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The "One-Day" Conservation Treatment Method for Wall Maps at the Northeast Document Conservation Center

INTRODUCTION

The treatment of wall maps, as noted by other articles in this volume, is not for the faint of heart. The maps have several complex issues and considerations that change drastically depending on the layers of the map and the number of conservators available to treat the piece. The Northeast Document Conservation Center (NEDCC) conserves, on average, one wall map per month every year—a rate that is much higher than many of the other members who attended the Wall Maps symposium in September 2022, much to the surprise of all attending conservators. In treating many wall maps through the 50 years of its history, NEDCC has created a flexible methodology in which the bulk of the map treatment is completed in 1 day. The method can be done on most wall maps that are brought for conservation, but not all, and conservators attempting to undertake the method should review the considerations noted in this article to determine if it is appropriate for their collections. Note that the treatment also requires at least four conservators, as the wall map stays intact throughout the treatment process. In its final stages, it is drop-lined in one go after the washing and backing removal are conducted. The article will discuss the preparation process, main treatment steps, and options for rehousing and display after completion.

Components and Considerations of a Wall Map

When approaching wall maps for treatment, it is easy to become overwhelmed by the sheer size of the pieces compared to many of the other items within collections. Indeed, oversized materials are always daunting when approached alone, even by those who encounter them more frequently than others. It is also important to remember that although we have the traditional definition of oversized materials, we should also consider anything outside the norm of our collections' storage and space as oversized and in need of special handling and treatment consideration. However, outside of the size, the overall materiality of the pieces is the same, and breaking down the components into familiar groups may help with getting over the mental barrier in treatment to make things seem manageable. In the case of wall maps, as is common with many mass-produced items, there is some consistency in their composition that can be tracked through various timelines and production methods. Deviations primarily occur within the customization of the maps by the public or individual owners with watercolors or layered markings (note 1).

Even though all of these factors can add a level of complexity to the treatment, they do also open the door for the utilization of several different treatment pathways depending on the space, supplies, budget, and staff of any conservation laboratory, regardless of whether they are private, institutional, or an independent nonprofit conservation center. As such, the considerations and treatment detailed in the following sections are not a comprehensive definitive approach to wall maps but merely one of many options that should be contemplated when tailoring the treatment protocols for a specific situation (fig. 1).

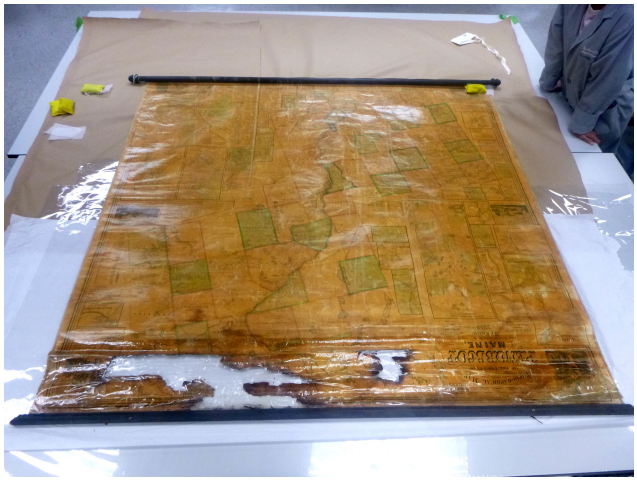

Fig. 1. Example of a 19th-century wall map awaiting treatment.

Proceedings from the AIC-sponsored event, "Varnished Wall Maps: A Collaborative Seminar to Investigate Treatment Methodology," September 14–16, 2022.

Primary Substrate: Paper

The paper used in wall maps can be either handmade or machine-made, although most maps treated at NEDCC are from the mid- to late 19th century and fall into the latter category. Qualitative observations from treatment and larger map collections, such as those at the Osher Map Library or the David Rumsey Map Collection, allow conservators to describe the primary substrate. Often the paper we encounter with these objects is a thin, wove paper imbued with a sizing that allows for both the crisp definition of a print and the diffused application of watercolors. From a more historical standpoint, the intersection of machine paper mills in America, especially along the eastern seaboard, and the rise in popularity of maps led to the creation of a specific paper noted in the literature as "map paper" during the 1800s (Brückner 2017, 93). Earlier ads (pre-1800) describe the origins of this map paper. As noted by Brückner in *The Social Life of Maps in America*, the earliest maps

