

Storage for Infinity: Part 1

Museum 202, Section 4

Storage Furniture

presented by

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Course Agenda

Section 1: Storage Philosophy

Section 2: Agents of Deterioration

Section 3: Storage Facilities

Section 4: Storage Furniture

Section 5: Conclusion

Section 4 Agenda

- 1: Introduction**
- 2: Shelving: Stationary and Compactor**
- 3: Cabinets: Stationary and Compactor**
- 4: Drawers and Trays**
- 5: Flat Files**
- 6: Vertical Screens**
- 7: Rolled Storage**
- 8: Pallets / Rolling Mounts**

Storage Furniture: New Furniture

Metal best:

- anodized aluminum**
- coated steel**
 - powder coated**
 - fully cured baked enamel (or formaldehyde emitted)**
 - chromium plating**

Storage Furniture:

- **Match furniture style to collection**
- **Make sure it can be completely cleaned**
- **No light leaks**
- **Tight gaskets**
- **At least 6 inches off the floor**
- **Large furniture, consider putting on wheels to ease cleaning**

No artifact should bear
the weight of another

STACK NOTHING

Storage Furniture Types

- **Open Shelving**
 - mounted to walls or free standing
- **Cabinets**
- **Flat Files**
- **Vertical Screens**
- **Rolled Storage**
- **Pallets / Platforms**
- **Compactor Units**

Shelves

- **Wood**
- **Metal**
- **Cantilevered**
- **Home-made**
- **On compactor rails**
- **With small drawers/shelves to reduce head space**
- **Art bins**

Storage Furniture:

Choosing Shelving

- **Strong enough for intended use**
- **Sufficient thickness / gauge to not warp or bend when loaded**
- **Not sway from side to side when loaded**
- **Accessibility and safe handling are important**

Storage Furniture: Installing Shelving

- **Bolt to walls, ceiling, flooring**
- **Cross brace with each other**
- **Lowest shelves 6 inches above floor**
- **Store oversized and heavy items at or below eye level**
- **Space shelves to minimize head space**

Wood shelving



Sealed wood
shelves
padded with
quilted cotton.

Harness storage

Buffalo Bill Historical Center

Cody, Wyoming

Open shelving



Furniture storage
Montana Historical Society
Helena, Montan

Open Metal Shelves

May torque unless braced.

Flimsier than closed shelving (sides and back solid)

**Open metal shelving
with large trays.**

**Buffalo Bill Historical Center
Cody, Wyoming**



Open shelving

Pallet shelving
for furniture/
textiles/ boxes.
Fixed powder
coated metal
and Formica
coated wood
shelves.

**McFarland
Curatorial Center
Virginia City, Montana**



Closed shelving

Powder coated metal shelving on compactor rails.

Secondary acid-free cardboard shelving.

Basket storage

**Abbe Museum
Bar Harbor, Maine**



Padded Shelves

- Bubblewrap
- Microfoam
- Ethafoam
- Nalgene
- Volara
- Zotefoam
- Mattress covers
- Quilted cotton



Homemade Metal Shelves

Materials

- Perforated metal angle iron frame
- Perforated metal sheet shelves
- Screws and bolts.

Shelf in odd space

Science Museum of Minnesota
St. Paul, Minnesota



Shelves within Shelves

Reducing Head Space



Tray support lessens head space on shelf.

