



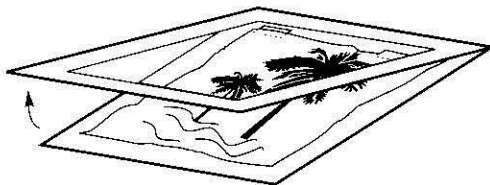
Conserve O Gram

July 1993

Number 13/1

Window Mats For Paper Objects

The window mat is essentially a rigid folder with a paper object, such as a print or photograph, attached to the inside. The object is viewed through a window cut into the top matboard.



Several criteria must be met to achieve what is called *museum quality matting*.

- The materials touching the object must not degrade over time or release chemicals that could cause damage to the object.
- The window cut into the mat must allow full viewing of the image *and* provide adequate coverage of the object's edges for protection in handling.
- The paper object must be attached to the back matboard with a reversible, chemically neutral adhesive.
- The attachment must allow movement, so the paper object can expand and contract with changes in relative humidity, without creasing, cockling, or tearing.
- The hinge adjoining the two pieces of the folder must be able to withstand repeated flexing without breaking.

Objects for Window Matting

Window matting is generally reserved for works of art on paper, such as drawings, paintings, watercolors, and prints; and for photographs and documents, such as birth or marriage certificates, old land deeds, and diplomas,

especially if they are decorated. For this method, the image or essential information must be on only one side of the paper. A double-sided paper object presents certain matting complications that are beyond the scope of this *Conserve O Gram* and for which a paper conservator should be consulted. (See *References* on page 4, and refer also to *Conserve O Gram* 13/4 and 14/1 for alternative mounting techniques.)

It is advisable to window-mat any artwork or document that has a fragile image susceptible to crushing or abrasion. A disadvantage of a paper or clear polyester folder is that the object is generally loose inside the folder and can slide when the folder is lifted. An additional disadvantage of polyester folders is that they build up a static charge. This static charge will pull up pencil, pastel, chalk, charcoal, wax seals, and crumbling watercolor media. In a window mat, the image has no contact with a surface that might cause damage to fragile media. For a more complete discussion of various storage techniques for paper objects, refer to the *NPS Museum Handbook*, Part I (Rev 9/90), Appendix J.

Caution: Before attempting to mat or hinge a museum object for the first time, practice this technique on a non-museum piece of paper.

Materials

All the matting materials that contact the paper object must be long-lived and chemically neutral. A discussion of paper quality with an explanation of terms such as acid-free, lignin, calcium carbonate, and buffering is provided in the *NPS Museum Handbook*, Part I (Rev 9/90),

Appendix J. Materials can be purchased from vendors of archival quality supplies. *NPS Tools of the Trade* also provides a listing of supplies and materials available to parks.

Matboard. The best matboard is made from 100% cotton fibers with an alkaline material, calcium carbonate, added to buffer the object against organic acids that are produced as paper ages. Acceptable but slightly less desirable matboards are made from purified chemical woodpulp which is lignin-free and buffered with calcium carbonate.

Unacceptable matboards are made of a sandwich of colored papers on the surface and a core of poorer quality groundwood matboard. The acids formed as the core matboard ages will migrate out along the cut of the window and discolor the paper object where it touches. The yellow line commonly observed on artwork framed in this manner is called *acid mat burn*.

Tape. The two parts of the matboard folder can be hinged with a strong linen fabric tape that is coated with a vegetable gum adhesive. Strong paper tapes with gum adhesives are sometimes used, but may not withstand being opened and closed as often as a tape with woven fibers. One brand of strong synthetic tape with a neutral self-adhesive is Tyvek® tape. This tape is made of polyethylene fibers with an acrylic adhesive. It does not require moistening to adhere it to the matboards. **NOTE:** These tapes are used only on the matboard, *never* on the object.

Japanese paper. The hinges used to attach the paper object to the back matboard are made from Japanese paper. This paper is very long-fibered, strong, and made in thinner sheets than Western-made papers. Japanese paper is made from fibers of the paper mulberry tree, and is a fairly pure cellulose containing no lignin. Select a type of Japanese paper that is strong enough to support the object, but not heavier than the object being mounted.