> *[W]ould be 'printed on one sheet of imperial paper, 30 inches broad, and 22 inches high' with 'plain' copies being available 'on printing paper' and 'the colour'd ones, on superfine writing paper . . . 'with each colour'd map [will be] delivered in three or four sheets . . .' (2017, 29).*

Brückner's findings further confirm our observations even on more damaged wall maps, noting that papermaker Theodore DeVinne supplied "a thin, hard, sized paper, made from selected stock, with special reference to strength and flexibility" as well as a paper of "[a] commoner quality, not unlike that of fine book paper, but tougher" (2017, 93). The rags that compose the paper, regardless of any other damage or issues, means that it tends to be fairly accepting of aqueous treatment and the movement of water through the cellulose structure of the paper matrix (Banik and Brückle 2011, 264–268). Only in rare cases is the paper the primary concern when it comes to moving forward with treatment.

Having said that, the layering of the paper and the order in which the maps were created should be considered when trying to wash the object. As historic oversized paper-based items, these pieces are often composed of multiple sheets to create a complete picture. At minimum, conservators can expect to have at least three sheets of paper on an average-sized wall map, with up to 10 or more sheets on larger-sized pieces. As the water in the bath allows for easier separation from the secondary substrate, it also softens the adhesive along the paper joins, as it is often the same adhesive. This dissolution can lead to misalignment of the sections during the drop process if they are not carefully monitored. As such, aqueous treatment serves as a double-edged sword for the paper. It ensures equal saturation and expansion of the paper complex—and therefore theoretically equal shrinkage of the paper upon drying—but leaves the piece open to excessive manipulation of the sheets. If it is believed that the damage to the map has resulted in a compromising of the paper matrix, foregoing the 1-day treatment for a multistep process, such as those proposed by Irwin (2024) or Edmondson (2024) in this same volume, may prove to be more beneficial for the map overall and certainly much easier if you are limited in staff.

Secondary Substrate: Cloth

The cloth backing of maps comes in a variety of types. The most common is an untoned fine woven cotton or linen support; however, NEDCC conservators have also removed textiles that more commonly resemble cotton gauze, mull fabric, or rough burlap from the versos of some particularly unusual maps. Although the textiles used in the creation of wall maps may have been considered quality material, time is often not kind to them, and they are usually far more damaged than is worth saving unless they contain significant information. The textiles are almost always applied to the verso with a water-soluble adhesive. Testing of this adhesive with 3% tannic acid and iodine-potassium iodide solutions tends to show that they are a natural adhesive composed of protein, starch, or some combination of the two. In a few cases, adhesives like synthetic or rubber-based wallpaper paste have been removed from the verso, and these tend to be the worst offenders when it comes to cross-linking in this author's experience.

The other cloth components on maps that may be encountered on maps are the edge and nail ribbons. Even though both are decorative, they serve an important purpose when it comes to the reinforcement and protection of the map. The ribbons behind the nails are usually a small ribbon made of a colored textile comparable in weave to the primary backing cloth. Although the edge ribbons may be made of the same material as the nail ribbons, they are often more decorative and sometimes composed of silk rather than dyed cotton or linen. The edge ribbons are often hand sewn to the map, although some mapmakers may have adhered them with a paste like that used to attach the backing cloth, and it serves to protect the edges while the map is either hung or rolled. Depending on the level of mechanical damage to the map and the original fabric composition, these two types of ribbons may be entirely lost, with only minor evidence of their prior attachment. The ability and desire to replicate or reattach them varies from map to map and client to client.

Overall, the secondary backing and other cloth components are often loosely viewed as "expendable" in the conservation of wall maps by the majority of conservation professionals, and their destruction falls under the category of "acceptable loss," as is the case with most deteriorated secondary supports in paper conservation. On smaller maps, it is possible to preserve and reattach the cloth backing, but for larger pieces, it is often replaced in favor of preserving the primary substrate and information contained upon it. As further noted in the preparation section, it is therefore removed in small strips during the backing removal process so as not to disturb the paper alignment of

the composite sheets. Avoiding this and/or using the original backing again should be discussed further and considered by other stakeholders on the project before treatment starts.

Media

Very rarely are commercially produced wall maps fully hand drawn or composed of only manuscript media. Those types of maps tend to be reserved for land surveys that served as the foundation for the final product. The base information on wall maps is often printed using lithography, engraving, and/or etching processes with black printing ink. These inks are usually quite stable and generally not problematic when it comes to the overall treatment of wall maps. Having said that, they should still be tested and carefully checked over to confirm that additional manuscript markings or inscriptions have not been added by the owners during the time the map was used.