Wasted space - excessive head room

Doubling shelf space for ceramics

**Science Museum of Minnesota
St. Paul, Minnesota**

Shelves within Shelves

Reducing Head Space



Large flat objects on narrow shelves

Science Museum of Minnesota

St. Paul, Minnesota

Shelves within Shelves

**Blue polystyrene
insulation board uprights**

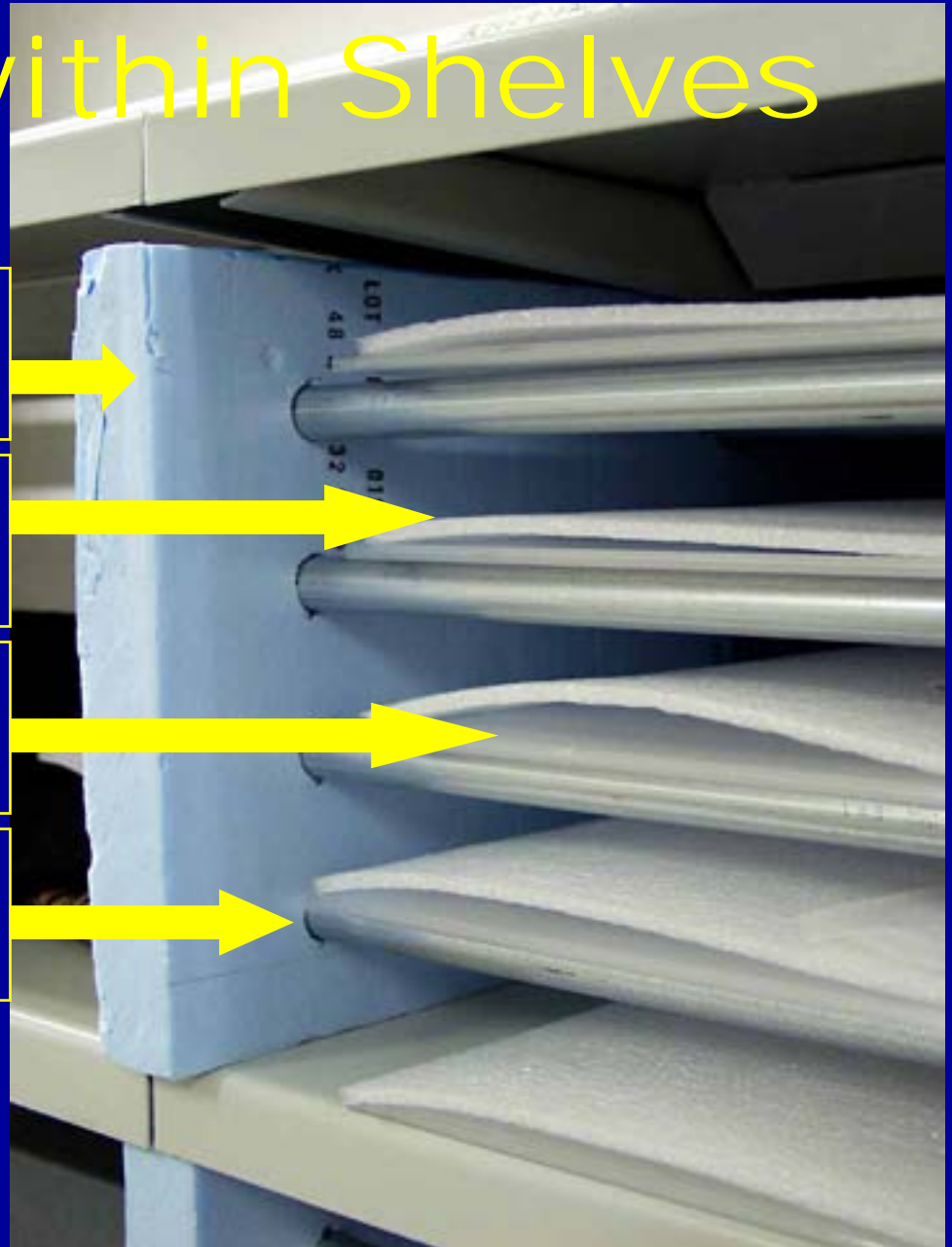
**Thin polyethylene foam
padding**

**Corrugated polycarbonate
rigid sheet support**

**Metal rod support holds
rigid sheets**

Shelf detail

**Science Museum of Minnesota
St. Paul, Minnesota**



Shelves within Shelves

Reducing Head Space

Rigid white polyvinyl chloride pipe screwed together to form runners and supports for commercial acid-free box trays. System designed by engineer volunteering at museum.



PVC plumbing supports for trays.

Science Museum Museum of Minnesota

St. Paul, Minnesota

Shelves within Shelves

Reducing Head Space



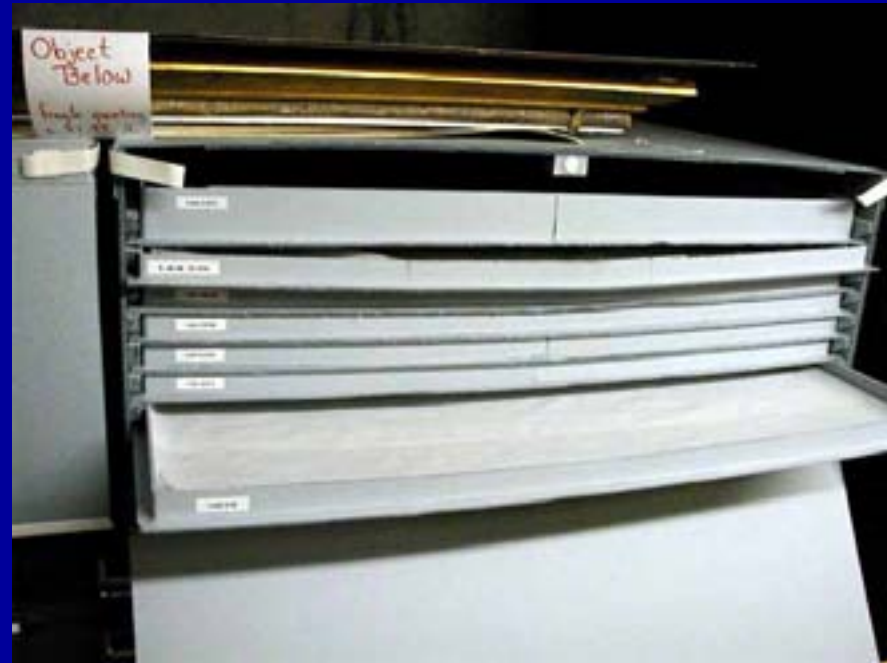
Acid-free cardboard shelves for china plates.
Student solution to storage problem at their museum, ASDM video workshops.

Shelves within Shelves

Reducing Head Space



Closed



Open

Small, flat textiles stored in separate acid-free cardboard trays. Trays held in box by C-channel.

**Buffalo Bill Historical Center
Cody, Wyoming**

Shelves in Cabinets

Cowboy hats, an awkward shape, maximize shelf space with mounts that put them on different levels.



Cowboy hat storage
Buffalo Bill Historical Center
Cody, Wyoming

Shelves Sized to Collections



**Metal shelves with
textile boxes**

**Montana Historical Society
Helena, Montana**



**Metal shelves fit
archives boxes**

**Wright County Historical Society
Buffalo, Minnesota**

Stacked Boxes

bottom boxes
may collapse

**Metal shelves with
textile boxes**

**Montana Historical Society
Helena, Montana**



Avoiding All Stacking

**Narrow metal shelves
in archives**

**Wright County Historical Society
Buffalo, Minnesota**



Homemade Cantilevered Shelves



**Montana Historical Society
Helena, Montana**



Homemade Cantilevered Shelves

Steel decking on
powder coated
welded supports.
Slanted supports
bolted to cement
storage floor.

