewed since they did not meet the interview requirements discussed earlier.

Selection of the specific textile or costume object was considered next. Whenever possible, object type was consistent across collections. However, length of time the object had been in the collection was not a factor used in selecting objects. Within each method of storage, the researcher requested specific object categories to examine, with the expectation that objects would be present in each museum (see Table 2).

Consistency of objects across collections provided another means of determining if the storage method had an impact on the object. When consistency was not possible, an object was chosen based on its similarity to other objects examined, that it fulfilled the storage category needed, or that the staff member recommended
it. When a collection had multiple examples of one object-method combination, another object-method was examined (see Table 2).

Consistency of objects across collections provided another means of determining if the storage method had an impact on the object. When consistency was not possible, an object was chosen based on its similarity to other objects examined, that it fulfilled the storage category needed, or that the staff member recommended it. When a collection had multiple examples of one object-method combination, another object-method was examined (see Table 2).

Originally, five to ten objects were to be examined per method of storage. Visits to each collection for a period of one or two consecutive days were expected to allow time to examine approximately forty objects. The actual number of objects examined in each collection ranged from 12 to 22 and included at least three objects from each storage method in each collection (see Table 3). This change in protocol was necessary because of the restricted time available for supervising examination of objects, time needed for interviews with staff members, accessibility of storage areas or units, retrievability of objects, examination of objects in storage or on a work surface, photodocumentation of storage and object, and retrieval of additional information for each object. Thus, two additional collections were contacted and used in the study to increase the size of the data set. Procedures followed with these two collections were the same as those discussed earlier.
Table 2. Specific object categories by storage methods

<table>
<thead>
<tr>
<th>Objects</th>
<th>Horizontal</th>
<th>Supported</th>
<th>Vertical</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Flat</td>
<td>Rolled</td>
<td>Folded</td>
</tr>
<tr>
<td>Tapestry</td>
<td>1</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>Furnishings</td>
<td>1</td>
<td>5</td>
<td>12</td>
</tr>
<tr>
<td>Flag</td>
<td>3</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Flat</td>
<td>1</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Dress</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Other</td>
<td>3</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Shoes/Boots</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Fans/Hats</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>10</td>
<td>19</td>
<td>25</td>
</tr>
</tbody>
</table>

*aQuilts, coverlets, and other household textiles.

bItalian textiles, brocades, Guatemalan textiles, and a mola.

cDresses, bodices, and skirts.

dSampler, robe, chasuble, dalmatic, scarf, apron, and paisley shawls.

Individual data collection forms were used for each object examined. When information was recorded on tags attached to objects, that information was written on the data collection form during examination. Additional collection records for specific objects examined were photocopied and attached to the data collection form.
Table 3. Storage methods by collections

<table>
<thead>
<tr>
<th>Collection</th>
<th>Horizontal</th>
<th>Supported</th>
<th>Vertical</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Flat</td>
<td>Rolled</td>
<td>Folded</td>
<td>Flat</td>
</tr>
<tr>
<td>A</td>
<td>0</td>
<td>6</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>B</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>C</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>D</td>
<td>0</td>
<td>5</td>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td>E</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>F</td>
<td>3</td>
<td>0</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>10</td>
<td>19</td>
<td>25</td>
<td>9</td>
</tr>
</tbody>
</table>

Photographs to document collection storage units, methods of storage, archival materials used, and condition of objects examined were taken by the researcher and developed professionally. A Canon AE-l, 35 millimeter camera and Kodak TMax, 400 ASA black and white film was used. Contact sheets of photographs were examined to supplement object examination forms.

Development of Storage Categories and Condition Assessment

Literature was reviewed to understand what is considered horizontal and vertical storage. Many authors have categorized their terminology using the method of storage. For example, a drawer is used to stored folded objects, but an author may consider the method flat. This researcher has used the definitions listed in the review of
literature. Horizontal storage included flat, rolled, folded, mounted; vertical storage included hanging and mounted; and accessory storage had no secondary methods. While examining objects during data collection, the researcher identified two secondary methods for accessory storage; they are supported flat and supported on the side. Thus, accessory storage becomes a secondary method in the primary horizontal storage method and is eliminated as a primary method.

Originally objects were examined and categorized based on the broad categories of storage methods presented and defined in the review of literature: horizontal: flat, rolled, folded, mounted; vertical: hanging, and mounted. During data collection the researcher began to clarify and develop the specific methods listed above and added a tertiary level incorporating methods and materials used in storage.

During object examination, storage units were described by their type, material and finish (see Appendix A). Methods of storing objects were described based on the categories presented in Table 1. Supplementary materials were identified as archival or non-archival.

Current condition of storage areas was described noting location, climate-control, room maintenance, storage units, method of storage and relationship to objects. Photographs were examined to supplement written comments.

Current condition of objects was described in detail on the object examination form based on physical appearance, especially
the relationship between object and storage unit, method of storage and packing materials. During object examination, objects were evaluated carefully and examined closely to identify any deterioration, abrasion, holes, tears, pulls or stress lines, folds, creases, wrinkles, stains, fading, dust or dirt, or other alterations of appearance regardless of the source. Staff members' manner of object retrieval and handling also were observed. Observations were made as to what happened to objects during retrieval such as sliding or swaying, compaction against other objects, rubbing on storage units, tipping of boxes, and so on.

Careful comparison were made between notes taken during object examination and condition records copied from the documentation files. This information was used to assess the impact of storage on the object's current condition. If object records did not specify condition at time of accessioning, the researcher had to judge the impact of storage. Caution was exercised to limit cause and effect relationships unless it was obvious, such as items swinging free when cupboard doors were opened. Much of the damage observed was apparently not due to storage. To illustrate, creases in items were not identified as relating to storage unless a direct cause and effect relationship were obvious, such as when a crease precisely matched folds in padding materials or when the staff member indicated that folds and
creases were due to a previous storage method. Thus, in the results chapter, object condition is reported first; second, problems related to storage are discussed.

Data Analysis

Analysis of interview data began with assigning letter and number codes to provide anonymity to collections. Taped interviews were transcribed; responses of all interviewees were grouped by question. Statements were combined and analyzed qualitatively to determine similarities and differences among respondents.

Data from the object examination forms were combined based on primary, secondary and tertiary methods within each individual collection. Data from primary and secondary methods were examined to determine similarities and differences across collections. Data were reported by generalizing across collections and summarizing data recorded during interviews and object examinations. Finally, personal observations were recorded.

Development of Decision Making Criteria for Storage

Based on the information from the review of literature, interviews and object examinations, conclusions reached, and study of theories of decision making, an empirical model for decision making was used to develop the model presented in the results. The researcher tested the model using an object examined in the research. No revisions were necessary. However, complete testing,
evaluation, and refinement or modification of the model will require additional research, application and follow-up evaluations by practitioners in museums and collections with textile and costume objects.
RESULTS

This chapter compiles information obtained through interviews with staff members at six collections and examination of selected objects in these collections. Interviewees' current titles, education and professional backgrounds are identified. This compilation also discusses collections' functions, type, access to and retrieval of objects, support, type of storage facilities, units, methods of storage and object types. Results are summarized for the open-ended questions concerning preferences for ideal storage, satisfaction with space and staff available for the collection and any impact storage facilities have had on the staff or objects. Finally the researcher summarizes personal observations, describes storage methods and the impact of storage on objects, and proposes a decision-making model specific to objects.

Summary of Interviews

Interviews were conducted with staff members at six collections. Types of collections consisted of one ethnographic museum, two historical society collections, two university collections, and one art museum. These collections will be designated with the letters A through F in tables; see Appendix D for a description of the collections.
Interviewees

A total of 14 interviews were conducted. Number of interviews conducted at each collection were one at the ethnographic museum, six at the historical societies, five at the universities, and two at the art museum. Titles of staff members interviewed included three curators, two research assistants, and one each for chief curator, curator/administrative program manager, curator/professor, registrar/curator, assistant curator, curatorial assistant/exhibit specialist, conservator, associate conservator, and storage technician. Each person interviewed met the criteria identified on page 72.

Their educational backgrounds included: four bachelor of science, eight bachelor of art, one bachelor of fine art, three master of science, six master of art, three museum practice degree, and three doctor of philosophy. One interviewee had post graduate work; one interviewee did not respond to this question.

All but two had some previous work experience including: volunteer, site interpreter, intern, exhibit crew, record keeper, museum aide, technician, and freelance work. Eight had professional work in education with a historical emphasis. Other interviewees had worked in other capacities before attaining their present positions: curatorial consultant, curatorial assistant, curator, apprentice fiber artist, conservation technician, conservator, assistant registrar, and registrar.
Length of time in current positions ranged from six months to sixteen years. Four interviewees had been working less than one year, four interviewees one to two years, three interviewees two to four years, and three interviewees five to sixteen years.

**Collections general information**

The description of textile and costume collections varied depending on the collection and the interviewee. The ethnographic collection included textiles, costumes and multicomponent objects. Historical society collections included men's, women's and children's fashion from 1800 to present, military uniforms, and household linens and textiles of the city or region. University collections included Midwest and ethnographic textiles and costumes and some contemporary objects. The art museum collection is encyclopedic and includes an emphasis on technique, construction, and fabric types of textiles, ethnographic and European textiles.

All collections use the three or four part nomenclature numbering system of standard year, donor, object and pieces when accessioning and cataloging their objects. Adoption of this numbering system ranged from the early 1980s to 1987. Previous numbering systems included codes for technique and provenance or systems that were not explained. Table 4 summarizes interviewees' perceptions of the collection's function and descriptions of use.
Table 4: Function of collections and description of use

<table>
<thead>
<tr>
<th>Function</th>
<th>Number of Collections</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exhibit and provide or assist in research</td>
<td>11</td>
</tr>
<tr>
<td>Document cultural heritage</td>
<td>3</td>
</tr>
<tr>
<td>Warehouse significant objects</td>
<td>2</td>
</tr>
</tbody>
</table>

**Description of Use**

<table>
<thead>
<tr>
<th>Use</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Educational</td>
<td>9</td>
</tr>
<tr>
<td>Working</td>
<td>5</td>
</tr>
<tr>
<td>Closed</td>
<td>2</td>
</tr>
</tbody>
</table>

Use and access to collections were discussed; interviewees had different opinions as to what qualified as closed or open storage. Access to objects was identified as either closed or open: four interviewees had closed collections, six interviewees had moderate access, and four interviewees had open access.