The hand-applied media that serves to emphasize the various aspects of the map tends to be much more problematic. Even though there does not seem to be a consistent coloring code agreed upon by mapmakers, it is believed that, at least in some cases, the color is associated with the population of the outlined areas for towns on county or regional maps or used as a way to communicate a point or statement more dramatically about the information presented (Brückner 2017, 68). It is noted that the hand coloring was done by, in at least some cases, the map manufacturers themselves at their studios. However, there are also cases where there are layers of secondary or tertiary watercolors applied on top of the map coating. If this is observed, the coloring may be indicative of a working map. In either case, common colors observed by NEDCC staff appear to be

- *Red*: Red madder or alizarin
- *Yellow*: Gamboge, chrome yellow, cadmium yellow, or yellow ochre (rarer)
- *Blue*: Prussian blue or cobalt blue
- *Green*: Verdigris (copper green), chromium oxide, blend of the yellow and blue media used in other parts of the map, or terra verte (green earth) (rarer)
- *Orange*: Rarer color, but if present, it is usually on later maps and either chrome orange or blend of the yellow and red media.

Given the composition of most of the colors, solubility in water or ethanol is a major concern. Another concern is the potential for a color shift in the case of the blended greens and oranges, where a fugitive yellow is used with a more stable red or blue—or vice versa. It is for this reason that the spot testing detailed in the preparation section is important but may also provide a false positive for stability.

Coatings

There is much debate over the nature of the coating on the surfaces of maps and how exactly it was applied, as well as what recipes were used (Brückner 2024). Maps are an oddity in the paper conservation field, as they are one of the few objects where an overall coating is consistently applied on top of the media as an intrinsic part of the object. We loosely use the term "varnish" for this final surface as a catch-all term; however, the surface coating may not necessarily be a true varnish in the traditional sense. Indeed, its use over the terms "glazing" or "coating," which may be more accurate in cases where we have no firm knowledge of the applied solution, comes from the historic use by mapmakers themselves, who often referred to them as "varnished maps" and the workers who applied the coating as "varnishers." As such, while we can turn to our painting conservation colleagues' far deeper breadth of knowledge on the subject, we should be wary to label the final layer as a "varnish" in our documentation process without the added historical context.

The applied coating is a bit odd, as it does not appear to fully penetrate the paper matrix on maps, although it does imbue the structure with a level of embrittlement that would not otherwise be observed. This lack of penetration may be attributed to one or several factors. First, there may be an intermediary isolation layer that was applied to the surface. Brückner notes that there are records of a layer of gum arabic being applied as part of the coloring and varnishing process (Brückner, pers. comm.).

Second, the hard sizing in the paper may itself serve as a protective coating and limit the overall level of penetration by the glossy finishing solution. Third, there may be something within the protective coating itself that does not interact well with the cellulose fibers and forces it to sit upon the surface.

Removal of historic coatings is usually straightforward. Regardless of the composition of the coating layer, be it shellac, varnish, or some other resinous material, it is often soluble in either ethanol or warm water. As noted by Edmondson (2024), some coatings may benefit from a slight pH bump in the water to facilitate the breakdown of the coating layer. Otherwise, removal via ethanol can be done locally or by immersion or spray, depending on the equipment and safety measures of the conservation laboratory. Greener methods would lean toward the limited use of solvents, but this is not always cost-effective for the conservation laboratory when weighed against the necessary associated labor. In cases such as these, proper chemical disposal and refinement is recommended. Further details on the coatings on wall map coatings and revarnishing can be found in the secondary article by this author and Natalia Paskova in this postprints volume.