Furniture Storage
Montana Historical Society
Helena, Montana

Cantilevered Shelves

**Commercial
construction**

Powder coated

Stores

- Furniture
- Large objects

**Science Museum of Minnesota
St. Paul, Minnesota**



Cantilevered Shelves



Cantilever shelves
Wright County Historical Society
Buffalo, Minnesota

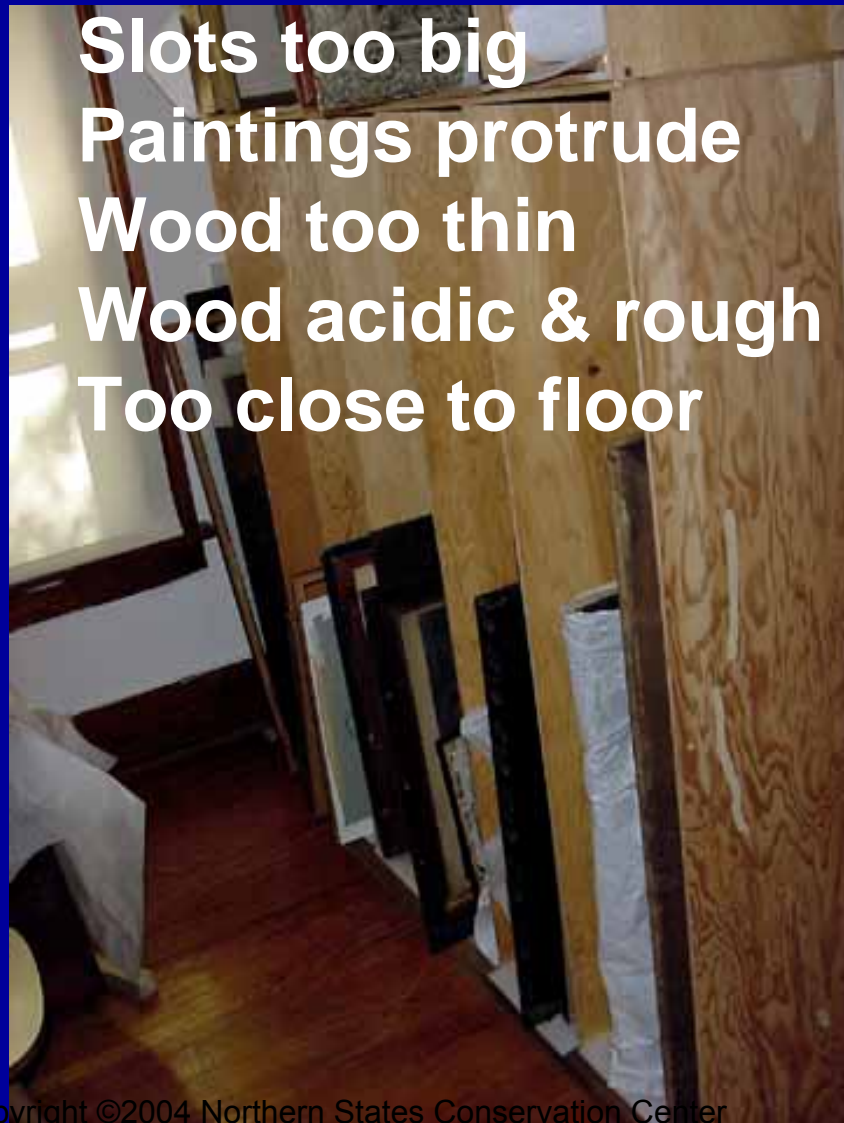
Art Bins

- **Frames stacked face to face, back to back**
- **Separators/pad between each frame**
- **2-4 per slot**
- **Slots sized to art**
- **No leaning**
- **No stacking**
- **Slots sized to artwork**
- **Paintings don't protrude into aisle**

Bad Art Bins



Slots too big
Paintings protrude
Wood too thin
Wood acidic & rough
Too close to floor



Homemade Art Bins

Materials

- Uncoated plywood

Problems

- Plywood warps
- Acidic
- Rough surface

Old Art Bins

Montana Historical Society
Helena, Montana





Old art bins
Montana Historical Society
Helena, Montana

Art Bins

Styrofoam bead board separator too small and sticks to surfaces.

Too much leaning.



Homemade Art Bins

Materials

- Square metal rod
- Metal sheeting
- Welding
- Powder coating
- Acid-free cardboard separators

New Art Bins

Montana Historical Society
Helena, Montana





Powder coated metal
Montana Historical Society
Helena, Montana

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Art Bins

Laminated wood bins.

Vesterheim Museum
Decorah, Iowa



Homemade Art Bins

Materials

- Perforated metal shelving
- Polyester clothes line
- 1/4 inch polyethylene foam



**Metal shelves with
taut rope separators**

**Wright County Historical Society
Buffalo, MN**

Homemade Art Bins



Details of metal shelves with taut rope separators

**Wright County Historical Society
Buffalo, MN**

Homemade Art Bins

Problems

- Rope sags

Solutions

- Thread rope through metal rod

**Metal shelves with taut
rope separators**

**Wright County Historical Society
Buffalo, MN**



Dust Covers

- Muslin, old white cotton sheets
 - wicks water, keep 3 inches (5 cm) from floor.
- Polyethylene sheeting
 - may trap moisture causing mold
 - static attracts dust and harms fragile items
 - use over cotton dust cover
- Tyvek
 - static
 - allows vapor transmission, but not liquid

Dust Cover Techniques

- Drape over items
- Drape over a frame
- Curtain on front of shelves
 - Pleated, gathered or flat
 - Held open with clips, rolled up, or pulled up like a balloon shade.
- Stretched over front of shelf
 - Magnets
 - Velcro

Dust Cover Drapes



Compactor Systems

Electronic

- Where is power?
- Floor: hazard with flooding
- Could close on a person

Manual

- Should be relatively easy to move

Shelves on Compactor Track



Compactor shelving was originally designed for libraries.