Adhesive. Wheat starch paste has been used in Japan for many centuries. Experience has

shown that it is always reversible and will not cause chemical breakdown in the paper it touches. Wheat starch must be cooked to make paste. Cooking directions may be obtained from any of the references at the end of this *Conserve O Gram*. Starch paste powder may also be purchased in a pre-cooked form from a conservation materials supplier. The paste is thinned with water to a smooth consistency that will adhere the hinge: not so wet that it soaks into the paper object or fails to adhere properly, or so thick that it adds thickness to the hinge.

Preparation

Assemble tools and supplies. As described above, matboard, linen or Tyvek tape, Japanese paper, and starch paste should be ready. The following additional tools and supplies will be needed:

- Mat cutter
- Mat knife and 36" steel straight edge
- Metal tape measure or ruler
- Several lead weights, each two to five pounds
- Pieces of clean blotter paper for drying the hinges after pasting
- Synthetic non-woven fabric squares (e.g., Hollytex® or Reemay®) to use between the blotter and the hinge to keep the paste from adhering to the blotter
- Stiff bristle brush about ½" wide for pasting
- Small watercolor brush for water-cutting the Japanese paper

Set up the work area. The mat cutting area must be clean and large enough to keep the paper object away from the mat cutter blade. Two different tables are ideal: one for cutting the matboard, the other for hinging the object. The cutting surface should be covered with clean cardboard which may be discarded after use.

Constructing the Window Mat

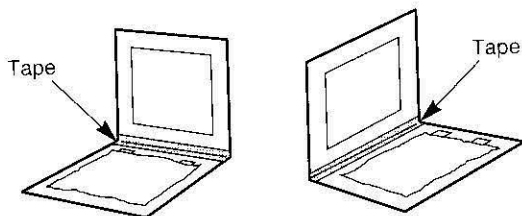
Measuring the window mat. An adequate width for the margins of the window mat is from 2" to 7" wide. A larger paper object should have larger matted margins. For example, 4" to 5"

margins are appropriate for a 24" x 30" object. A smaller object, 5" x 7" could have margins 2" to 3" wide. If the exterior dimensions are dictated by the size of the storage box or the size of a frame, place the object within the available margins for a balanced appearance. There are two ways to proportion a window mat: all four margins can be equal; another, more conventional practice allows equal margins for the top, left, and right dimensions, while the bottom margin measures approximately 30% wider.

Cutting the window mat. Cut a mat with a beveled window using a commercial mat cutter or a hand-held mat cutter guided by a steel straight edge. Cut the mat on a flat surface covered with cardboard. Change the blades when they begin to dull. The goal is a smooth, clean cut with no over cutting of the corners. This can be achieved through practice. **NOTE:** Practice on scrap pieces of matboard before attempting to cut the matboard for an object.

Cutting the back matboard. With the mat knife, cut a back matboard to the outside dimensions of the window mat. All outside edge cuts should be straight and even.

Hinging the folder. Hinge the two pieces of the folder together along the top, or along the left edge, using a linen or polyester fiber tape as described above. Conventional practice hinges the matboard along the longest edge, but there is no particular rule.



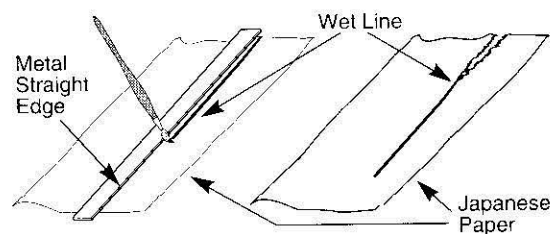
Hinging the Object

Placement. Place the object within the folder, positioning it underneath the window mat. Protect the surface of the object with a clean blotter and place a weight on the blotter to hold

the object. **Caution:** If the object is fragile, susceptible to crushing or abrasion, or, for example, is a pastel that would rub off, lift up the window and place weights at the edges. Keep the window mat open and the object weighted until the hinging is completed.

Prepare the Japanese paper hinges. Rather than blunt-cut the Japanese paper with a knife, *water-tear* the paper. This will taper the edges and tease out the fibers. To water-tear 1" wide hinges:

1. Place a ruler 1" from the edge of the paper.
2. Wet a clean watercolor brush and run it along the edge of the ruler, making a wet line down the paper.
3. Gently tear the paper along this wet line.
4. Water-tear a series of equal-sized hinges from this 1" strip, each 1" to 1½" long.