Hanging Hardware

The last component of wall maps is most often the first to be removed to facilitate the impending treatment. The hardware applied to wall maps usually consists of a decorative piece of wood molding at the top and a circular roller rod with finials at the bottom. These were usually painted black, although

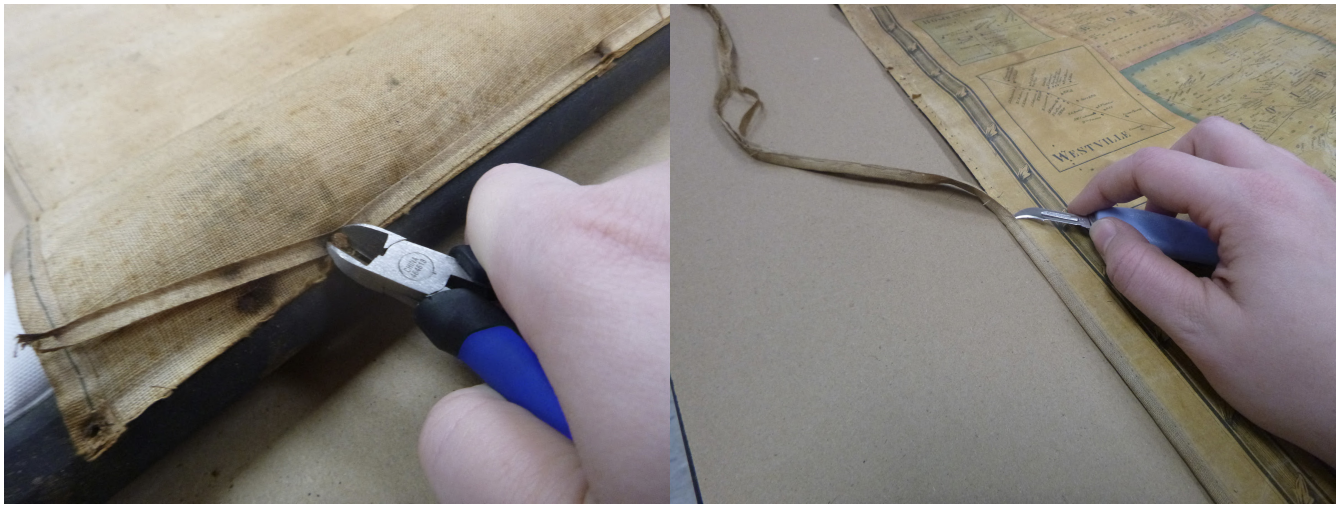

Fig. 2. Mechanical removal of handling rods and ribbons.

some may be colored with a wood stain instead. While decorative, historically the round rod also helped with the rolling of the map for transport and storage. The upper molding often had textile loops or a long cord that helped with the hanging of the map on the wall. Many times, these wooden components have warped or been damaged, requiring that they be replaced with newer, sympathetic materials. Alternatively, it is possible that the stakeholders involved do not wish to display the map for an extended period. In this case, the long-term storage of the item will be inhibited by the reattachment of these components, and so it is not always recommended that they be rejoined. In these cases, care should be taken to keep these pieces together in a manner that creates a housing that works for the object and storage space.

PREPARATION OF A WALL MAP FOR TREATMENT

A day or two before the "one-day" treatment is conducted, there is some minor work that needs to happen to prepare the wall map. After the before-treatment photos are taken, removal of secondary components such as hanging rods, iron tacks, or edge ribbons is done by mechanical means prior to aqueous treatment (fig. 2). The removal of these components at the start allows for easier handling of the object through the rest of treatment. Some conservators may prefer spot testing prior to this phase, depending on the level of deterioration affecting the map.

If you are limited in your available space, often it is easier to roll the piece onto a larger-diameter tube for support during the initial surface cleaning process. Surface cleaning on the recto is primarily done with vulcanized rubber sponges rather than block erasers, crumbs, or by vacuuming. The sponges are easy to cut into malleable sizes and shapes, making them versatile in their ability to clean the surface and remove larger debris without adversely affecting the often-fragmentary wall maps or leaving behind any debris that would interfere with the washing and lining procedures. Even though further surface cleaning can be conducted with smaller pore latex-free sponges in areas of significant surface dirt, extensive surface cleaning is not recommended, as much of it may be removed during the solvent baths to address the coating. If there is heavy dirt on the verso of the object and the textile lining is stable, debris may be removed using a screen and HEPA vacuum before using the sponges.

Local spot testing for solubility of the coating and media is then conducted. As the surface coating hides the true color and can bolster the stability of the media, discreet local removal with swabs is recommended. In some cases, the fragmentation of the map allows for more accurate testing of both components, as the conservator can fully immerse the small pieces/fragments in both ethanol and water, mimicking the overall treatment. Aside from further helping to guide the treatment choices around water temperature, bath duration, and/or pH adjustment, microtreatment of the fragments can help establish the acceptable loss parameters around color shift in the media and paper prior to beginning the treatment. In cases of large losses, it can also help with the paper toning preparation that is applied to the intermediary Kozo lining layer for a uniform color field.