Shelves on Compactor Track

Possible problems

Vibration might damage fragile bird mounts.
Compactor must run smoothly.

Specimens that protrude beyond shelf will be damaged.



Closed Shelves on Compactor Track



**Manual
controls
best for
storage.**

Shelves on Compactor Track



What should NOT be on moving shelves?

- Wet collections
- Collections damaged by vibration
- Glass, ceramics
- Flaking surfaces

Cabinets

- **Wood**
- **Metal**
- **Commercial**
- **Home-made**
- **On compactor rails**
- **With drawers, shelves or rods**



Wood Cabinets

Problems

Acids from wood
Security for guns

Solutions

Wood has three coats of
water cure polyurethane
varnish.

High security area

Gun storage

Montana Historical Society
Helena, Montana

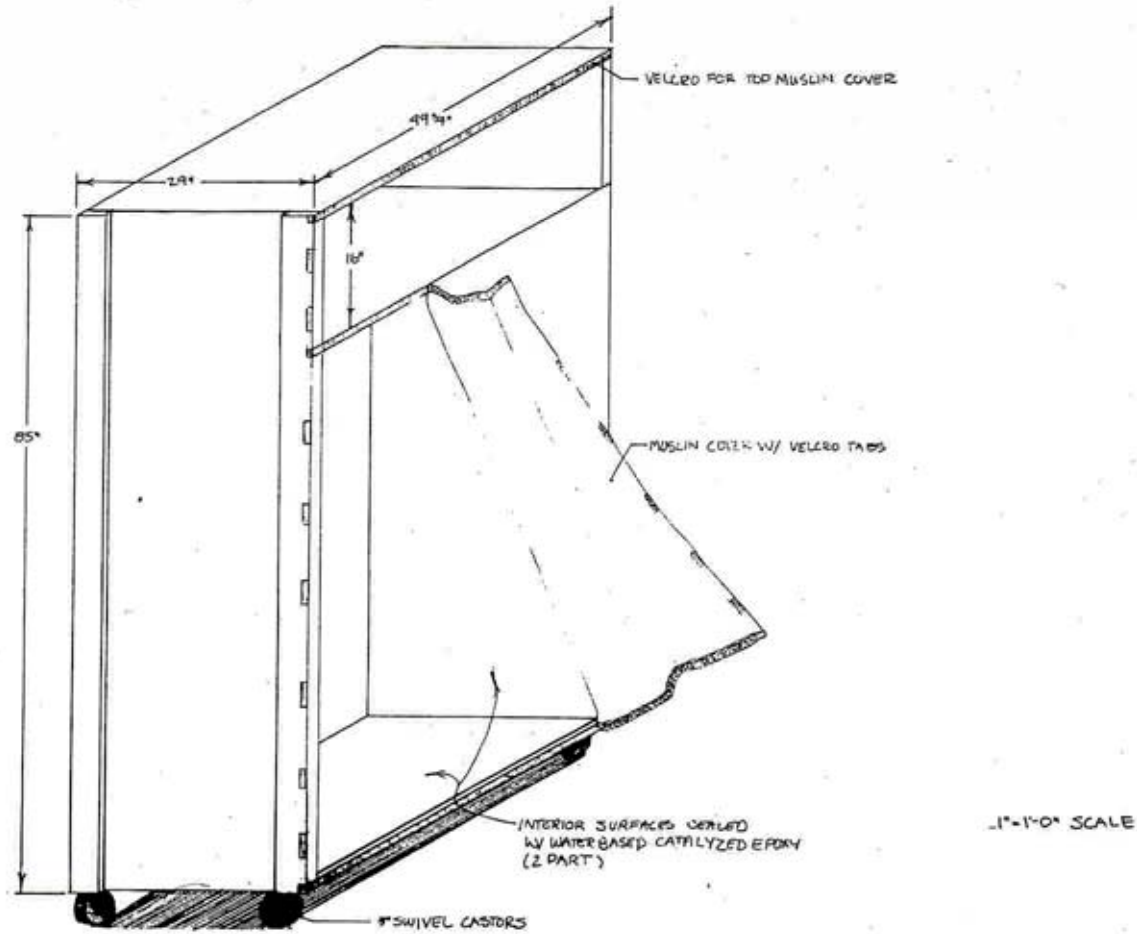
Homemade Wood Drawers



- Hard to open
- Generates sawdust
- Warps
- Acidic
- No dust or light protection

Old wood drawers

Montana Historical Society
Helena, Montana



Costume wardrobe blueprints

Montana Historical Society

Helena, Montana

Homemade Costume Wardrobes

- Wood sealed with water-cure polyurethane
- On wheels
- Tyvek lining inside
- Tight dust/light covers

Costume wardrobes

Montana Historical Society
Helena, Montana



Homemade Costume Wardrobes

- Shelf for hats
- Lining reduces snags
- Space for costumes
- Padded hangers
- Dust cover velcros on

Costume wardrobes

Montana Historical Society
Helena, Montana



Homemade Costume Wardrobes

- Detail of Velcro holding dust cover
- Detail of fabric lining



Costume wardrobe

Montana Historical Society
Helena, Montana



**Retrofitting wood
drawers with Marvelseal**

**Siouxland Heritage Museums
Sioux Falls, South Dakota**

Cabinets with Shelves on Top

Gun storage cabinets.
Buffalo Bill Historical Center
Cody, Wyoming



Commercial Cabinets

- Powder coated steel
- Different drawer depths
- Fixed shelves and rolled storage drawers optional.
- Fit on compactor carriages

Storage cabinets with drawers.

Science Museum of Minnesota
St. Paul, Minnesota



Commercial Cabinets



Storage cabinets with shelves and drawers.