Closed storage was indicated to be storage that was off-site or not accessible for individuals to conduct research in the storage area. When objects are hard to access, storage may be considered closed. Permission to use collections may be difficult to attain and the collection is considered closed to persons other than selected museum staff. However, for legitimate and important research, access may be allowed if proper channels are followed and there is minimal handling and movement of objects.
Open access storage policies have limits based on staff members' criteria. Access is considered open when documentation such as catalogs, slides, photos, and video discs can be used prior to retrieving an object from storage. Open storage allows research by qualified individuals and access by staff members. One collection states that files are open, but storage is closed. Four collections try to accommodate all people, tours, colleges, public outreach, designers, and families of donors.

All collections supervise all visitors. Six of the fourteen interviewees identified exceptions to this policy based on the decision of the staff member and the visitors' qualifications.

Support for collections

General financial support comes from the museum or collection budget, state budget, endowments, support groups or foundations, general operating funds, development funds and monetary gifts. Budgets may be supplemented by private funds; foundations; city, state or university monies; or endowments. Money provided from fundraising supports several collections and is obtained in a variety of ways including: silent auctions; donor balls, fashion shows, department store events, newsletters; call-a-thons; brochures describing needs; and personal contacts. Interviewees did not volunteer information regarding the effectiveness of these activities.
Grants are another way budgets are supplemented. Five of the six collections have applied for and four of the six have received National Endowments for the Humanities, National Endowments for the Arts, Institute for Museum Services grants and other smaller institutional grants. Other money is in the form of gifts and special projects. These monies are used for exhibits, initialization of new projects, full time and temporary staff positions, internships, infestation control, computers, and special storage equipment.

Funding that is available for storing the collection may come from the museum budget. Included in storage costs are devices for monitoring, climate-control and safety in storage rooms, remodeling storage units, supplies, and photography of objects.

Staffing support varies by collection. In this study, historical societies had the greatest staff support and ethnographic and university collections had the smallest staff support. In five of the six collections, staff support is supplemented by volunteers, work study students, and unpaid interns; they stuff envelopes, work on clipping files, file, help with rehousing collections, or work on special projects in the collection, registration department, or library. Table 5 summarizes both paid and volunteer staffing.

**Recommended ideal storage**

Staff members prefer dedicated storage space that is a sealed, monitored, climate-controlled, and secure environment. Because of its minimal impact on objects, flat storage is preferred over any
Table 5. Staffing by collection

<table>
<thead>
<tr>
<th>Position</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Curator(^a)</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>Assistant Curator(^b)</td>
<td>3</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Conservator</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Professional Staff(^c)</td>
<td>2</td>
<td></td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Others(^d)</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Student/Intern(^e)</td>
<td></td>
<td>5-7</td>
<td>.5</td>
<td></td>
<td></td>
<td></td>
<td>5.5-7.5</td>
</tr>
<tr>
<td>Temporary Staff(^f)</td>
<td>.5</td>
<td>1-2</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td>4.5-5.5</td>
</tr>
<tr>
<td>Volunteers</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1.5</td>
<td>15-18</td>
<td>2</td>
<td>6</td>
<td>1.5</td>
<td>7</td>
<td>33-36</td>
</tr>
</tbody>
</table>

\(^a\)Chief Curator, Curator/Department Head, and Professor/Curator.
\(^b\)Associate Curator, and Curatorial Assistant.
\(^c\)Collection Manager, Registrar, Assistant Registrar, and Cataloger.
\(^d\)Administrative Assistant and Secretary.
\(^e\)Half-time Research Assistant and Work Study Students.
\(^f\)Half-time Temporary Assistant, Special Project Positions, and Temporary Exhibit Positions.
other type even though it requires more space and supplies. Staff members prefer shallow custom units that house one object per shelf or drawer. Folding or boxing of objects is not recommended by most staff, even though they use these methods in their collections because of space, staff, and other restrictions. Objects should be in stress-free positions, stored so handling is minimized, and not effected by fluctuations of temperature and humidity. Objects should be stored low, no higher than eye level. Abrasion and vibration should be eliminated. Some staff prefer specific materials for units, usually a coated metal of some type. Other preferences relate to housekeeping and preparation for disasters.

Most staff members are striving for ideal storage conditions. Table 6 summarizes their recommendations for storage. However, even after rehousing and purchasing new storage units they have not yet met all their ideal conditions.

Satisfaction with current storage

When asked if staff members were satisfied with space available for their collection, seven of fourteen interviewees are satisfied with the space while two were not satisfied. Five staff members did not respond to this specific question. Concerning staff available for the collection, while five of fourteen were satisfied, five were not satisfied and four interviewees did not respond. Areas where staff members suggested improvements related to space and staff available for the collection. Impact of these suggestions,
Table 6. Recommended storage by collection**

<table>
<thead>
<tr>
<th>Method</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flat</td>
<td>BC</td>
<td>*P</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*M</td>
</tr>
<tr>
<td>Rolling</td>
<td>O</td>
<td>LS</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Folded</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hanging</td>
<td>C</td>
<td></td>
<td></td>
<td></td>
<td>*M</td>
<td></td>
</tr>
<tr>
<td>Boxed</td>
<td></td>
<td>F</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

*Recommended, but object type not specified.

**Blank indicates no specific recommendation identified.

B = Banners.
C = Costume.
F = Furs.
L = Paisley shawls.
M = Compaction unit.
O = Coverlets.
P = Preferred for most objects.
S = Scarves.
X = Advise against.
especially related to space, on the function of and working with the collection is a major concern since access and retrieving objects is essential for ideal storage. Each collection is in the process of providing better storage conditions for their textile and costume objects. Recognition of the problems with basement and top-most floor storage and lack of complete documentation for objects were identified as additional areas of dissatisfaction with storage (see Table 7).

Table 7. Satisfaction with storage by collection

<table>
<thead>
<tr>
<th>Changes preferred</th>
<th>Collection</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>More of one type of storage</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Modify current storage</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>More staff time</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reconsideration of past storage which created problems</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Storage area amount not ideal</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>More work space needed&lt;sup&gt;a&lt;/sup&gt;</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>More documentation</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage methods not ideal</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Alter function of collection</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

<sup>a</sup>For packing and unpacking, research and cataloging.
Current storage does not necessarily reflect what is ideal or the method preferred by staff members. They are trying to store objects in the best possible method relative to available funding, staff, and space. If an object is being damaged by the method of storage, staff will address the problem as soon as possible. At present, there is little time for preventative conservation, but initial conservation reports are now done.

Limitations related to incomplete documentation for and descriptions of objects hinders access and research. In order to work with the collection, staff need documentation. Ease of access and retrievability of objects are goals for which collections are striving.

Object Examination

During object examination, additional general observations of storage facilities were made. These general observations briefly describe what the researcher saw. They are presented here before discussing horizontal and vertical storage.

Collections need to have a dedicated space that is climate-controlled. Objects need to be stored with proper techniques and periodically checked and re-stored. Archival materials are needed to assist in the preservation of objects and objects need to be easily accessed since they are critical components of storing objects safely. Adequately sized units and devices are needed.
Good documentation and proper labeling are needed. Collection growth should be done in a slow, organized and discriminating way so objects can be cataloged completely and stored properly. Storage needs to be very organized and well planned. Work and preparation areas in the storage area puts the collection at risk.

**General storage in collections**

Records were examined for initial condition and past treatment of objects. Objects had descriptive documentation to assist in recognizing and describing the objects.

Space allocated to storage, environmental conditions and square footage in the six collections varies significantly. Table 8 reports storage space by collection. Existing storage facilities range from a small room with air conditioning formerly used as a class-room, to a large warehouse-type room with climate-control to a clean and stable former fall-out shelter used for temporary storage.

Four collections have climate-control storage conditions; two do not. Three collections have storage in the basement; the other three have storage in the top-most floor of a building. Two collections have had difficulties and misfortunes associated with storage in one of these high risk areas: flooding, leaks from water pipes, and absence of or regulation of climate-control. Two collections are experiencing problems because walls, ceiling and
Table 8. Storage space by collection

<table>
<thead>
<tr>
<th>Collection</th>
<th>Number of Rooms</th>
<th>Storage Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1</td>
<td>*TSEX</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>TSEC</td>
</tr>
<tr>
<td>B</td>
<td>1</td>
<td>*BLEC</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>*TSEPX</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>OPXC</td>
</tr>
<tr>
<td>C</td>
<td>1</td>
<td>*TSEXC</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>TSEC</td>
</tr>
<tr>
<td>D</td>
<td>1</td>
<td>*BLMXC</td>
</tr>
<tr>
<td>E</td>
<td>1</td>
<td>TASEXC</td>
</tr>
<tr>
<td>F</td>
<td>1</td>
<td>*BLMXC</td>
</tr>
</tbody>
</table>

* = Climate controlled.  
A = Air-conditioned.  
B = Basement.  
C = Costume.  
E = Separate space.  
L = Large room.  
M = Combined space.  
O = Off-site storage.  
P = Temporary storage.  
S = Small room.  
T = Top-most floor.  
X = Textiles.
floors were not coated with a sealant and particles of building material are settling onto storage units and objects. In addition, temperature and humidity fluctuate.

Two collections had textile and costume objects stored in spaces with other objects. These two collections found more dust and dirt since work on objects is performed in these areas. Access to objects is open to all staff members which inhibits security.