Spot testing is indicative of the potential solubility of the various components; however, it is important to be prepared for a worst-case scenario prior to full immersion. In hand-colored oversized objects, the potential variations in color mixing over multiple areas may provide false positives more readily than on smaller pieces, especially given that even though the paper substrates are similar, they are not identical. As it is impossible to safely test the media to the extensive degree necessary without beginning treatment, if there is some concern around the results, a risk-benefit assessment should be discussed with other stakeholders, and other

treatments proposed in this volume may prove to be a better alternative for the object.

However, if the treatment is determined to be the best pathway after the testing phases, the map will move into a solvent bath for the removal of its coating. As noted previously, in this author's experience, the wall map coatings are nearly always soluble in ethanol to some degree. For the sake of efficiency and uniformity, as well as the large fume hoods available to NEDCC conservators, the maps are placed in a shallow ethanol bath for this stage. Occasionally, light agitation of the map to improve solvent dispersion and absorption is conducted by rolling and unrolling the piece around a polyester support. If the map is not too fragmented, the coating is brushed off with a solvent-safe soft brush to further facilitate coating removal. The agitation and removal process are repeated as necessary until the coating is deemed to be adequately removed. For most average-sized wall maps (less than 70 × 70 in.), this only requires a single shallow solvent bath but can still use up to 30 L (8 gal.) of ethanol. The solvent bath is then drained and packaged for hazardous waste pickup, while the map is laid flat within the fume hood area for safe evaporation, filtration, and venting of the solvents overnight. Assessment of whether additional surface cleaning is needed can be done after all solvent has evaporated.

The last preparation work that needs to be done is to cut the lining materials. A fine- or medium-weight linen is cut approximately 10 inches larger than the size of the board that the map will be drop-lined onto. Sections of a machine-made rolled kozo are cut to fit the backing board. The width of the pieces and where the join should be is determined by comparing the location of the original map seams and considering whether to line the piece with or against the grain. In either case, the seams of the new lining should not align with the old seams exactly but rather should be offset in some way. The historic joins tend to be where there are large areas of loss and continual breaks and often benefit from having a solid intermediary layer behind them. Nonwoven polyester supports are also prepared, along with wet-strength tissue, to help with handling.

A "ONE-DAY" CONSERVATION TREATMENT

On the day of treatment, prior to any immersion work on the map, the lining linen needs to be soaked in a dilute ammonium hydroxide solution (1:16 30% NH_4OH:H_2O v/v) to break any sizing and to soften the fabric. After soaking with light agitation, the textile is rinsed using a washing machine. An acrylic sheet is placed on a low table rough side up and lightly cleaned with water to remove any old adhesive residues from prior use. The map is placed between the nonwoven supports (Hollytex or Reemay) with wet strength tissue as needed on the face (fig. 3) to reduce the movement of loose segments or fragments of the map during washing. As the sink is filled

Fig. 3. Diagram of the washing sandwich supports.

with water, the map is first misted out with Dahlia sprayers and followed by further wetting using a Japanese water brush (*Mizubaki*) and filtered water until it is fully saturated.

The water level should be sufficient to immerse the map but shallow enough to prevent fragments from being dislodged. After placing a semirigid support in the sink—NEDCC has a custom oversized rigid screen for this purpose—the map is brought over and positioned on the screen for immersion in the water. At the beginning, discoloration tends to rapidly come out of the piece, resulting in the need to draw several baths in quick succession. The map is removed from the sink using the support, and the water is cleared away with a squeegee. The washing continues for most of the day until the water runs clear (fig. 4). On average, the process takes three to six baths that cumulatively total 3 to 4 hours of washing.

While the map washes, the lining is prepared. The damp linen is brushed and aligned onto the Plexi board and inspected for knots or flaws. If possible, these are either burnished or hammered down, in the case of knots in the fabric, to reduce their potential to transfer through to the map proper. If this does not adequately reduce the flaws, they may be lightly shaved down with a blade. If going this route, care must be taken to ensure that a hole is not cut into the textile. Once the textile is completely flat, the excess margins are trimmed off so that they are flush with the edges of the board. Wheat starch lining paste is then brushed out on the linen to allow for attachment of the kozo paper.