Buffalo Bill Historical Center

Cody, Wyoming

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Cabinets

- Contains dangerous, sensitive, or limited access materials
- Exterior notification - simple red fabric strips

Warning flags

NAGPRA Material

**Science Museum of Minnesota
St. Paul, Minnesota**

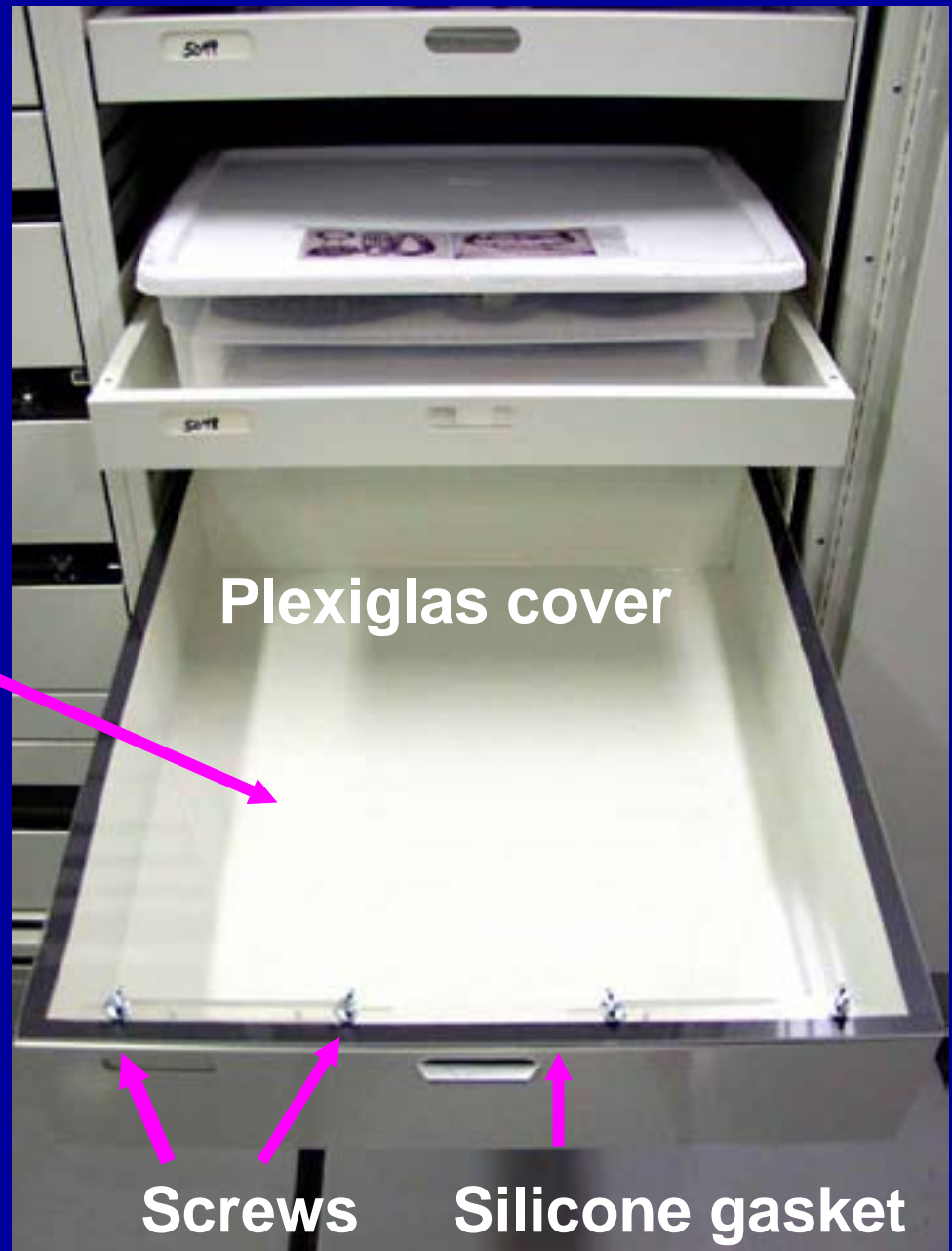


Retrofitting Cabinets

Drawers sealed with clear cover provide stable low RH for bronze storage.

Bronze storage drawers

Science Museum of Minnesota
St. Paul, Minnesota



Plexiglas cover

Screws

Silicone gasket



Moccasins inside metal drawers

Montana Historical Society
Helena, Montana

Homemade Drawers



Metal flat textile drawers

**Vesterheim Museum
Decorah, Iowa**

Homemade Drawers

Materials

- L-stock welded
- Flat stock
- Acid-free foamcor

Light, shallow
drawer



Large flat storage drawers for flags

Vesterheim Museum
Decorah, Iowa

Homemade Drawers

Materials

- Aluminum baking pans
- Wood cabinet
- Latex paint
- Formica

Excellent for
small, flat textiles



Cooking tray drawers

Vesterheim Museum

Decorah, Iowa

Drawers in Commercial Cabinets



Drawers with specimens

Science Museum of Minnesota

St. Paul, Minnesota

Using Old Cabinets

- Probably baked enamel
- Choose most inert collection
- Monitor for problems

Archaeology storage cabinet

Montana Historical Society
Helena, Montana



Flat Files

- Narrow drawers to store large flat items, usually blueprints, art on paper, posters
- Items should be individually protected
 - encapsulation
 - storage mats (weight on mats, not paper)
- Remove front clips and plastic drawer covers
- Line drawer with acid-free blotter paper
- Do not stack too high
- Place blotter on top of stack

Flat File

Matted artwork best protected



Flat File

Object too big



Flat File



Flat file

**Wright County Historical Society
Buffalo, Minnesota**

Flat File



Encapsulated maps inside flat file

**Wright County Historical Society
Buffalo, Minnesota**



Damaging clip at drawer front. Try to remove it.