Storage units in collections

Storage units for textiles and costume collections range from non-archival boxes to current top-of-the-line inert units of aluminum or stainless steel. Collections make-do with inherited storage units or furniture originally intended for another purpose. Other collections have made their own storage units from inert products or have purchased custom-made units specifically for their collection. Units are stationary, moving or compacting. Drawers, shelves, rolled units, hanging units, and other units are made of enameled metal, aluminum, stainless steel, or wood. Boxes are made of archival and regular non-archival cardboard. Hangers are made of plastic or wood and are padded or not padded. Materials used in storing objects are of archival quality tissue, paper, foam core, Ethofoam®, and muslin. Other materials used include non-archival plastics, tissue and paper. Table 9 summarizes the units used for storage in these collections.
**Table 9. Storage units by collection**

<table>
<thead>
<tr>
<th>Units</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Drawers&lt;sup&gt;a&lt;/sup&gt;</td>
<td>*MFU</td>
<td>CV</td>
<td>CMV</td>
<td>*X</td>
<td>M</td>
<td>*AM</td>
<td></td>
</tr>
<tr>
<td>Shelves&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
<td>C</td>
<td>*A</td>
<td>I</td>
<td>S</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rolled Unit&lt;sup&gt;b&lt;/sup&gt;</td>
<td>*R</td>
<td>C</td>
<td>*X</td>
<td></td>
<td>KD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Support</td>
<td>G</td>
<td>KW</td>
<td>GK</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tubes</td>
<td>HU</td>
<td>HNU</td>
<td>HU</td>
<td>NU</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hanging Unit&lt;sup&gt;b&lt;/sup&gt;</td>
<td>*I</td>
<td>I</td>
<td>*I</td>
<td>I</td>
<td>KE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rod</td>
<td>G</td>
<td>W</td>
<td>W</td>
<td>G</td>
<td>KE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hangers</td>
<td>PQ</td>
<td>WL</td>
<td>PZU</td>
<td>PWUQZ</td>
<td>PWUQZ</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boxes&lt;sup&gt;c&lt;/sup&gt;</td>
<td></td>
<td>HUL</td>
<td>HU</td>
<td>HUF</td>
<td></td>
<td>*NUL</td>
<td></td>
</tr>
<tr>
<td>Other&lt;sup&gt;d&lt;/sup&gt;</td>
<td>B</td>
<td>*FL</td>
<td>*AY</td>
<td>*AY</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup> Aluminium, enameled metal, steel, and stainless steel.

<sup>b</sup> Metal and wood.

<sup>c</sup> Archival and non-archival.

<sup>d</sup> Stainless steel baking pans and aluminum trays.

*Custom-made.

A = Aluminum.

B = Baking pans.
C = Compaction unit of enameled steel or metal.
D = Painted.
E = Enameled.
F = Foamcore.
G = Galvanized steel conduit pipe.
H = Archival.
I = Stationary.
K = Metal.
L = Plastic sheeting or dry cleaner bags.
M = Map drawers.
N = Non-archival.
O = Other.
P = Plastic.
Q = Not padded.
R = Rolling.
S = Stainless steel.
T = Steel.
U = Ethofoam®, tissue, paper, polyester batting, muslin.
V = Moving.
W = Wood.
X = Enamel, electrostatically applied.
Y = Trays.
Z = Padded.
Storage units used in collections were all shapes and sizes and made of various materials. Units included stationary, mobile, simple, complex, sophisticated, custom-made and generic commercially manufactured ones. Many units have been adapted to make them physically inert and as chemically safe as possible. Storage units included cardboard boxes; steel, metal, or wood shelving; and drawers and cupboards of wood or metal. These units ranged in age from new, contemporary ones to ones that have been in use for many years. Because of staff concerns with wood, most wood units have been coated with a barrier of some kind and lined with either muslin or acid-free paper. In collections where units are higher than eye level, problems with access, retrievability, and periodic maintenance checks exist.

When using boxes for storage, extra movement of objects during retrieval occurred. Objects in boxes had shifted indicating that they had been tipped or jarred at some time.

Clear plastic bags were used in one collection, but no problems were identified. Collections used unbleached and washed textiles as a buffer in storage units. Cotton or fiber batting also was used in storage to cushion costume or folded textiles or to pad-out hangers. Acid-free buffered and unbuffered tissue and paper, L-tissue, and an unidentified wax-like paper also were used as buffers between the object and storage unit or device, objects, and for other storage uses. Problems related to the use of too little or too much of these materials were identified.
Many objects were at risk because archival materials were not used. Objects moved or slid along the surface and were subject to abrasion damage, compaction, and wrinkling.

**Type of object and storage method**

Number of objects examined in each storage method were: 25 horizontal folded, 19 horizontal rolled, 14 horizontal supported on side, 13 vertical hanging, 10 horizontal flat, 9 horizontal supported flat, and 1 vertical mounted. Thus, even though flat storage is considered by most professionals to be the ideal way to store textile and costume objects, other methods were used more frequently in this study. This may relate to the practical limitations presented by floor and building space, budgets, staff time and other restrictions.

Objects were grouped by the manner in which they were stored. This section summarizes storage methods with horizontal methods presented first, then vertical methods. Table 10 organizes storage methods into three levels.
Table 10. Primary, secondary, and tertiary storage methods

<table>
<thead>
<tr>
<th>Horizontal</th>
<th>Vertical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flat</td>
<td>Hanging</td>
</tr>
<tr>
<td>Archival material</td>
<td>Padded</td>
</tr>
<tr>
<td>No archival material</td>
<td>Not padded</td>
</tr>
<tr>
<td>Rolled</td>
<td>Mounted</td>
</tr>
<tr>
<td>Suspended</td>
<td>Pressure</td>
</tr>
<tr>
<td>Resting on roll</td>
<td>Stitched</td>
</tr>
<tr>
<td>Folded</td>
<td></td>
</tr>
<tr>
<td>Cushioned</td>
<td></td>
</tr>
<tr>
<td>Not cushioned</td>
<td></td>
</tr>
<tr>
<td>Mounted</td>
<td></td>
</tr>
<tr>
<td>Stretched between bars</td>
<td></td>
</tr>
<tr>
<td>Mounted on a rigid form</td>
<td></td>
</tr>
<tr>
<td>Supported</td>
<td></td>
</tr>
<tr>
<td>Flat on bottom</td>
<td></td>
</tr>
<tr>
<td>On side</td>
<td></td>
</tr>
</tbody>
</table>
Examination of Objects and Storage Area

**Horizontal flat storage**

Various textile and costume objects were stored in horizontal flat storage. The ten objects stored flat and examined in this research are listed in Table 2, page 76. Storage units included map cases and 12 inch deep drawers, trays, muslin stretchers, foam core boards and non-archival cardboard boxes sealed in plastic sheeting. Refer to Table 9, pages 96 and 97 for storage units.

Objects were stored with archival material which included foam core board, grey board, tissue, muslin and bias tape. Seven objects were layered with other objects three to sixteen deep. Three objects were not interleaved with an archival buffer material and had heavier objects layered on top of them.

Objects' current physical condition was examined. All objects, but one, were examined in detail by the researcher. This object was examined in a superficial manner only since it was not totally accessible due to the discretion of the collection staff member. One object had no apparent damage. The other nine objects had yellowed or faded or had bullet holes, mended tears, frayed edges, or dye transfer stains. Folds and creases were apparent from previous storage; new ones had appeared. Painted areas of flags had cracked, apparently due to aging and stress from previous rolled and folded storage. Dust and dirt were apparent on the visible portion of the
superficially examined object since it had not been covered with a protective layer.

Objects also were examined for evidence of condition related to storage. Four objects did not show any signs of damage or degradation from storage. However, for two objects, previous methods of storage were apparent because old fold lines and creases remain even though objects had not been stored in that manner for several years. Figure 1 shows evidence of fold lines from previous storage. In addition, two objects showed apparent signs of damage from current flat storage. Examples are objects stored between two layers of tissue and foam core with creases that match folds in

Figure 1. Object currently stored flat, evidence of previous folded storage
tissue. Apparently, folds caused pressure in those areas so that objects molded around the tissue. Problems identified for the 10 objects in this storage category are summarized in Table 11.

Table 11. Problems identified in horizontal flat storage

<table>
<thead>
<tr>
<th>Type of problem</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Object shifts with no archival material</td>
<td>3</td>
</tr>
<tr>
<td>Stress and compression from storage materials</td>
<td>4</td>
</tr>
<tr>
<td>Dust and dirt</td>
<td>1</td>
</tr>
<tr>
<td>Sagging of support</td>
<td>1</td>
</tr>
<tr>
<td>Distortion of fabric for other reasons</td>
<td>1</td>
</tr>
<tr>
<td>Abrasion from storage unit</td>
<td>2</td>
</tr>
<tr>
<td>Folds and creases from past storage</td>
<td>2</td>
</tr>
<tr>
<td>Not accessible</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
</tr>
</tbody>
</table>

Observations of problems in storage include shifting when drawers were opened. Objects stored layered in map drawers did not show any obvious signs of damage from this method of storage. However, compression from weight of layered objects and abrasion from excessive handling and the drawer above may be occurring. Another concern is that objects may distort when they are folded and not stored flat.
Layering of flat objects examined in this study presented problems due to excessive compression, abrasion, and transfer of dye, fiber, soil or other material. Although authors suggest fragile and lighter weight textiles and costumes be placed on top of heavier and more stable objects (Finch & Putnam, 1977; Mailand, 1980; National Park Service, 1990; Shelley, 1987), this was not always the case.

**Horizontal rolled storage**

The 19 objects examined in this storage category are listed in Table 2, page 76. Units for storing rolled objects in a horizontal orientation include open roll-away stacked storage, compaction high density units, cupboards with slide-out drawers, wooden slatted rolling units, bottoms of hanging storage units and cardboard boxes. Refer to Table 9, pages 96 and 97 for storage units.

Fourteen objects were rolled face-out; five objects were rolled face-in. Fifteen objects were rolled onto acid-free tubes and four onto cardboard tubes. All tubes, but one, were buffered with acid-free paper, tissue or fabric. Fifteen objects were rolled with interleaving tissue or paper for protection or to even out pressure from skewed objects or those with sleeve attachments from exhibits. All objects were secured with muslin ties, and 16 were covered with a muslin, tissue, or paper sleeve. Four objects were suspended and stored in cardboard boxes, covered and sealed in plastic. Three objects were rolled together on one tube, wrapped in
muslin and secured with unbleached bias tape ties. Boxes had Ethofoam® on the length-wise ends to suspend the wooden dowel supporting the archival tube. One object was wedged between dowels and was touching other objects. Other materials used in rolling objects included: cotton batting, a white cotton sheet, and a white flannel-like towel.

Objects current physical condition was examined. All objects, but four, were examined in detail by the researcher. Ten objects had no apparent damage. Five objects had dye transfer or unknown substance stains, holes and tears. Fold and crease lines were apparent from previous storage; new creases had appeared.

Objects also were examined for evidence of condition related to storage method. Six objects did not show any signs of damage or degradation from storage. However, for one object, previous storage may have contributed to staining from non-acid-free paper. Problems identified for the 19 objects in this storage category are listed in Table 12.

