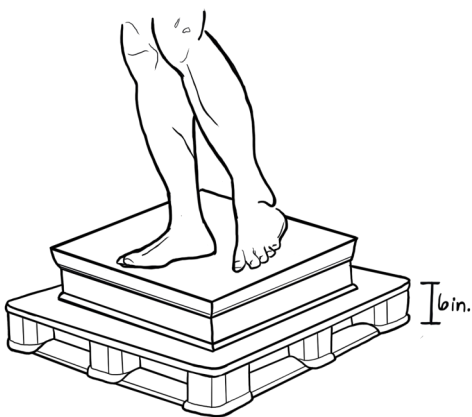


INTRODUCTION

Safe collection storage is essential to the preservation of cultural heritage objects. Storage promotes the organization and physical protection of collections that aren't in use and offers a respite from the increased risks of damage associated with display. Storage can take many forms, but storage furniture—the shelves, cabinets, and racks that support collections—are always an integral part of the storage system. General principles of collections storage include the following:

- Collections storage is a dedicated space, separate from other activities, and non-collections items are stored elsewhere.
- The needs of the collection dictate the choice of furniture.
- With some exceptions, objects of similar size and with similar preservation needs are stored together.
- Collection items are raised up from the floor at least six inches. This includes large objects, which can be stored on pallets or dollies.



This leaflet introduces storage furniture for different material types. For information about individual artifact enclosures, see the companion leaflet *Collection Storage: Housing & Support*. Suggestions for additional resources are provided below.

WHERE TO START

Organizations that are purchasing new or modifying existing storage furniture have several things to balance. Consider the following questions prior to your storage reorganization project:

- What are the size and accessibility needs of the collection?
- How sensitive are collection objects to their environment?
- What is the size and condition of the storage space?
- What is the condition and suitability of existing storage furniture?
- What are the funds available for storage furniture purchase or modification?

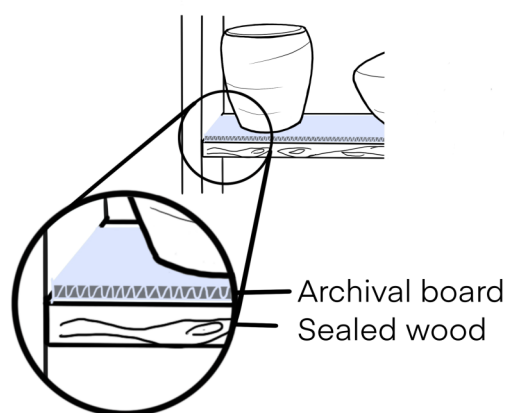
MATERIAL CONSIDERATIONS

Many materials used to make household or office furniture can be damaging to collections, which may already be fragile due to their age or condition. **Select inert materials.** Avoid storage furniture containing: wood, wood composites, oil based paints and sealants, baked enamel, and/or rubber gasketing. These materials can produce **volatile organic compounds (VOCs)** including acids, peroxides, aldehydes, and sulfur that can

cause damage to collections over time. Identifying potentially harmful materials is especially important when considering closed cabinetry with little air circulation. Commonly available inert materials for storage furniture include **powder-coated steel and anodized aluminum**.

If replacing VOC-producing furniture such as older wooden cabinets isn't possible, introduce a barrier layer to help mitigate the damaging effects of off-gassing. Bare wood can be coated with a sealant such as a moisture-borne polyurethane clear coat, or latex or acrylic paint. Two-part epoxy paints are excellent barrier layers but can be toxic during curing; apply them in a well-ventilated area. Avoid oil-based products. Ample time should be allowed for your selected paint or sealant to fully dry or cure *and off-gas* before collection objects are reintroduced. This time varies depending on the sealant but 2 weeks minimum is a good starting point.