Flat file

Wright County Historical Society

Buffalo, Minnesota

Vertical Screens

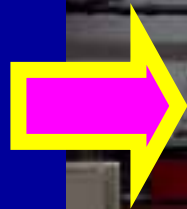
- Usually rolling
- Can be stationary/fixed on a wall
- Artwork hangs from S-hooks
- Best if S-hooks attach to two D-hooks on each side of frame
- Minimal vibration for rolling racks (best if track on floor and above)
- Should not swing

Homemade Vertical Screens

- All-metal best
- Sturdiest: Chain link fencing, perforated metal
- Weaker: Chicken wire, hardware cloth
- Use garage door tracks and wheels
- For floor track, raise floor with decking (pests) or embed in cement (better)
- Do not use perforated fiberboard

Vertical Screens

Sliding
Art
Racks



MacAlester Art Gallery
St. Paul, Minnesota

Homemade Vertical Screens

Wood frame



Paintings racks

**Montana Historical Society
Helena, Montana**

Vertical Screens



**Buffalo Bill Historical Center
Cody, Wyoming**

Vertical Screens



Vertical Screens



Rolled Storage Racks



- Roll suspended from ends or on a rod
 - Suspended from brackets on wall or post
 - Suspended from support underneath
 - Suspended from sides of a drawer
 - Suspended from sides of a tray
 - Suspended from a chain with S-hooks
- Rod
 - Wood dowel warps / bends
 - Metal tube strongest

Homemade Rolled Storage Rack

Materials

- Chain
- Wood dowels
- Welded metal rack
- S-Hooks
- Twill tape,
- Mylar
- Cotton fabric



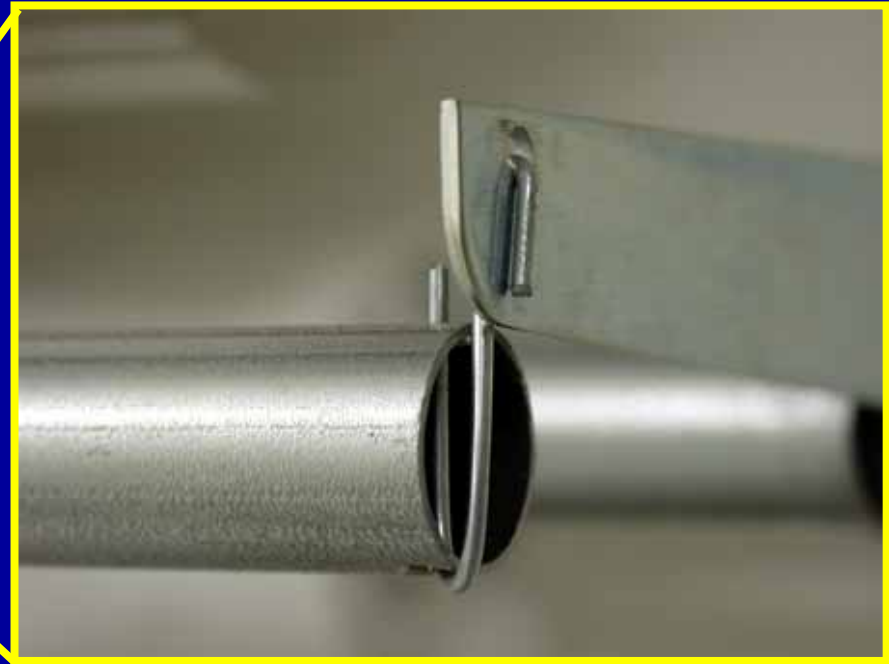
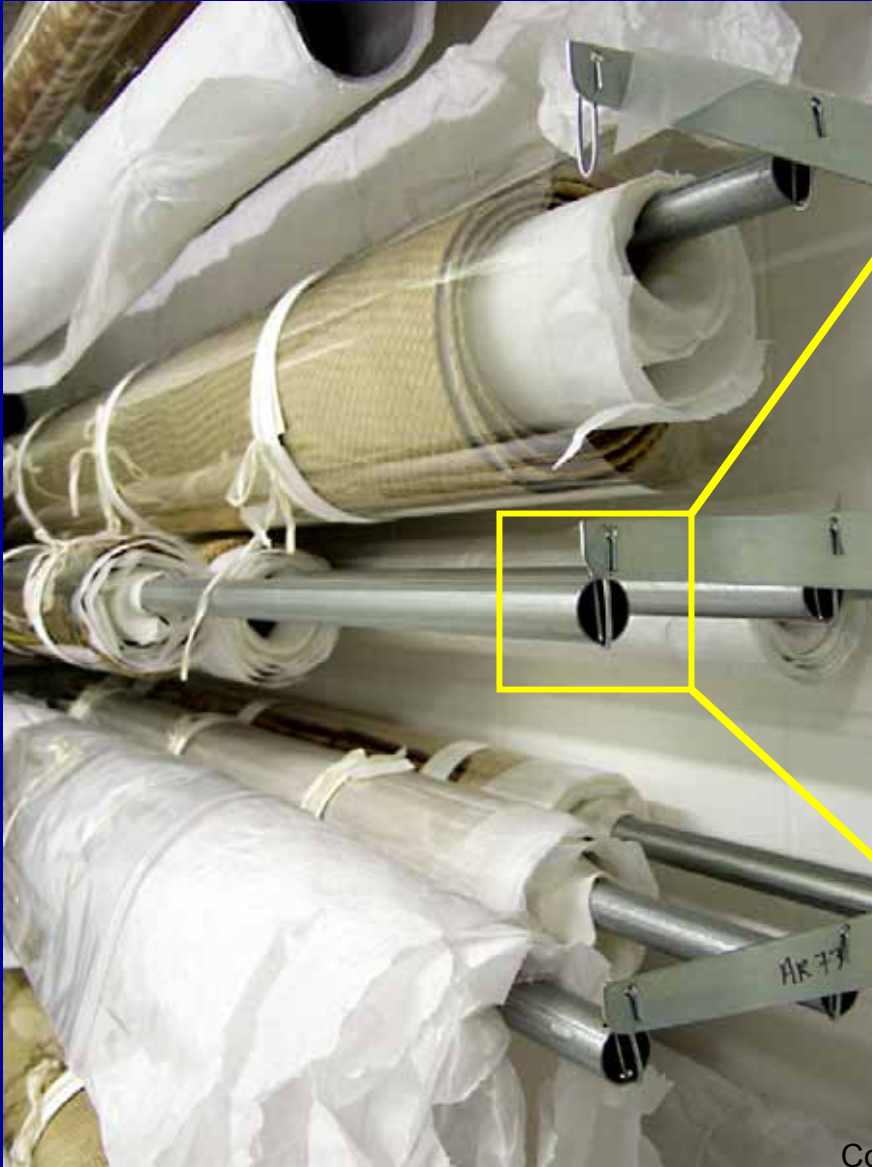
Rolled Storage Rack