Problems exist when more than one object is stored on the same tube with multicomponent objects. A slight pressure or indentation mark is apparent even though objects were interleaved with tissue. Pins in selvages have indented other areas of an object when it was rolled. Stress marks are evident where the pin was located. In addition, objects rolled with uneven pressure or at an angle had creasing, strain and sagging. One object that was stored
Table 12. Problems identified in horizontal rolled storage

<table>
<thead>
<tr>
<th>Type of problem</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>No archival material</td>
<td>1</td>
</tr>
<tr>
<td>Stress and compression from storage materials</td>
<td>3</td>
</tr>
<tr>
<td>Stress and compression from other objects</td>
<td>2</td>
</tr>
<tr>
<td>Stress at pins</td>
<td>1</td>
</tr>
<tr>
<td>Dust and dirt</td>
<td>1</td>
</tr>
<tr>
<td>Damage from light</td>
<td>1</td>
</tr>
<tr>
<td>Vibration from racks</td>
<td>1</td>
</tr>
<tr>
<td>Bending or sagging of support</td>
<td>1</td>
</tr>
<tr>
<td>Creasing from rolling</td>
<td>2</td>
</tr>
<tr>
<td>Abrasion from other objects</td>
<td>1</td>
</tr>
<tr>
<td>No protection in storage</td>
<td>1</td>
</tr>
<tr>
<td>Not accessible</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>16</strong></td>
</tr>
</tbody>
</table>

face out in an open rack with no archival materials for protection was dusty and dirty and showed signs of damage from light.

None of the objects showed signs of damage or degradation from vibration, but the potential exists. An example would be objects stored on pull-out racks that vibrate and do not pull out easily. Two objects were protected with a covering but touch; abrasion and compression may occur.
Long objects require a thicker tube or need to be rolled on two adjacent support tubes. One objects may be too heavy for the support, causing it to bend. Three objects have a buffer of tissue or muslin and an outer cover of plastic so that the object can not breath. In this case a potential for humidity build-up, static, and other problems exists. One object that is folded face-in and rolled, rests on other objects and is not suspended.

Although each roller should support only one textile per length, many collections had more than one rolled textile on a support tube or dowel. This uses available space efficiently, but requires additional movement of objects and limits access to a specific textile. Rolled textiles are suspended between wood supports, wooden pegs, or dowels; holes cut out of Ethofoam®; moveable hooks on a roll-out rack; on racks with square slots; or stationary metal hooks. Other rolled objects are not suspended but rest on their sides. Rolled storage uses aluminum rollers, acid-free tubes, or regular cardboard carpet, fabric, or upholstery tubes. Most tubes are protected in some way: a coating of pigmented shellac of calcium carbonate or a layer of Mylar® film, archival paper, unbleached muslin, other suitable fabric, or aluminum foil. The process of rolling the textiles and archival support materials is critical. If this is not done carefully and correctly, the object may be creased or wrinkled. Most rolled textiles are covered with Mylar® film or muslin, secured with strips of bias tape or cut muslin.
Horizontal folded storage

The 25 objects examined in this category are listed in Table 2, page 76. Storage units used for folded objects include open shelves, shelves in a cupboard, map cases, drawers in a closed unit, and archival and cardboard boxes. Refer to Table 9, pages 96 and 97 for storage units.

Twenty-two objects were laid flat and folded face-in, three to six times. Twenty objects were layered in storage stacked two to twelve high per storage unit. Twenty objects had muslin covered polyester batting rolls, tissue or paper placed in the folds with archival tissue placed between objects. Object weight was not always considered when stacking objects. Lighter objects were on the bottom of some stacks. Objects in drawers and boxes touched unit sides and tops or the bottom of the drawer above (see Figure 2).

Eleven objects were stored boxed; boxes were stacked two to six high. Three objects were placed in 18" wide archival boxes with quantities of archival tissue in folds, padding-out objects. One object had a layer of brown tissue, apparently not archival, folded accordion style on the top layer of the box to act as a cushion so objects would not move. One object was stacked and layered among twelve other objects in a box. Figure 3 shows compression in storage.

Seven objects were stored in archival boxes on unbleached washed muslin or foam core boards. Muslin lining the box was used as a sling to help with lifting objects from the box. Foam core
boards were used like trays to lift objects from boxes. Two or three trays were stacked in a box depending on the height of objects when folded.

Objects' current physical condition was examined. All objects but one were examined in detail by the researcher. This one object was examined in a superficial manner only since it was not totally accessible. Nine objects had no apparent damage. Fifteen objects had patched holes, tears and pulls, frayed edges, shattered silk, weak areas along stitches, stains, discoloration, yellowing and
fading. Of these objects, deterioration had occurred along previous fold lines for two objects. A straight pin remained in one object and six objects had former pin marks, missing sequins, abrasion from use or wear, and crushed fabric. In addition, one object appears to have water-borne stains, possibly resulting from previous storage in a cardboard box or wood storage unit. One object had a metal attachment on its front which had abraded another area on the object prior to the collection acquiring it.
Objects also were examined for evidence of condition related to storage method. Nine objects did not show any signs of damage or degradation from storage. Eight objects have creases due to lack of padding or storage in a box that does not provide enough space for the object. In addition, objects were folded many times, causing creasing and shattering. Within these folded objects, straight pins and safety pins were attached. Damage was also evident from oxidation stains. Staff members had not located pins because of the number of times objects were folded. A bodice had been stored upside down with no tissue or padding and was crushing itself along the lace, collar and sleeves. In addition, two objects had been jarred and were compressed to one end of the box.

A shallow narrow shelf could not accommodate the width of one unevenly folded textile that was being abraded and compressed from the storage unit. Although not observed, it is likely that this object may be caught in door hinges when they are opened and closed.

Although many authors recommend not folding or creasing textile and costume objects (Basic principles, Date unknown; Burcaw, 1975; Dudley et al., 1979; Fall, 1973; King, 1985; Lambert, 1983; National Park Service, 1990; Perlingieri, 1981; Shelley, 1987; Tarrant, 1983), folded storage was used frequently in this study. However, limiting folds and using crumpled tissue paper or muslin in inner folds was common to support folded fibers and yarns and minimize excessive strain. Problems identified for the 25 objects in this storage category are listed in Table 13.
Table 13. Problems identified in horizontal folded storage

<table>
<thead>
<tr>
<th>Type of problem</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>No archival material in folds</td>
<td>2</td>
</tr>
<tr>
<td>Object shifts with no archival material</td>
<td>2</td>
</tr>
<tr>
<td>Stress and compression from storage materials</td>
<td>1</td>
</tr>
<tr>
<td>Abrasion holes from other objects</td>
<td>1</td>
</tr>
<tr>
<td>Water borne stains</td>
<td>1</td>
</tr>
<tr>
<td>Stress from pins</td>
<td>1</td>
</tr>
<tr>
<td>Rust stains from pins</td>
<td>1</td>
</tr>
<tr>
<td>Old fold lines and creases</td>
<td>2</td>
</tr>
<tr>
<td>Stored upside down</td>
<td>1</td>
</tr>
<tr>
<td>Vibration from racks</td>
<td>1</td>
</tr>
<tr>
<td>Compression, packed too tightly</td>
<td>2</td>
</tr>
<tr>
<td>Compression from weight of object or other object</td>
<td>2</td>
</tr>
<tr>
<td>Abrasion from storage unit, drawer, door, shelf</td>
<td>2</td>
</tr>
<tr>
<td>Damage from closure in door</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>20</strong></td>
</tr>
</tbody>
</table>

**Horizontal supported flat storage**

The nine objects stored flat supported and examined are listed in Table 2, page 76. Storage units used for these objects include drawers in compaction units and closed units, archival boxes on closed shelving, open cupboards and bottoms of closed hanging units. Refer to Table 9, pages 96 and 97 for storage units.
The compaction unit drawer was lined with Ethofoam® and shoes were wrapped loosely with tissue and additional tissue placed between individual shoes and pairs so they would not abraded during movement of units or when drawers were opened or closed.

Archival boxes were lined with a wax-type tissue on the bottom, but no archival materials were used between shoes. Light padding in shoes provided sufficient support for the fabric.

One hat was padded with tissue and three fans were stored open and flat on padded flannel and tissue foam core boards within a Ethofoam® lined drawer.

One pair of shoes and one pair of boots were upright and flat on their soles in an open unlined cupboard with no protection from light, dust or dirt. The shoes did not have tissue padding inside; the boots had a small amount of tissue in the toe area, but it was insufficient to support the entire boot. Shoes were placed on the bottom of an unlined hanging unit. Costumes did not touch or abrade any objects on the bottom of the unit. There was sufficient space around each object.

For all nine objects, current physical condition was examined. Three objects had no apparent damage. Six objects had damage including; split fabric, abrasion, holes, and chipped paint, dry brittle or warped leather.

The nine objects also were examined for evidence of condition related to method of storage. Four objects did not show any signs of damage or degradation from storage. However, for the other five
objects, previous methods of storage were apparent because of creases and wrinkles, even though objects had not been stored in that manner for several years. Problems identified for supported flat storage are listed in Table 14. Examples are slippers previously stored on their side, which are now stored flat in a drawer within a compaction unit; these slippers show signs of compression and creasing along their sides. Not enough padding had been placed in the toe, body and ankle area of the slippers.

Table 14. Problems identified in horizontal supported flat storage

<table>
<thead>
<tr>
<th>Type of problem</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Folds and creases from past storage</td>
<td>1</td>
</tr>
<tr>
<td>Compression, not enough padding</td>
<td>2</td>
</tr>
<tr>
<td>Abrasion from other objects</td>
<td>1</td>
</tr>
<tr>
<td>Dye transfer</td>
<td>1</td>
</tr>
<tr>
<td>Object shifts with no archival material</td>
<td>2</td>
</tr>
<tr>
<td>Unstable, objects likely to tip or fall over</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>9</strong></td>
</tr>
</tbody>
</table>

One object stored compacted in a box and not protected from other objects has been abraded and dye transfer has occurred. Since the fans did not show any signs of damage or degradation due to
storage; this method of storage may provide adequate space for all three objects.

**Horizontal supported on side storage**

The 14 objects stored supported on their side and examined are listed in Table 2, page 76. Storage units used for these objects included muslin bags, drawers in a closed unit, and boxes in compaction units, or closed or open cupboards. Refer to Table 9, pages 96 and 97 for storage units.

Two pairs of shoes and one pair of boots were stored in a custom-made muslin bag with individual compartments to protect from dust and dirt. Bags were placed so that these shoes and boots were horizontal on their sides. One pair of shoes had metal and wood shoe stretchers supporting the toe area, boots had tissue padding and support, and another pair of shoes had no inner padding or support. All pairs were stored adjacent to each other.