Wood furniture can also be covered with a barrier film like Mylar®, Marvelseal®, or Melinex®. Archival board is not a completely effective barrier material, but can be a short-term solution for uncoated shelving. **Avoid direct contact between collections and wood surfaces.**

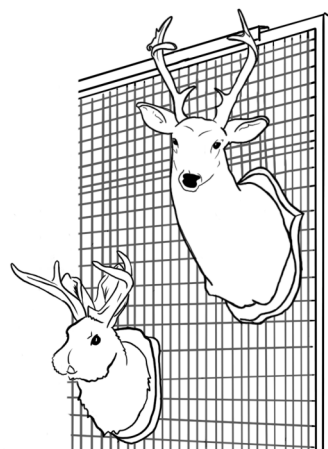


MATERIAL STORAGE

FRAMED WORKS

The primary storage methods for framed works are vertical storage screens and slotted shelving. Because frames are built to hang, vertical storage screens are ideal, but slotted shelving can be a good alternative when organized carefully.

Vertical storage screens are made with a metal frame and perforated metal or wire mesh. They support framed objects by allowing them to hang using the existing frame hardware. Vertical storage screens can be mounted to a wall or installed on tracks to allow for compact storage. They work well for large and/or ornate frames that would be damaged by supporting their own weight.



TIPS FOR VERTICAL SCREENS

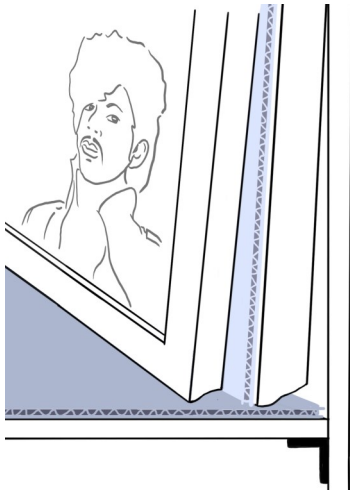
- In addition to framed works, vertical screens can be used for the storage of other wall mounted objects like taxidermy.
- Aluminum screens are preferable to steel because of their light weight.

Ceiling tracks allow for smoother movement than floor tracks; take care when moving tracked screens to prevent excess vibration.

The other option for the storage of framed works is **slotted shelving**. Slotted shelves have vertical dividers that allow for compact storage. Slotted storage is roughly 50% more space efficient than hanging racks, but is not suitable for all framed artworks. Damaged, unstable, oversized, or works with ornate frames are not suitable for slotted storage. This method works best for uniformly-sized artwork in simple, flat frames.

TIPS FOR SLOTTED SHELVES

- Line slots with an inert, high quality padding material such as coroplast or archival board.
- Store no more than four artworks together in a single slot.
- Use separator board between each artwork and orient frames front to front or back to back.
- Group framed works of similar size together.



UN-FRAMED WORKS ON PAPER

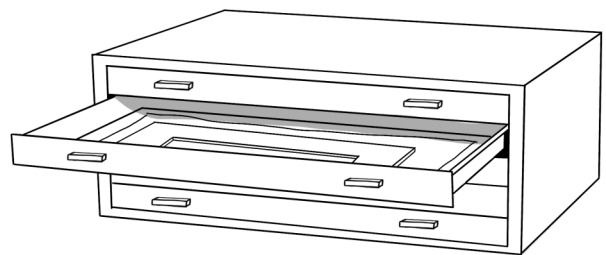
The safe storage of unframed works on paper is very size-dependent. The two main storage methods for WOPs are flat files, which are

cabinets with large shallow drawers, and storage in acid-free boxes on shelving.

Flat files provide good protection when used properly and come in sizes that accommodate large paper artworks. While they can be custom built, standard sizes for works on paper allow for modular organization and stacking. Flat files with gasketed seals buffer objects from large shifts in temperature and relative humidity and are a good option for storage spaces with environmental control challenges.

TIPS FOR FLAT FILES

- Select powder coated steel flat file cabinets.
- Store works of art on paper in folders, mats, or enclosures *within* flat files to minimize handling and protect image media.
- Group paper artworks by size, with the larger objects on the bottom of the drawer.
- Flat file drawers should be uncrowded with at least 1" space at the top.



Smaller works of art on paper can be also be stored in acid-free boxes on shelves. **Powder coated steel modular shelving** is adjustable and applicable to the storage of many materials, including boxed paper items. When choosing shelving, 30" is a good depth for most mixed collections. Archival storage boxes can be

purchased premade or custom constructed. Shallow boxes can be stacked on shelves to maximize space with heavier boxes on the bottom to prevent crushing.