The kozo paper is applied rough side up to the surface in sections by a two-person team using a broad-bristle brush

Fig. 4. Wall map slightly raised during water exchange for a new bath.

or Japanese smoothing brush (*Nazebake*). The overlap of the seam should be between a quarter-inch and a half-inch wide, and the natural deckle of the rolled paper can be used as a guide for the join. It should be noted that if toned kozo paper is being used to facilitate even color fields in large areas of loss, it may be slightly more inclined to wrinkle while it is being brushed out due to the added properties from the acrylic media. Any creases or wrinkles should be initially worked out with the *Nazebake*, but if the efforts are ingraining them more, immediately moving on to the addition of the next lining paper is advised. The entire lining of Japanese paper should be pasted with the wheat starch lining paste, and at this point, all wrinkles in the lining paper can be smoothed out. The lining can be checked for areas of dryness by looking at the surface in raking light. A layer of 1% to 2% methylcellulose can then be applied to the surface of the lining. The methylcellulose serves two primary purposes during the map lining. The first and more vital role is that it allows for slip and manipulation of the map once it has been drop-lined. The second is that it slows the drying rate of the wheat starch paste and makes it easier to rehydrate the adhesive without wetting out the lining excessively.

The map is then removed from its final bath onto the rigid support, and the sink is drained and thoroughly dried. The map is lifted vertically to further drain the water from the surface and limit pooling of water. At this point in treatment, the full five-person team should be prepared to invert the map and return it to the sink face down. One member of the team serves as the observer to note any issues and offers corrections as needed. Two conservators (Team A) lift the map and its nonwoven polyester support materials straight up while maintaining surface tension to prevent distortions and creasing. At about the second to third point, the semirigid support board is removed from the area of work entirely by the other two team members (Team B). The map is held vertically for a moment or two if deemed safe to allow for water to drain off further. Team B then assists with transport into the sink by lifting at the lower corners in such a way that the map is now face down.

The verso nonwoven polyester is then removed. The cloth lining is removed in sections by the conservators by lifting and tearing away portions of the textile along the natural weave, taking care not to catch or fold any of the map fragments into the bundle. Any areas of backing cloth that have text, notations, or stamps are removed first and set aside to air-dry (fig. 5). The lead conservator will monitor the dampness of the lining and prepare the necessary tools (sponges, tweezers, and spatulas) for the adhesive removal stage while Teams A and B continue to remove the backing. The old adhesive, if not already fully dissolved in the bath, is gently removed with lightly dampened sponges and warm water (fig. 6). If there are sections of misalignment or places where the fragments have become extensively overlapped, the area can be lightly flooded with water from the sponge to allow for more extensive manipulation. However, the goal at this point is not to correct all misalignments, only those that will not be easily corrected once it has been drop-lined.

Fig. 5. Mechanical removal of the original lining canvas.

Once the secondary materials are fully removed, the map is then drop-lined. It is important that all members of the team are prepared to make the drop. A walk-through of the travel path as well as who will be setting the edge and who will bear the weight of the map is important to determine prior to lifting and moving the map out of the sink. One person on the team should be designated as the leader from whom all directions are delivered. This can be someone who will be handling the map or the individual who has been the observational conservator. The map should be lifted continuously upward out of the sink by Team A in the same way that it was lifted off the screen while Team B prepares to lift the opposite edge once it reaches the maximum handleable height by staff. The map is then lifted fully out of the sink under tension, and Team B lets go of their side to allow the map to hang vertically while it

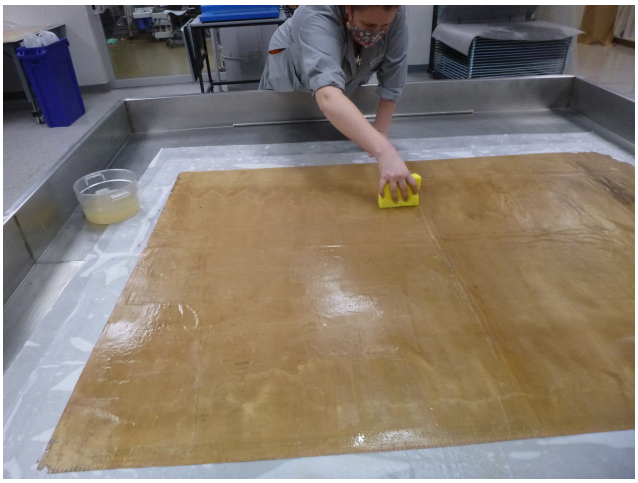

Fig. 6. Adhesive removal with sponges and light pressure.