One pair of shoes and one pair of boots were stored in archival boxes which were placed in drawers in compaction units. Boxes were packed with eight to twelve pairs of shoes, crowded and stored on their side with wads of tissue between each shoe. Boots were crowded and placed on wads of tissue on the bottom of the box so that they were not placed directly on their sides nor on their soles. Another pair of shoes were located in a box with eight other pairs. Since no archival tissue was used as buffer or padding, shoes were touching one another.
Two pairs of shoes and one pair of boots were stored in separate map drawers. Two drawers were lined with Ethofoam® and one with tissue. Two pairs of shoes were stored on their sides since the height of the drawer would not accommodate them flat. One pair had tissue padding covered with black velvet which had been used while the shoes were on exhibit. The velvet had dusted off onto the fabric of the shoe. The other pair of shoes was touching other objects in the drawer. There was no apparent problem with the boots stored in this manner.

One pair of shoes were stored in an open cupboard wrapped in tissue, secured with adhesive tape and stacked four to eight high. The tissue was torn and did not cover the shoes completely; no tissue was used for padding inside.

Fans were stored in a deep drawer placed on their sides on a layer of Ethofoam®. Fans were folded closed and lay on the edges of their ribs. No additional materials were used.

All 14 objects current physical condition was examined by the researcher. One pair of shoes, one pair of boots, one hat and four fans had no apparent damage. For seven other shoes and boots, the fabric had stretched, pulled, creased, folded, frayed, flattened, split, abraded, or stained. Leather had become dry, stiff, brittle, misshapen, or worn. Other components were twisted, torn, shattered or frayed.

These 14 objects also were examined for evidence of condition related to storage. Seven objects did not show any signs of damage
or degradation from storage. However, seven other objects were showing problems due to current storage. Three objects were compressed due to storage in snug muslin bags. Wads of tissue used in boxed shoes have strained and creased four objects from overpacking. These objects are unlikely to move or be jarred in the box. A pair of slippers was creased and misshapened laying on its side next to the bottom of the box. Compression also may be occurring from the box's top resting on the shoes. Boots are creased, wrinkled, and distorted from padding underneath and insufficient internal padding.

Ethnic shoes placed on their side in an archival box did not show any apparent signs of damage. However, because the box lid rests on the sides of the shoes, they are compressed and may be experiencing abrasion and compression.

One fan showing no evidence of degradation was stored closed and placed flat in a single layer in a shallow drawer lined with acid-free paper or Ethofoam®. For three of the seven fans that were folded closed and laying on the edges of their ribs, leaves showed evidence of spreading. The other three fans were stored in an open position with a mount to support and pad each rib in an open position. The hat showed no problems with storage. Problems identified for horizontal supported on side are listed in Tables 15.
Table 15. Problems identified in horizontal supported on side storage

<table>
<thead>
<tr>
<th>Type of problem</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compression space too small</td>
<td>2</td>
</tr>
<tr>
<td>Abrasion from other objects</td>
<td>2</td>
</tr>
<tr>
<td>Soil</td>
<td>1</td>
</tr>
<tr>
<td>Stress from over packing or improper shaping</td>
<td>4</td>
</tr>
<tr>
<td>Stress or compression from other objects</td>
<td>1</td>
</tr>
<tr>
<td>Oxidation of metal components</td>
<td>1</td>
</tr>
<tr>
<td>Non-archival fabric</td>
<td>1</td>
</tr>
<tr>
<td>Lack of archival materials</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>14</strong></td>
</tr>
</tbody>
</table>

Five pairs of shoes and boots were stored flat on their soles with padding to retain the original shape showed no problems related to storage. However, using the correct amount of archival tissue or other appropriate padding without straining the material or providing insufficient support is a problem. Support should stabilize the heels of some period shoes since they have a tendency to fall over. Sufficient space should be allowed between costumes and shoes in hanging cupboards so they do not abrade or touch one another. Shoes and boots stored and supported on their side have experienced significant compression and abrasion from being stored in areas too small and with insufficient internal padding.
Vertical hanging storage

Costume objects were the only hanging objects examined. Specific types are summarized in Table 2, page 76. Storage units used for objects in a vertical hanging position include wooden open walk-in closets, mobile or stationary wooden cupboards with sliding doors, open front doors, or cloth covered fronts, and enameled steel free-standing units. Refer to Table 9, pages 96 and 97 for storage units.

Storage conditions of thirteen objects were examined. Objects in two collections are closely packed on rods in cupboards or sectioned hanging areas.

Three objects were hung on white molded plastic hangers of varying thickness, possibly furrier hangers. These hangers had long hooks and the bodies were slightly concave. One bodice, was stored on the hanger backwards and was distorted and misshapen. Two additional objects were placed on white plastic coat hangers and were padded with Ethofoam®, polyester fleece and covered with muslin. Three bodices were hung on hangers of unknown materials which were padded and covered with muslin. Each hanger was wider than the bodice shoulders and extended into the sleeves. Two skirts were pressed between tissue and a wood pant hanger. Another skirt was hung partially from the waist line with no tissue between the wood pieces; the hanger did not have enough pressure to keep the skirt secure. Another object was stored on a purchased plastic
hanger; two objects were on small wooden hangers padded and covered with muslin.

Two skirts were hung on wooden hangers with no archival materials, however, the skirts had loop tapes attached to the waistband and were looped over the shoulder area of the hanger. One set of tapes were long and the object did not touch the hanger; another object had very short loops and the object's waistband was touching the hanger. The area where the loops were attached was folded over and had been creased. One skirt did not have attached loops and was draped over the hanger through the waist opening.

Two objects had accessories stored in archival envelopes with a string looped over the hanger. Another object had the strap of a purse hung over the hook of the hanger. No archival tissue or padding was used with these objects. Another objects' hanger had been looped over the bodice's hanger compressing its neck and collar area. A clear plastic dry-cleaner bag was placed over one object. Some objects showed evidence of previous and current damage from creasing between the door hinge.

Objects' current physical condition was examined. All objects were examined in detail by the researcher. Eleven objects had some form of deterioration including holes, tears, pulls, fraying, fading, abrasion from wear and storage, sweat and humidity stains, shattering of silk, and disintegrating seams. Two of these objects had sections that had been removed or had disintegrated.
Objects also were examined for evidence of condition related to storage method. Two objects did not show any signs of damage or degradation from storage. However, for the other eleven objects there were signs of damage from method of storage. Examples are over-crowding of objects in the storage units with signs of compression, color transference and fabric abrasion. Figure 4 shows evidence of compression during hanging. Three objects had impressions from attachments on surrounding objects. One object had holes from where it had abraded against an object with hooks that had not been closed.

Figure 4. Vertical hanging storage shows evidence of compression during storage
Three bodices were stored on hangers which were too wide causing abrasion, tearing, pulls and holes in the shoulder, neck, and back areas. Some objects experienced problems where hanger ends were abraded by the storage units. One object was placed on the hanger backwards straining the back, shoulder and sleeve areas. One bodice had creasing and damage to the neck, shoulder, and front of bodice from a skirt hanger looped over the hook.

Skirts stored between pressure closure pant hangers fall off or sag if pressure is not consistent along the waistband. One skirt, draped over the hanger through the waist area, has distorted at the waist and where it drapes over the hanger ends (see Figure 5).

Figure 5. Vertical hanging storage showing improper use of the hanger
One skirt with tape loops that were too short had distorted a waistband. The other skirt with tape loops show signs of strain at areas of attachment.

Three objects which have accessories attached, hooked or looped over the hanger have damage to the objects' neck and shoulder areas. Some objects weigh a considerable amount which damages shoulder areas.

Hanging vertical storage was used for many costumes studied. However, for many objects, hangers did not fit the shoulder and added stress to the costume. Since the shape was inappropriate, distortion occurred across the backs of shoulders, tops of sleeves and other areas depending on style. Plastic and wood hangers were used; some were wrapped in acid-free tissue, muslin, or cotton or fiberfill batting. The padding and hanger shape minimized excessive stress or strain on the shoulder and neck areas of the costume.

In cases where heavy twill tape looped straps were used to help support the weight placed on the neck and shoulder area from another part of the costume, stress lines were apparent at attachment points and distorted the costume. In some cases, the loops' lengths created distortion of waistbands. Yet, another problem with hanging storage occurred when the hanger abraded the costume. Compression in hanging storage was also a problem. Problems identified for the 13 objects in this storage category are listed in Table 16.
Table 16. Problems identified in vertical hanging storage

<table>
<thead>
<tr>
<th>Type of problem</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compression, too small a space</td>
<td>2</td>
</tr>
<tr>
<td>Abrasion from object or with other objects</td>
<td>2</td>
</tr>
<tr>
<td>Color transfer</td>
<td>1</td>
</tr>
<tr>
<td>Stress or compression from other objects</td>
<td>1</td>
</tr>
<tr>
<td>Distortion of fabric</td>
<td>3</td>
</tr>
<tr>
<td>Abrasion from storage unit</td>
<td>4</td>
</tr>
<tr>
<td>Creasing due to other objects</td>
<td>4</td>
</tr>
<tr>
<td>Sagging</td>
<td>1</td>
</tr>
<tr>
<td>Hanger too wide</td>
<td>4</td>
</tr>
<tr>
<td>Compression from hanger</td>
<td>1</td>
</tr>
<tr>
<td>Stress from waist tapes</td>
<td>2</td>
</tr>
<tr>
<td>Improper use of hangers</td>
<td>2</td>
</tr>
<tr>
<td>Damage from closure in door</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>28</strong></td>
</tr>
</tbody>
</table>

**Vertical mounted storage**

The only object examined for this storage method was a flag. The flag is in very good condition with no evidence of damage. However, it sags slightly on the mount in the upper center area. No damage is evident, and there were no collection records or documentation available for the flag.
It was stored vertically to provide some support in storage, minimize vibration during handling and eliminate risk during examination. The flag was stored on fabric stretched perpendicular between framed sealed wood stretcher bars. Since the frame had a tendency to twist and warp, it does not provide stable support for the flag. However, no problems specifically related to this storage method were identified.

Storage Problems

Ideally, storage should protect objects and not put them at risk. A total of 91 objects were examined in six collections. Of these, 58 objects had problems related to storage; 33 did not. With these 58 objects, 34 separate problems were identified that put objects at risk while in storage. These problems were examined and grouped by commonalities across the seven storage methods into five categories. Four problems relate to storage units (see Table 17). Five problems relate to insufficient use of archival materials (see Table 18). Ten problems relate to improper protection in storage (see Table 19). Six problems relate to improper support (see Table 20). Nine problems relate to incorrect or improper storage practices (see Table 21).