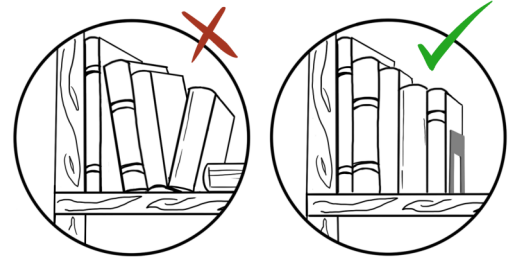
TIPS FOR MODULAR SHELVES

- Store any paper artwork larger than a legal-sized document flat.
- Store paper materials with structural or image instabilities flat.
- Store photographs and fragile or delicate paper in folders or enclosures within boxes.
- Works of art on paper can be matted using inert, high quality materials for additional protection and ease of access in storage.
- Solander and clamshell boxes are structurally robust boxes that are well-suited to storing matted artwork.

BOOKS

Books and albums can be safely shelved vertically or horizontally depending on their needs. When choosing **bookshelves**, note that the furniture material is an important consideration. Ensure that bookshelves are solidly constructed and be mindful of slots, pegs, and recesses that could cause damage to collections when shelved.

Books in good structural condition can be shelved vertically, filling the shelf sufficiently to provide support for each book without being overcrowded. If shelves are not full, use bookends and/or spacers to keep volumes in an upright position. Shelf heavy, oversized volumes and volumes in poor structural position *horizontally*.



TIPS FOR BOOKSHELVES

- Position books on the shelf so that there is space between the book and the back of the shelf; this allows for airflow and safer handling.
- Store books with clasps *flat*, not stacked, to avoid damaging adjacent volumes.
- Damaged books can be supported by simple boxes (“phase boxes”) or wrappers.

High density storage is a good solution for large volume collections of books and other materials. High density systems are composed of rows of shelves, cabinets, flat files, etc. that are installed on carriages mounted on steel tracks that travel back and forth (also known as compact shelving). This allows whole rows of storage units to be compressed for space conservation, or expanded for access to the desired storage unit. These systems maximize efficiency in small spaces, saving roughly 30% in floor area when compared with un-compacted shelves.

TIPS FOR COMPACT SHELVING

- The load bearing capacity of the building’s infrastructure must be considered before installing high density storage.
- Choose systems with minimal vibration.

- This is not a low-cost solution, but federal and state grants are available to offset the expense.



TEXTILES

The storage needs of textiles are dictated by the fact that they need evenly distributed support to support their weight and prevent deformations and damage. Depending on the shape and size of the textile, hanging-, rolled-, or boxed storage may be most appropriate.

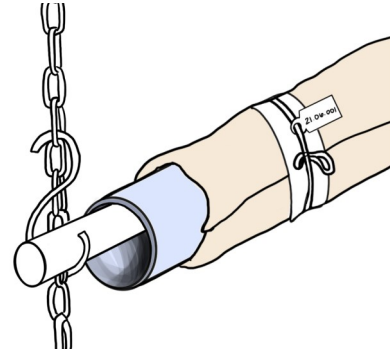
Wardrobe storage cabinets are a good option for costume collections in stable condition. Quality wardrobe storage furniture includes rods for hanging as well as additional shelving and drawers for costume accessories and flat storage.

TIPS FOR WARDROBE CABINETS

- Store hanging collections on padded hangers made with non-damaging materials.
- Garments that are too fragile to hang should be stored flat

Rolled storage is an excellent space-saving option for large, uniformly flat textiles. Textiles are rolled onto heavyweight acid-free tubes and wrapped with a dustcover made of Tyvek or un-

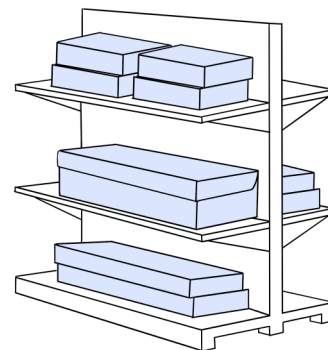
dyed cotton. Tubes can be stored boxed, or on dowels supported by brackets or metal chain link. Some cabinet systems have drawers with bracket supports good for small rolled textiles.