Fig. 7. Drop-lining the map as a team.

Fig. 8. Correcting small areas of the map while it is wet.

is walked over to where the lining is set up. Team B will then pick up the corners from the recto side of the map, and both teams will work to suspend the map in place over the lining and confirm that there is an equal margin on all four sides of the piece. Team B will then set down their end of the map and brush out the piece quickly while Team A controls the drape and tension. This entire process must happen quite quickly, as there is a risk of losing surface tension between the map and the Hollytex/Reemay/wet-strength tissue supports as gravity starts to take over (fig. 7).

Once down, the upper layer of the nonwoven polyester support is removed, and light manipulation and alignment of the map are done through the wet strength as needed. Keeping the wet-strength tissue in place will allow one to adjust large sections of the map without tearing it. To set areas, lightly rolling over the surface of the wet strength with paper towels or a rolled absorbent cloth can wick the water away and limit further movement. After alignment of the map, the wet strength is removed, and any fragments collected during the washing stage can be placed in their correct locations. Even though it is not important to place all fragments now, an effort should be made to secure any large pieces with text and printed media (fig. 8). When staff feel that they have completed the placement as best as they can, a fresh, clean nonwoven polyester support is brushed out on the surface with a broad-bristle or reed brush to set and fully adhere the map to the surface. If the paper is especially thick or there is concern about the fragments lifting, it can also be lightly pressed down with a rubber roller like those used in printmaking to apply ink to a plate.

As a last step, the edges of the lining are lifted up from the board and an application of polyvinyl acetate or a 1:1 mixture of 4% methylcellulose and polyvinyl acetate is applied in a narrow band along the margins, avoiding any application under the lined map. This helps to ensure that the lining does not lift away from the acrylic support while drying and helps to tension the stretch dry of the map more evenly. The map is then left to dry flat overnight, although full drying may take as long as 24 to 48 hours, depending on the ventilation, humidity, and temperature within the laboratory space. If it is still excessively damp the following morning, cross ventilation with box fans can be utilized to ensure full dryness.

Over the following days, conservators should be able to work either flat or vertically to place remaining fragments, improve the tone of the lining paper in exposed areas of loss, and insert additional fills and/or any other aesthetic work that may be deemed necessary to create full visual cohesion within the piece.

REHOUSING AND DISPLAY

Although the object may not be fully complete at this time, it is recommended that the formal color-balanced after-treatment photos or high-resolution digital captures be taken while the piece is still mounted to the board, as the object is much easier to transport and manipulate. The addition of a new surface coating that mimics the original finish of the map should also be done at this time, as the tensioned mount prevents warping of the map while the isolation layers and surface coatings are applied (note 2).

Once the object has been imaged and/or a surface coating has been applied, it can be removed from the board for the final stages. The extent to which the map lining is trimmed for rehousing and display varies depending on the final form the map will take and whether or not new edge ribbons will be applied. In general, the map is either trimmed to the edge of the paper if the original format with hanging hardware will be maintained or with a border of an eighth-inch to a half-inch in width if the map will be rolled onto an archival tube or framed. The most common rehousing method for whole maps is rolling onto a 6- to 12-inch-diameter archival tube,

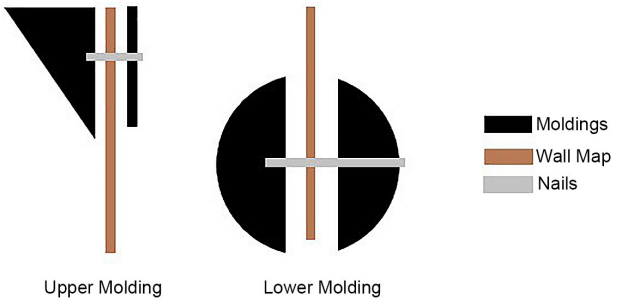

Fig. 9. Diagram of hanging rod attachment for display on a wall.

secured using polyester and twill ties. Doing so, however, means that reattaching the hanging rods and hardware is not done, as there is a risk that the rods will damage the map and/or complicate handling by staff.