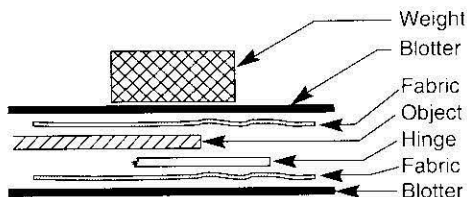
Number and placement of hinges. Hinges are attached across the top edge of the object, and always adhered to the *back* of the object, never to the front. The width of the hinges is usually 1" to 2," according to the size of the object. Small objects will require two hinges. For larger objects, a series of three to five smaller hinges is better than two wide ones; the object is better able to expand and contract between the hinges without cockling or tearing.

Paste the hinges. Use one piece of blotter paper for pasting. This technique will absorb excess water and minimize cockling problems. Using the stiff bristle brush, apply paste along the bottom ¼" to ½" of the hinge.

Apply the hinge to the object.

1. Place a blotter and synthetic fabric under the edge of the object.

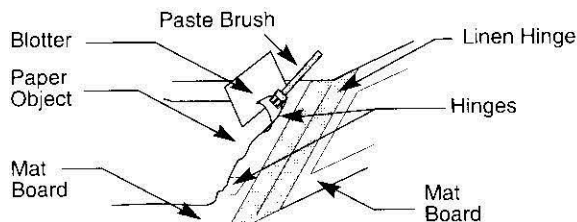
- Place the pasted hinge to the top edge of the back of the object.
- Place synthetic fabric and blotter on top of the hinged area.
- Place a weight on the top blotter.



- Change the blotter after a minute, and thereafter every few minutes until the hinge is dry and flat. This may take up to an hour, depending on the relative humidity level in the workroom. **NOTE:** The synthetic fabric does not need to be changed.

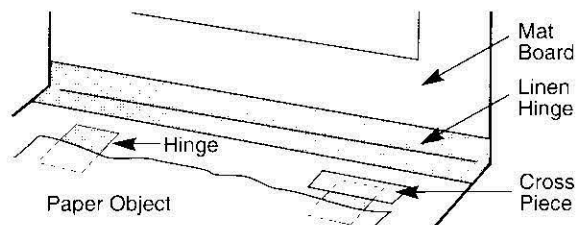
Apply the hinge to the back matboard. Keeping the object in position for desired viewing through the window mat:

- Lift up the free edge of the Japanese paper hinge.
- Apply paste to the side which will contact the back matboard. This can be done by laying it on the paste-up blotter.
- Place the hinge on the matboard.
- Cover it with synthetic fabric, blotter, and weight and follow the drying procedure in step #5 above.



A cross piece of Japanese paper can be applied over the hinge to reinforce its contact with the

matboard. This should be one inch longer on either side than the hinge. This cross piece does not need to be water-cut since it does not contact the paper object at all. Follow the above described pasting and drying procedures.



Finishing. When all the hinges are dry and flat, close the window mat over the paper object and check to see that placement is correct. If placement needs to be adjusted, the hinges may be lifted from the matboard by moistening them slightly with a brush, the object may be repositioned, and the hinges repasted and dried. It is wise to check the placement of the object at earlier intervals during the process, for example, after hinges are applied to the object but not yet pasted to the matboard.

References

Smith, Merrily A. *Matting and Hinging of Works of Art on Paper*. Washington, D.C.: Preservation Office, Library of Congress, 1981.

Clapp, Anne F. *Curatorial Care of Works of Art on Paper*. New York: Nick Lyons Books, 1987.

Ogden, Sherelyn, ed. *Preservation of Library and Archival Materials: A Manual*. Andover, MA: Northeast Document Conservation Center, 1992.

Susan Nash Munro
Paper Conservator
P.O. Box 1011
Shepherdstown, West Virginia 25443

The *Conserve O Gram* series is published as a reference on collections management and curatorial issues. Mention of a product, a manufacturer, or a supplier by name in this publication does not constitute an endorsement of that product or supplier by the National Park Service. Sources named are not all inclusive. It is suggested that readers also seek alternative product and vendor information in order to assess the full range of available supplies and equipment.

The series is distributed to all NPS units and is available to non-NPS institutions and interested individuals by subscription through the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, FAX (202) 512-2233. For further information and guidance concerning any of the topics or procedures addressed in the series, contact the National Park Service, Curatorial Services Division, Harpers Ferry, WV 25425, (304) 535-6410.