Materials

- Aluminum rod
- Tube lined with Marvelseal, polyester quilt batting, and cotton stockinet.
- Metal brackets
- S-hooks
- Acid-free tissue paper
- Cotton twill tape



Rolled Storage Rack



Rolled storage detail
Science Museum of Minnesota
St. Paul, Minnesota

Rolled Storage Racks



Rolling wood cabinets

Buffalo Bill Historical Center

Cody, Wyoming

Compactor Rolled Storage



Quilt garage
Montana Historical Society
Helena, Montana

Compactor Rolled Storage



Quilt garage - compactor rolled storage

**Montana Historical Society
Helena, Montana**

Rolled Storage Rack

Compactor system built in-house

- Garage door track
- Hanging painted wood at each end
- Wood T-bars
- Metal stabilizer across bottom
- Metal hanging rods
- Central aisle



Central aisle

Racks move into aisle.

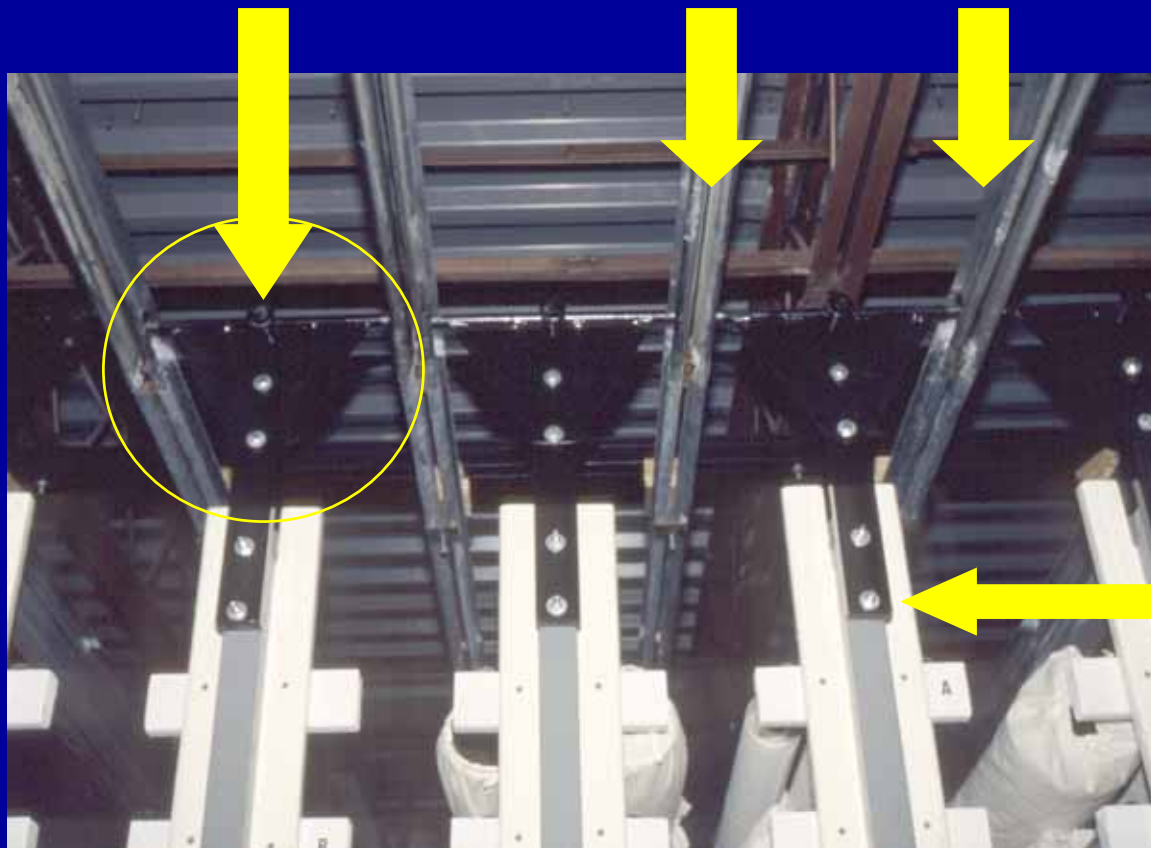
Racks

Rolled Storage Rack

Looking up at the ceiling

Wheels on track

Garage door track



Wood ends

Placing Roll on Rolled Storage Rack

**Compactor rolled textile
racks**

**Vesterheim Museum
Decorah, Iowa**



Hanging Costume Racks



Compactor costume racks

Vesterheim Museum

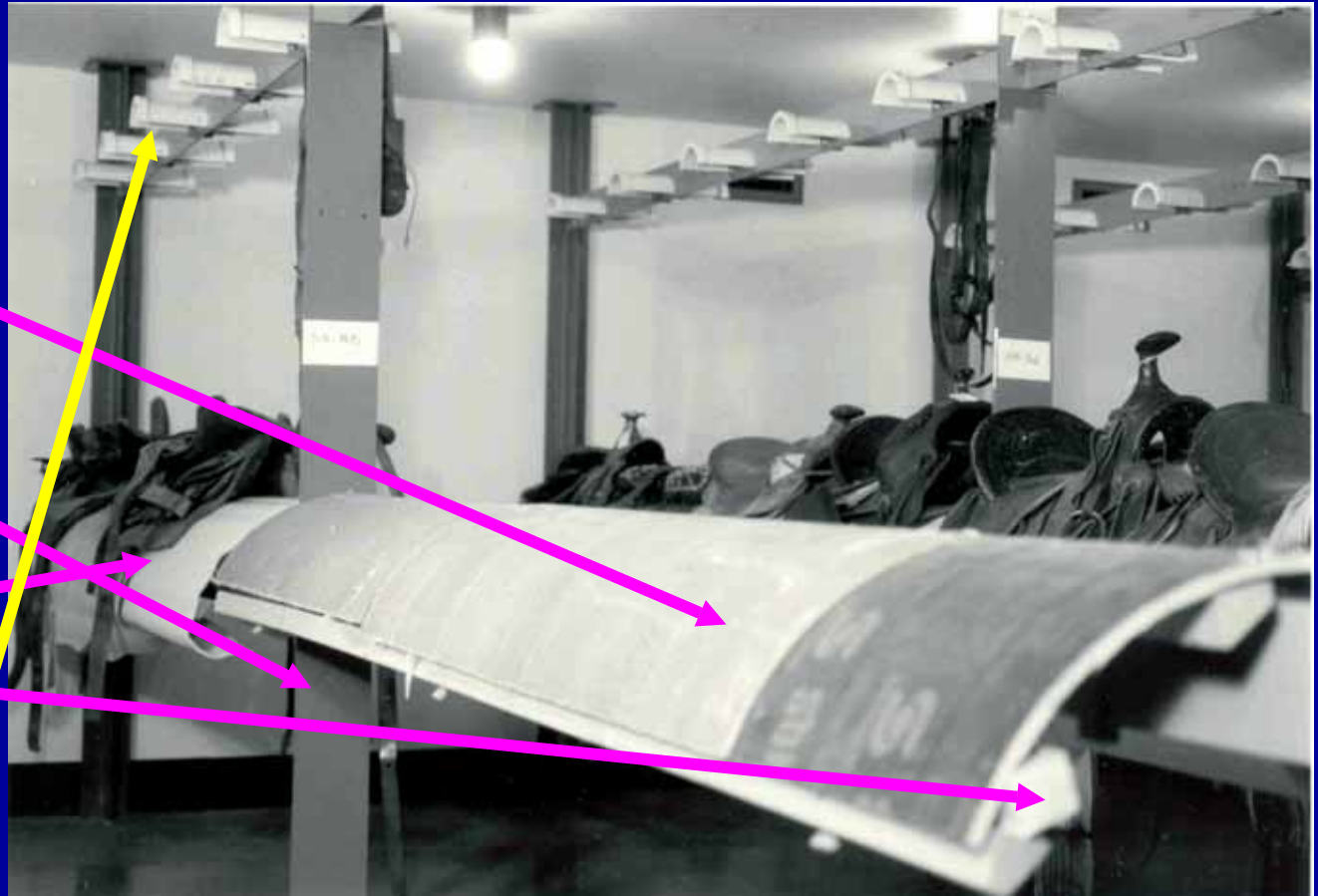
Decorah, Iowa

Saddle Storage Racks

Materials

- Sono tubes (acidic cardboard cement forms)
- Fixed metal uprights
- Polyethylene padding
- Wood support