TIPS FOR ROLLED TEXTILES

- Textiles must be uniformly flat and in good condition to be rolled.
- The larger and heavier the textile the sturdier and larger the tube should be.
- Roll textiles face inwards - with the exception of dimensional textiles like rugs and embroidery, which should be rolled face out.

Fragile garments and other textiles that cannot hang or be rolled should be stored shelved in boxes. **Cantilevered open shelving** is excellent for storing long textile boxes without the limited mobility caused by support bars on traditional open shelving.



TIPS FOR BOXED SHELVING

- Choose a box size that minimizes the number of folds necessary to store the textile.
- Pad the folds with acid-free tissue.
- Store frequently requested collection objects on accessible shelves.
- Use carts to move large boxes. Handle large and heavy objects in teams.

3D OBJECTS

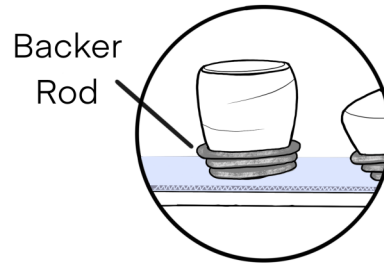
The category of “3-dimensional objects” is incredibly diverse, ranging from tiny natural history specimens to large-scale sculpture.

Modular shelving and cabinet systems are commonly used for small/medium sized objects and **pallets** are ideal for oversized objects.

Open shelving (as opposed to closed cabinets) is appropriate for boxed objects or objects that are not susceptible to environmental damage like stable ceramics, glass, and metals.

TIPS FOR OPEN SHELVING

- Open shelving works well when dealing with well-controlled storage areas where light, temperature, humidity, and pollutants are monitored and mitigated.
- Shelved, un-boxed objects often require some form of support, such as a handling board or collar, to prevent damage caused by physical forces.
- Store objects of similar type together unless use considerations require a different approach. For example: collections frequently requested for research may be stored in a separate, more accessible cabinet.



Cabinet storage is ideal for vulnerable collections and fluctuating environments. Powder-coated metal cabinets with gasketed seals provide the greatest protection to collections, but less tightly sealed cabinets also protect objects from light, dust, and other risks. Cabinets are available in many different configurations including units with shelving, drawers, and hanging storage. Glass front cabinets provide access and visibility in addition to protection.

TIPS FOR CABINETS

- Drawers can be modified with subdividers for small objects.
- Hazardous collections such as heavy metal-containing taxidermy are best stored in cabinets to provide containment and to protect other collections. Care should be taken when opening cabinets containing hazardous materials as chemicals can build up over time.

When storing **oversized objects**, it is important to prioritize ease of movement. Because oversized objects are most often damaged during moves, storing them on pallets or dollies allows for support and facilitates safe transportation. Palletized objects can be lifted onto shelving using a forklift.

TIPS FOR OVERSIZE OBJECTS

- Additional framing can be added to pallets to support fragile objects.
- Dust covers can be made from polyethylene sheeting or washed, undyed cotton fabric.

Investing in Long-term Care

While storage furniture can be expensive, it is important to keep in mind that high-quality furniture is a long-term investment. Inert and well constructed modular collections storage furniture will adjust to suit the needs of an institution and protect collections for decades.

Including plans for storage furniture modification, acquisition, and replacement in long-range preservation plans signals to stakeholders and funders that your institution is committed to sustained preservation. MACC maintains a list of federal, state, and private grants on the [website](#) in addition to providing grant writing assistance.

ADDITIONAL RESOURCES

- MACC's Storage: Housing & Support Technical Leaflet
- [Stash C: Storage Techniques for Art, Science, and History](#)
- CCI's [Coatings for Display and Storage in Museums](#)
- SPNHC's [Preventive Conservation: Collection Storage](#)

The Midwest Art Conservation Center is a non-profit organization for the preservation and conservation of art and artifacts, providing treatment, education, and training for museums, historical societies, libraries, other cultural institutions, artists, and the public.

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