The only storage method that did not have any risks associated with it was vertical mounted storage. This is more than likely due to the number of objects examined and the sample used in the study, not the method itself.
Table 17. Problems related to storage units

<table>
<thead>
<tr>
<th>Type of problem</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abrasion from storage unit</td>
<td>8</td>
</tr>
<tr>
<td>Vibration of moveable racks</td>
<td>2</td>
</tr>
<tr>
<td>Damage, object caught in door</td>
<td>2</td>
</tr>
<tr>
<td>Object not accessible</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>14</strong></td>
</tr>
</tbody>
</table>

Table 18. Problems related to insufficient use of archival materials

<table>
<thead>
<tr>
<th>Type of problem</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shifting of object due to lack of use of archival material</td>
<td>7</td>
</tr>
<tr>
<td>Stress or compression from storage materials (creases or folds)</td>
<td>9</td>
</tr>
<tr>
<td>Insufficient use of archival materials in folds</td>
<td>2</td>
</tr>
<tr>
<td>No archival materials in folds</td>
<td>2</td>
</tr>
<tr>
<td>Lack of archival materials</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>23</strong></td>
</tr>
</tbody>
</table>
Table 19. Problems related to improper protection in storage

<table>
<thead>
<tr>
<th>Type of problem</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dust, dirt and soil</td>
<td>3</td>
</tr>
<tr>
<td>Damage from light-no protection in storage</td>
<td>1</td>
</tr>
<tr>
<td>Water stains</td>
<td>1</td>
</tr>
<tr>
<td>Abrasion from other objects</td>
<td>7</td>
</tr>
<tr>
<td>Dye or color transfer</td>
<td>2</td>
</tr>
<tr>
<td>Rust from metal component of object</td>
<td>1</td>
</tr>
<tr>
<td>Dust from non-archival fabric</td>
<td>1</td>
</tr>
<tr>
<td>Rust from pins</td>
<td>1</td>
</tr>
<tr>
<td>Compression due to other objects</td>
<td>4</td>
</tr>
<tr>
<td>No protection in storage</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>22</strong></td>
</tr>
</tbody>
</table>
Table 20. Problems related to improper support

<table>
<thead>
<tr>
<th>Type of problem</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sagging of support causing distortion of object</td>
<td>3</td>
</tr>
<tr>
<td>Compression from weight of objects or other objects</td>
<td>2</td>
</tr>
<tr>
<td>Object at risk from falling over</td>
<td>2</td>
</tr>
<tr>
<td>Stress from overpacking or improper shaping</td>
<td>4</td>
</tr>
<tr>
<td>Distortion of fabric for other reasons</td>
<td>4</td>
</tr>
<tr>
<td>Stress from waist tapes</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>17</strong></td>
</tr>
</tbody>
</table>

Table 21. Problems related to incorrect or improper practices

<table>
<thead>
<tr>
<th>Type of problem</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fold or creases from past storage</td>
<td>5</td>
</tr>
<tr>
<td>Stress at pins</td>
<td>2</td>
</tr>
<tr>
<td>Creasing from rolling</td>
<td>2</td>
</tr>
<tr>
<td>Stress or compression from other objects</td>
<td>3</td>
</tr>
<tr>
<td>Stored upside down</td>
<td>1</td>
</tr>
<tr>
<td>Compression, from packed in an area too small</td>
<td>6</td>
</tr>
<tr>
<td>Hanger too wide</td>
<td>4</td>
</tr>
<tr>
<td>Compression from hanger</td>
<td>1</td>
</tr>
<tr>
<td>Improper use of hanger</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>26</strong></td>
</tr>
</tbody>
</table>
Revised Storage Method Definitions

Based on these results, definitions presented in the Review of Literature have been revised. New categories are defined here. The primary horizontal storage method includes the secondary methods of flat, rolled, folded, mounted, and supported. The tertiary methods of horizontal storage include: use or no use of archival materials, suspended or resting on the roll, cushioned or not cushioned, stretched between bars or mounted on a rigid form, and flat on bottom or placed on the side. The primary vertical storage method includes the secondary methods of hanging and mounted. The tertiary methods of vertical storage include: padded or not padded, and pressure or stitched. Refer to Table 10, page 100, for a listing of these methods.

**Horizontal storage**

Objects are stored in a horizontal orientation where support and size requirements are related to the specific method of interest.

**Flat**

The entire object is stored level against the storage unit or archival material. Storage space required is equal to or greater than the surface area of the object and archival materials used in storage. Depth requirements are equal to or greater than the thickness of the object and archival materials, including any protective covers used.
Rolled

Objects are rolled around a tube or pole with or without archival materials and suspended between two stationary attachments. Space requirements are equal to or greater than the diameter of the tube, textile, archival buffer materials, and dust cover. Length of the storage area is equal to the length of the tube plus the extending portions of the inserted hanging or support device.

Folded

Objects are bent, creased and manipulated in a manner that the warp or filling yarns are strained or stressed with each folded layer maintaining a flat or nearly flat orientation. Storage space is equal to or greater than the folded area of the object and archival materials. Depth requirements are equal to the thickness of the folded object and any archival materials used for padding or protective covers used.

Mounted

Objects are stretched, stitched, or pressure mounted between various materials and stored in a horizontal manner. Space requirements are equal to or greater than the length, width, and depth of the completed mount and protective cover.

Supported

Objects are stored flat or on their side in a horizontal orientation, with or without archival materials. Space requirements are equal to or greater than the length, width, and depth of the object plus the archival buffer materials and protective cover.

Vertical storage

Objects are stored in a vertical orientation where supports and size requirements are related to the specific method of interest.
Hanging

Objects are suspended or hung on hangers of various styles and materials where the hanger directly supports a small portion of the total object. Archival padding materials enlarge the area of support to a degree and protect the object from the hanger. Space requirements are equal to or greater than the total height of the object-hanger combination and the total width and depth of the object-hanger-padding material-protective cover combination.

Mounted

Objects are stitched, placed or pressure mounted between various materials and stored in a vertical manner. Space requirements are equal to or greater than the length, width, and depth of the completed mount and protective cover.

Decision Making Model for Object Specific Storage

The decision making model that was developed is listed below in an outline form. It is suggested that this sequence of steps be followed in the process so that no critical information be omitted.

- Identify function or purpose of the object within the collection. Why has the object been accessioned?
- Identify type of object and its condition, fiber content, fabrication, and technique.
- Recognize potential problems or risks for the object.
- Identify facilities within the storage area, such as storage units.
- Select a method that will maintain or improve current condition, minimize alteration and present minimal risk to the object (see Table 22).
- Determine the procedure or process to be used to prepare the object for storage and the specific conditions to be met in storage.

- Analyze, evaluate, or predict any problems that may develop from the method selected.

- Perform storage correctly (i.e., pad-out folds, use narrow hangers, cover with archival materials).

- Periodically check for impact of procedures and re-store as necessary.

- Keep current on new practices, evaluation of past methods, new research, and information, i.e., units, materials, etc. and restore as necessary based on this information.

Criteria that should be considered in this model include the following:

1. What is the condition of the object?

2. What methods should not be used for this object based on its shape, condition, fabrication, size, etc.?

3. Of the remaining methods, which is the collection able to use based on their facilities, staff and time, and which puts the object at least risk?

4. If the options in criteria 3 do not match, what compromises can be reached?

5. If a compromise has to be made and the object can not be stored in the safest manner possible, why was it accessioned and why is it being saved?

6. Can the collection maintain the object in a realistic manner for its time and setting?

7. What alternatives are available to provide the financial support, staff and space needed to store the object?
Table 22. Advantages and disadvantages for each method of storage

<table>
<thead>
<tr>
<th>Method</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horizontal</td>
<td>Objects completely and uniformly supported in all areas</td>
<td>Not recommended for large textiles and rugs</td>
</tr>
<tr>
<td>Flat</td>
<td>Minimal layering of objects with archival materials</td>
<td>Not recommended for three-dimensional costumes because of space requirements</td>
</tr>
<tr>
<td></td>
<td>Best method to keep textiles horizontal and flat with no stress</td>
<td>and quantities of archival material needed to support the layers and to</td>
</tr>
<tr>
<td></td>
<td>Especially good for many ethnic costumes</td>
<td>maintain shape</td>
</tr>
<tr>
<td></td>
<td>Requires minimal preparation of objects</td>
<td>Quantities of archival materials needed to protect objects</td>
</tr>
<tr>
<td></td>
<td>Ideal for small, flat, two-dimensional objects</td>
<td>Large volume of storage space needed for ideal conditions</td>
</tr>
<tr>
<td>Horizontal</td>
<td>Efficient use of space, especially when storing large objects or those larger in one direction</td>
<td></td>
</tr>
<tr>
<td>Rolled</td>
<td>Good for single layer and single component two-dimensional objects of almost any size</td>
<td></td>
</tr>
</tbody>
</table>
- Provide fairly even distribution of weight and stress
- Access to objects dependent on unit and support method
- Easy visual examination of outer layer if no protective sleeve is used
- Rolling objects in warp direction minimizes strain and stress to woven structures
- Archival materials protects objects and hinders abrasion, dye or finish transfer, acid leaching and oxidation
- Protective sleeves protect from dust and soil

Disadvantages:
- Full examination difficult; requires removing protective sleeve, other materials and completely un-rolling object
- Pressure points and stress at support areas, especially when rolled objects rest on roll
- Stacking rolled objects hinders access and adds stress
- Access restricted depending on storage unit, method, and number of objects in unit or on roll
- One or more textiles per roll requires movement of objects and excessive handling
- Not suitable for multi-component or three-dimensional objects since crushing, compression and creasing may occur
- Fragile objects may not withstand stress and strain from rolling
- Method of rolling (face in or out, warp or filling direction) not standardized
- Rolling in filling directions may add excessive strain and stress on woven structures
- Rolling face-out with no archival materials or protective cover exposes decorative areas to dust, light and abrasion
- Archival materials or preparation of other materials (tubes) required
- Incorrect rolling puts object at risk
- Special support units for tubes required for ideal conditions
- Additional time required for preparing objects for storage

**Horizontal Folded**

**Advantages:**
- Minimizes space required for storage
- Archival materials support folded fibers and yarns, minimizing strain, bending and creases
- Folds in warp direction may minimize deterioration
- Used for large textiles and costume in good to excellent condition or where other storage space is limited