- PVC pipe

Should seal with aluminum foil or Marvelseal



Saddle rest

**Montana Historical Society
Helena, Montana**

Saddle Storage Racks



Saddle rest

**Montana Historical Society
Helena, Montana**

Saddle Storage Racks

Materials

- Powder coated metal
- Wheels
- Padding

Saddle rack frame

Buffalo Bill Historical Society
Cody, Wyoming





Rolling saddle racks

Buffalo Bill Historical Society
Cody, Wyoming

Saddle Storage Racks

Saddles on racks
Buffalo Bill Historical Society
Cody, Wyoming





Saddle Storage Racks

Materials

- Perforated metal stock
- PVC tube
- Ethafoam
- Cotton stockinette

Saddle racks

Science Museum of Minnesota
St. Paul, Minnesota



Saddle racks detail

Science Museum of Minnesota
St. Paul, Minnesota

Saddle Storage Racks

Materials

- Wood
- Padding
- Cotton dust covers

Fixed saddle racks

Buffalo Bill Historical Society
Cody, Wyoming



Rolling Pallet

**Good for heavy
furniture and
sculpture.**

**Furniture dolly
MacAlester Art Gallery
St. Paul, Minnesota**



Rolling Pallet

Furniture dolly

Wright County Historical Society
Buffalo, Minnesota



Rolling Pallet

Wheel Detail



Furniture dolly
Wright County Historical Society
Buffalo, Minnesota

Rolling Pallet



Rolling drum cradle
Science Museum of Minnesota
St. Paul, Minnesota

Take a Break!



Brandt

Aurora