In cases where the display of the map as it originally appeared is desired by library and archives staff, reattachment of the hanging rods can be done with the original tacks, assuming they have not become corroded and are reusable, or with new nails and brads. In many cases, the upper molding and lower rods are quite warped or damaged, so replacement with new pieces is recommended. By replacing the upper molding and using two half-rounds for the roller, the chance to limit further stress on the piece can also be avoided by sandwiching the map between two wood pieces (fig. 9). The original finials will be reused if present. Doing so can facilitate the attachment of a Z-bar or French cleat reducing the stress on the wood rod to create an even distribution of weight across the upper edge of the map.

The attachment of hanging rods provides a more authentic reading of the map; however, it also can lead to the potential for more damage while the map is displayed, as there is limited protection for the piece. Historically, NEDCC (and others) have tried to minimize this risk by encapsulating the maps prior to attaching the hanging rods if no other housing is provided and long-term display is desired by the institution; yet, this is not a perfect solution either, as it leads to a visual disruption over the map nearly negating the authentic read of the map. There are also complications and limitations around the welding capabilities of either an ultrasonic or a heat-welded encapsulation and conservation-grade polyester when it comes to dealing with materials of this size. As such, the center has been limiting the amount of map encapsulation that is done and leaning into advising display, in historic exhibition environments, either behind barriers or out of easy reach for patrons, as suits the budgets and spaces of its various clients in combination with protective coatings in the form of varnishes or natural resins.

CONCLUSIONS

Even though modifications to the treatment are possible, alternative methodologies proposed in this volume should also be contemplated by conservation staff prior to the start of treatment. Considerations around any annotations and media should be explored prior to the start of the treatment, as although not impossible, interrupting the process mid-way can be difficult given the size of the piece and the speed with which the corrections would need to be done. Additionally, ensuring that proper storage and display options have been considered by the various stakeholders of the map should be explored to determine if this method is right for any collections material that comes into the laboratory.

Overall, the "one-day" treatment is a viable, economical method for the stabilization of wall maps, provided that the conservation laboratory has the appropriate amount of space and staff to handle the map in one piece. The primary benefit of this treatment is that as the map is kept intact and treated as a single object throughout the washing process, the risk of misalignments from irregular paper expansion and shrinkage action is lowered. Additionally, the process provides ample time for portions of the map to be carefully manipulated by staff once drop-lined to correct any shifting that may have occurred due to movement of the piece. The end result of this treatment means that the map remains whole and closer to its original form than those that are cut into smaller sections for easier storage.

ACKNOWLEDGMENTS

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NOTES

1. Other papers in this postprints volume cover the breakdown of the components of a wall map in more detail. The information listed here is merely an overview if this work is read in isolation.
2. More information on the methodology and choices for the recreation of surface coatings can be found in "An Investigation into Alternative Recreations for Surface Coatings on 19th-Century Wall Maps after Conservation Treatment" by Kathryn Boodle and Natalia Paskova within this volume.

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FURTHER READING

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SOURCES OF MATERIALS

Clear acrylic sheet (SKU: ACRYCLR0.250PM72X96, 0.250 × 72 × 96 in.)
ePlastics
https://www.eplastics.com

Hollytex–3257 (SKU: TNW006021, 47 in. × 25 yd.), Kuroge Tsukemawashi Japanese mounting brush (SKU: TTB092005), Mizubake Japanese mounting brush (SKU: TTB092003), Methyl cellulose (Culminal MC 2000 S Methylcellulose; SKU: Methyl-cellulose), Reemay—2014 (SKU: TNW008007; 72 in. × 100 yd.), Wheat starch (previously Aytex-P; SKU: TAD003005, 5 lb.)
TALAS
https://www.talasonline.com

Flat smoothing bristle brush—12 inch, Zinnser (Model #98012)
Home Depot
https://www.homedepot.com

Lightweight natural linen fabric (Y1140NT120, 120 inches wide [no longer available]), Alternative: Medium weight natural linen fabric (Y1357NT120, 120 inches wide)
Ulster Linen
https://ulsterlinen.com

Rolled kozo machine made—RK29 (34 gm^2, Paper Nao [unable to ship to the United States], Alternative: R-101 Sekishu extra thick roll (30 gm^2, 38 in. × 60 m)
Hiromi Paper
https://hiromipaper.com

Takach jumbo Brayer 35 durometer rubber (#B4912, 12 × 3½ in.)
McClain's Printmaking Supplies
https://www.imcclains.com

Wet strength tissue—Tarantula tissue (PASWTT0100, 100 × 960 m)
Conservation by Design
https://www.cxdinternational.com

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