**Disadvantages:**
- Little or no support may damage objects
- Folds along filling yarns may accelerate deterioration
- Requires periodic re-checking for degradation and re-folding to prevent damage
- Folding practices not standardized
- Requires archival materials for ideal support of folded areas
- Folding stresses, creases, strains, compresses and bends fibers and yarns at folds
- Incorrect folding or support in folds puts objects at risk
- Folds minimize air movement and may provide an environment for vermin and insects.
- Requires additional preparation time for storage of objects

**Horizontal Mounted**

**Advantages:**

- Supports object with no unnecessary stress, flexing or abrasion
- Minimizes risk and supports object during examination
- Provides individual space for objects while protecting them from dust and light
- Objects mounted on a rigid form less likely to experience a change or fluctuation in the support material
- Minimizes abrasion, folding, crushing, and snagging on other objects
- Provides for complete visual examination on one or both sides depending on type of mount
- Positive effects of mount dependent on type of and materials of mount
- Object may not require additional work for display or exhibit

**Disadvantages:**

- Support material stretched between bars may experience strain and stress at attachment or sewn points
- Rigid forms, folders, frames and boxes do not allow for complete visual examination
- Crepaline mounts may slightly restrict and distort visibility
Mount methods, especially stitching, may put object at risk
- Archival materials required
- Additional space required
- Requires additional preparation time for storage

**Horizontal Supported Flat**

**Advantages:**
- Does not contribute to stress and strain
- Clear plastic boxes provide easy visual examination without handling
- Archival boxes with windows provide visual examination in a dust and acid-free environment
- Support from archival materials minimizes pressure points, abrasion, reduces handling, and maintains object's original shape
- Good for many accessories and small three-dimensional objects

**Disadvantages:**
- Clear plastic boxes and boxes with windows may contribute to light degradation
- Plastic boxes, styrofoam or plastic heads, original hat boxes, and cardboard may off-gas or leach acid
- Archival and support materials required
- Insufficient or incorrect support puts objects at risk
- Support practices are not standardized
- Requires additional space for appropriate supports for objects
- Additional preparation time required
Horizontal Supported on Side

Advantages:
- May use available space efficiently

Disadvantages:
- Pressure, strain, folding, and creasing may occur on objects
- Clear plastic boxes and boxes with windows may contribute to light degradation
- Materials may off-gas or leach acid
- Archival and support materials required
- Insufficient or incorrect support puts objects at risk
- Support practices are not standardized
- Requires additional space for appropriate supports for objects
- Additional preparation time required

Vertical Hanging

Advantages:
- Objects readily accessible
- Special hangers may prevent compression of objects and slippage off hangers
- Custom-made hangers possible for specific objects
- Proper support eliminates folds, creases and supports objects
- Padding of hangers may protect objects from acid leaching and wood splinters, distributes strain and stress, and eliminates crushing or creasing
- Padding-out sleeves, bodices, and collars keeps the shape and eliminates crushing or creasing
Dust covers minimizes dust adhering to objects and prevents abrasion and snagging from other objects.

- Used for three-dimensional costumes and textiles
- Space between objects eliminates creasing and abrasion
- Space requirements less extensive than for flat storage
- Objects easy to visually examine

Disadvantages:

- Crushing and compression difficult to control
- Insufficient padding adds stress and strain to objects
- Hangers contribute to straining, creasing, and distortion of objects if inappropriately shaped or used
- Bias tape loops cause strain and distortion at attachment points
- Materials may off-gas or leach acid
- Archival and support materials required
- Insufficient or incorrect support puts objects at risk
- Support practices are not standardized
- Additional preparation time required

**Vertical Mounted**

Advantages:

- Supports object with minimal stress, flexing or abrasion
- Pressure mount secures object in place
- Objects mounted on a rigid form less likely to experience a change or fluctuation in the support material
- Positive effects of mount dependent on type of and materials of mount
- Minimizes abrasion, folding, crushing, and snagging on other objects
- Minimizes risk and supports object during examination
- Provides individual space for objects while protecting them from dust and light
- Object may not require additional work for display or exhibit
- Diagonal support minimizes distortion from gravity

Disadvantages:
- Rigid forms, folders, frames and boxes do not allow for complete visual examination
- Archival materials required
- Mount methods, especially stitching, may put object at risk
- Strain from gravity may create distortion of object
- Additional space required
- Requires additional preparation time for storage

Decision making model example

A pair of ethnic shoes were used to test the model. The function of the specific collection was to collect for educational and research purposes and represent non-western textiles based on their fabrication and techniques. The ethnic shoes were of Chinese origin, made of silk with hand embroidery and motifs painted on the fabric. Some wear abrasion is apparent; abrasion from other objects has occurred on the side areas. Methods that should not be used are storage with unlike objects within a larger space; archival
materials must be used to hinder abrasion and compaction. Additional methods that should not be used are horizontal flat, since the object is three-dimensional; rolled, since the object can not be accommodated on a rolled tube; folded, since the object is not capable of folding; mounted, since the object is not capable of being stretched between bars or mounted on a ridged form; vertical hanging, since the object would distort if hung on a peg or a special hanger; and mounted, since the object is not capable of being stitched on a material or pressed between two pieces of material.

The object needs to be placed in an area where it will not be abraded by other objects. Considering the small size of the shoes and their height, they may be placed flat on their soles in an archival box with archival materials for buffering and padding or in a drawer with support on all sides. The shape of the shoes needs to be supported from the inside with a sufficient amount of archival tissue paper. It is critical that the object be adequately supported, but too much support also would be harmful. The archival materials need to be of a non-abrasive nature because of the fragile nature of the silk, embroidery and paint.

Storage recommendations are that the object be stored in a small box to accommodate the height of the object and the added archival materials. Since drawer space is limited in this collection and is used for other objects, the decision also should include placing this smaller box in a larger box and documenting the location on the outside of the larger box. Other objects are likely to be
placed around the boxed Chinese shoes. No objects should be placed underneath or on top of this smaller box within the larger box to assure stability and prevent compression of the object within. Abrasion to other objects is limited. The object can be retrieved without disturbing other objects and examined superficially by opening the top of the box and removing the top-most layer of archival material.

This storage method would maintain the condition of the object. The method is feasible given the collection's limitations in facilities, staff and time.

Based on this example, no modifications of the model were necessary. This model was designed to be sufficiently adaptable to conditions specific to individual museums and collections so that it will function in most situations. Additional refinements of the model are expected when the model is applied in making storage decisions in museums and collections. As staff makes periodic maintenance checks and re-assessments of objects stored using this model, further refinements also are likely to occur.
CONCLUSIONS

Storage practices varied according to existing facilities in these collections. None of the collections studied met ideal conditions. There were 11 different titles held by the 14 staff members who participated in this study. The majority of the interviewees had at least one graduate degree and various professional experiences in different collections before obtaining their current position. For almost all interviewees, storage is one of many responsibilities. Many other people also contribute to the well-being of collections.

Three textile and costume collections storage areas are in the basement; the other three are located in the top-most floor of the building in spite of recommendations. Units have been designed, adapted and purchased with the goal of providing ideal storage. Some storage units work well; others do not. Some are highly imaginative and appear to be practical, but may be too expensive for many collections with limited budgets.

Storage of multiple objects together puts each object at risk during storage. These risks relate to potential for movement, handling or exposure each time any object is needed, and the potentially antagonistic interactions of objects. Thus, as number of objects in a unit increases, risk increases in a non-linear, geometric fashion.
Some storage methods do not lend themselves to periodic maintenance checks. Examples include boxed storage, inaccessible objects, and objects in off-site storage, or units requiring more than one person to access, or use of a ladder. Some methods may be more labor intensive in the long-run than methods not selected for these objects.

Documentation at many collections is insufficient which increases handling of objects and use of the collection. Insufficient documentation may be due to the lack of financial and staff support. There was no apparent pattern of storage problems related to type of storage, number of staff members, or size or function of the collection. Although each collection in the study had specific deficiencies in support (financial, staff and space) that contributed to problems found in storage, no one problem could be attributed to a specific deficiency.

Damage due to off-gassing and alterations of pH due to storage unit materials, and related problems could not be assessed in this project. No conclusions are addressed related to the material of units because these changes can not be assessed visually and instrumental analysis was not used in this research. However, as a practical rule of thumb, materials that do not rust, oxidize, or out-gas are preferable to those that do or may. Since insect or other pest damage was not observed during examination of objects in the six collections, infestation control apparently has been effective.
Ideal storage is flat for most objects; however, it is not risk free and requires a substantial amount of space. Other appropriate methods of storage such as rolled, hanging, mounted, and supported are not ideal, but require the same amount of effort to provide a safe environment while in storage. The challenge is for the collection administration to finance and hire the appropriate numbers of trained staff, provide climate controlled space, and provide funds to purchase appropriate types of storage units and materials to store textiles and costumes in a safe manner. This is the only way these objects will be available in the future for the collection's specific purposes.

Support for the collection has an impact on the condition of the collection. Objects suffer due to lack of funds for staffing and proper storage materials and units. Most staff recognize many limitations with storage and are working to correct problems and address concerns. Their storage practices are based on what is recommended in the literature; these practices are based on suggestions and directions from qualified and experienced staff and consultants. Unfortunately, much of the information conflicts or does not address specific objects or aspects that are unique to a collection.

Staff members need to be aware of hidden costs related to storage when objects are considered for accessioning. Rate of growth of collections should take into account support that will be needed from the museum or administrative unit. Storage cost is
related to staffing, time, materials used in preparing objects for storage, and storage units. Additional cost are associated with preparing objects for storage and periodic maintenance checks. In addition, specific work on objects for exhibits or conservation may be required from time to time.

Collections need to re-examine and re-evaluate their storage. Limitations relate to support for storage (financial, staff, space). Apparently storage is low priority since storage is in locations specifically identified as placing objects at risk.

In addition, storage units contribute to problems. Dunn (1963) suggested that manufacturers of museum storage equipment and museum staff members do not realize fully that the majority of most collections are located in storage and not on exhibit. Thus, manufacturers of storage units adapt or modify existing storage units for use in museums. However, this practice has not provided a safe method of storage for collections. Manufacturers of storage units provide specific units for collections, but these units may need to be re-designed. Some storage units are expensive and may not fit in existing storage space.

The decision making model presented here is designed to assist collection staff in determining appropriate storage for specific objects. The model allows collections to work within the limitations imposed by their specific institutions.
The following research needs have been identified:
- assess the pH of storage units and their effect on objects,
- evaluate aging of storage materials and their impact on objects,
- conduct an assessment of the decision-making model presented here in the following dimensions: applicability to collections, modifications and refinements to the model, and the long-term impact of storage decisions based on the model,
- assess current commercial and custom-made storage units and determine how these units meet ideal conditions and how they age, and
- develop new procedures for storing objects using a problem solving format and evaluate the impact of these procedures.
REFERENCES


*Basic principles for the care and preservation of period costume.*


Bishop Museum (Ed.). (Date Unknown) *General handling guidelines.*

(Available from [Bishop Museum, Honolulu, HI])


ACKNOWLEDGEMENTS

My very sweetest mahalo (thank you) to my mom and best friend, Marjorie Ann Geer, for her continued love, support, notes on reflection and inspiration, and encouragement throughout my life and especially throughout graduate school. The phone lines were our physical link, our hearts were our emotional link. I also would like to thank my daddy, Merritt Lester Heard, who for the last ten years has not been on this earthly plane, but has been guiding and looking after me in his own special way. He provided me with the challenge to "set and work my plan", to achieve my goals. My parents were and still are always there to tell me that I can accomplish anything I set my mind to. I believed it and still do. And I have.

Throughout the last two years, my major professor, Dr. Sara J. Kadolph has been my guide and has helped me to realize my greatest challenge so far. She has shown great kindness, understanding and encouragement, while setting a tremendous example of what a teacher really is and does. I knew what area of research I wanted to focus and Dr. Kadolph's insight and needs assessment was the catalyst to the realization that museums and collections were concerned with and awaited research-based data about storage. Thanks also to the members of my committee, Dr. Mary Littrell, Dr. Jane Farrell-Beck and Dr. Norma Wolff for their insight and time. Other special people who have helped and guided me to realize my
goal are Dr. Mary Ellen Des Jarlais, Leo F. Hobaica, Jr., and Dr. Sue Davis who were there from the beginning.

Especially important are my friends and colleagues, Laurann Figg, for going out of her way to help guide me through the bumps of graduate school and became my dear friend in the process, Patti Kimle, who helped get me back to earth when I was up in the clouds and Marsha Casselman, who has been there to listen, give hugs and encouragement. Thank you to the Kadolph family, for being my Iowa family. And to all the friends and others who opened their hearts and homes to provide a place for me to stay while collecting data.

This study would not have been possible without the assistance and support of the museums and collections who permitted me to interview their staff members and examine and document information about their textile and costume collections storage. Their interest and cooperation in this project is very much appreciated, mahalo nui loa.

The assistance the College of Family and Consumer Sciences Graduate Student Research Fund provided, helped to make this research possible.

The Iowa State University Committee on the Use of Human Subjects in Research reviewed and approved this project. Confidentiality of data was assured to the participants and modified informed consent was obtained by appropriate procedures.

Love and Aloha, Teresa Ann Heard
APPENDIX A: DATA COLLECTION FORMS

Oral Interview Schedule

Name:  (Number code) __  __  __  

Title at this institution:

Educational background:

Professional background:

Length of time in current position:

Nature of textile and clothing collection:

Type of numbering system used in museum:

Function of collection:

   Cultural:
   Research:
   Display:
   Fundraising:
   Cultural warehouse:
   Other (please identify):

Type of collection:
Working:
Educational:
Closed:
Other:

Access to objects
Availability:

Closed_________________________________________Open

Closed:
Hard to get at:
Hard to get permission to use:
Closed to all:
Supervised visits:
Exceptions:

Open:
Easy accessibility:
Easy to get permission to use:
Open to all:
Supervise visits:
Exceptions:
Support for collection (general):

Financing:

Space:

Staffing:

Source of support (specific):

Volunteers:
Museum budget:
Fundraising:
Grants:
Gifts:
Other:

Funding available for storing the collection:

Volunteers:
Museum budget:
Fundraising:
Grants:
Gifts:
Other:
Storage:

Description of existing storage facilities:

Type of storage:

Type of object(s):

Other:

Procedure recommended for ideal storage of museum textile artifacts, or necessary specific to this museum:

Satisfaction with space and staff available for the collection:

Areas where improvements could occur related to space and staff available for the collection:

Impact of the storage facilities on working with the collection:
Impact of the storage facilities on the function of the collection:

Effect of storage conditions on staff and other objects in the collection:

Curator and Conservators observations (additional strengths and limitations):

Personal observations:
Object Examination Form

Check (_) when completed:

- Accession # (format) used for collection or museum:
- Organization of museum (who is in charge of what):
  - Costume:
  - Textiles:
  - Decorative Arts:
  - Combinations:
  - Other:

- Current storage unit:
  - Open
  - Cupboard
  - Compaction
  - Closed
  - Shelving
  - Other
  - Map case
  - Roll-away

- Describe:
  - Accession # ______________

- Type of textile: flat, shaped, multi-component

- Approximate age of textile:

- Length of time in museum collection:

- Numbers of items of similar type in museum collection:

- Original condition of object:

- Basic description of object:

- Photocopy of museum record for the object, attached:

- Information on past use of object:

- Information on past storage of object:
Storage facilities:

- Material used:
  - Wood (types)
  - Laminated steel
  - Other
  - Metal
  - Glass
  - Plastic
  - Vinyl

- Describe:

- Finishes:
  - Paint
  - Unfinished
  - Other
  - Varnish
  - Coatings

Method of storing:

- A. Horizontal
  - Rolled
  - Flat
  - Supported
  - Other

- B. Vertical
  - Hanging
  - Supported
  - Other
Supplementary materials: archival quality?: Yes No

Acid free/Acid-neutral tissue or paper

Grey board Other

Polyethylene (chemical content, physical form)

Film Foam Fiberfill

Solid plastic Foam core Other

Fabric

Calico Other fabrics (list)

Muslin -Soft tissue

Other cotton fabrics (list) -L tissue

Other materials (list) -

-on support surfaces:

-lining the area:

-attached to the textile: Yes No (see below)

-age of supplementary materials:

-other applications:

How textile artifacts are held in position:

Materials and techniques used:

Bindings (tape, book type mount):

Adhesives (pressure sensitive tape):

Glues (types):

Stitches (thread, type and description):

Pressure (describe how):

Pins (straight, brass, T-pins, etc., staples, other):
Current condition of storage area (verbal description and photo, overview and close-up):

Current condition of textile: (verbal description and photo, overview and close-up):

Deterioration:

Abrasion:

Holes:

Tears:

Pulls:

Other:
Condition of textile: related to method of storage: (may not be apparent for all):

Deterioration:

Abrasion:

Holes:

Tears:

Pulls:

Other:

Examine collection records for initial condition and past treatment of artifacts- see photo copy of records (list if no records available, describe):
Photo Documents

- Original photo of artifact when accessioned to collection:
- Photographs of:
  - Storage units:
  - Methods:
  - Materials:
- Current condition of textile artifact specific to research (Overview and close up):
APPENDIX B: CONFIRMATION LETTER
December 7, 1991

Name
Title
Museum
Address

Dear Name:

I am graduate student at Iowa State University working on a Masters Degree in the Department of Textiles and Clothing. I am conducting research for my thesis topic in the area of storage practices of textiles and costume. With your permission, I would like to conduct research at your institution. I am writing to formally request permission to interview you and to photograph and document ways in which objects are stored in your collection.

At present, there are no research based recommendations for storing textiles to minimize the process of deterioration. I will study current methods of storing textiles, evaluate these methods for their effectiveness and usefulness, and recommend storage methods to minimize deterioration of selected textile objects.

I will be doing this research during January, 1992. I would like to make an appointment at your convenience to interview you, document the storage facility and examine selected textiles. I will be phoning you in one week, to arrange a time to meet. If you would like to call me, I can be reached at (area code) phone number.

I thank you for your time and assistance in data collection for my thesis.

Sincerely,

Teresa A. Heard
Graduate Student

Dr. Sara J. Kadolph
Major Professor
APPENDIX C: HUMAN SUBJECT APPROVAL
checklist for Attachments and Time Schedule

The following are attached (please check):

2. [ ] Letter or written statement to subjects indicating clearly:
   a) purpose of the research
   b) the use of any identifier codes (names, #’s), how they will be used, and when they will be removed (see Item 17)
   c) an estimate of time needed for participation in the research and the place
   d) if applicable, location of the research activity
   e) how you will ensure confidentiality
   f) in a longitudinal study, note when and how you will contact subjects later
   g) participation is voluntary; nonparticipation will not affect evaluations of the subject

3. [ ] Consent form (if applicable)

4. [ ] Letter of approval for research from cooperating organizations or institutions (if applicable)

5. [ ] Data-gathering instruments

5. Anticipated dates for contact with subjects:

   First Contact                                      Last Contact
   December 30, 1991                                  February 1, 1992
   Month / Day / Year                                  Month / Day / Year

1. If applicable: anticipated date that identifiers will be removed from completed survey instruments and/or audio or visual tapes will be erased:

   July 30, 1992
   Month / Day / Year

1. Signature of Departmental Executive Officer       Date

1. Decision of the University Human Subjects Review Committee:

   [ ] Project Approved     [ ] Project Not Approved     [ ] No Action Required

   Patricia M. Keith
   Name of Committee Chairperson
   Date

   Signature of Committee Chairperson

1/90
To: Dr. Pat Keith, Chairperson  
Human Subjects Review Committee

From: Teresa A. Heard, Masters Candidate  
Department of Textiles and Clothing

Subject: Extension Of Time For Contact With Subjects

As per my thesis committee, I have been advised to obtain data from additional museums/collections. Procedures and questions will be the same as the previously approved request. Please refer to attached forms. Data collection has been completed for the prior request.

Additional museums/collections for the study include: State Historical Society of Iowa, Des Moines, Iowa; Iowa State University, Department of Textiles and Clothing Collection; and the Dodge House, Omaha, Nebraska.

I am asking to extend the final date of last contact to April 30, 1992.

Thank you for your time in this matter.

Signatures have been redacted for privacy

Teresa A. Heard
530-34-0095
306 MacKay Hall
294-0948 wk
292-7813 hm

Approved
P. Keith
2-11-92
APPENDIX D: COLLECTIONS

A = Ethnographic Museum, rural setting, small city, focus on Northern European immigrant culture.

B = Historical Society, urban setting, metropolitan, large city, city focus.

C = University collection, land grant university, urban setting, medium-sized city.

D = Art Museum, urban setting, metropolitan, large city, full art museum.

E = University collection, land grant university, rural setting, small city.

F = State Historical Society, urban setting, large city, state focus.