

# Works on Paper

Conservation of Art and Archival Materials

## Conservation Treatment Report

### Client

Unity Historical Society & Town of Unity  
c/o Jim Romer  
13 Center Road, Box 6  
Charlestown, NH 03603-7513

### Job number

14082C01

General collection information – see itemized list for details:

**Object Type:** *collection of manuscript and printed documents*

**Subject:** *54 19<sup>th</sup>-century voter checklists and unknown quantity of partial checklists/fragments for the Town of Unity, NH*

**Author:** *various residents/town officials of the Town of Unity, NH*

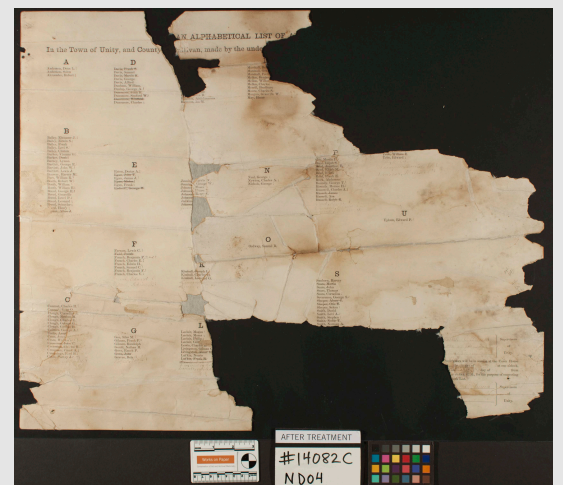
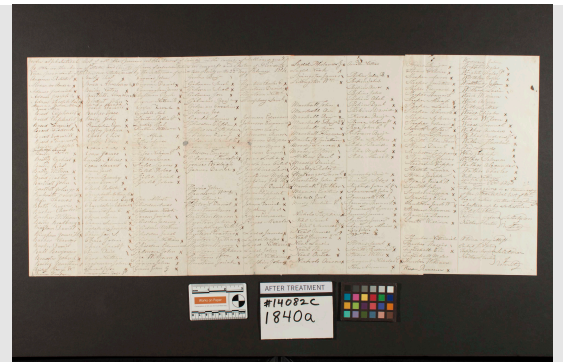
**Date:** 1832 - 1899

**Dimensions (h x w):** *various sizes (see itemized list)*

**Media:** *various black, brown, red and blue manuscript inks; black printing inks; graphite*

**Supports:** *various off-white, beige and blue wove and laid papers*

**Housing Materials:** *2 conservation-quality drop-front storage boxes, folders, and Melinex L-sleeves*



### Condition of 54 complete 19<sup>th</sup>-century checklists before conservation

The fifty-four complete 19<sup>th</sup>-century voter checklists were executed in a variety of manuscript inks, many of which were iron gall inks, on off-white, blue or beige wove or laid papers. Several of the earlier checklists were comprised of two or more sheets adhered together with their original starch wafers. Some of these wafer joins had failed completely or partially and were in danger of becoming separated if not addressed by conservation treatment. Checklists from the later half of the 19<sup>th</sup>-century were letterpress printed with manuscript additions. The majority of the checklists had manuscript inscriptions on the reverse.

The collection of complete 19<sup>th</sup>-century voter checklists had a pronounced musty or moldy odor and needed to be treated for mold contamination. Approximately ten checklists from this group had considerable amounts of black powdery mold growths and mold stains.

The majority of the complete 19<sup>th</sup>-century checklists were previously folded, usually once horizontally and then three to seven times vertically. This resulted in the development of pronounced creases and folds, many of which had subsequently broken and torn. Several documents had been extensively chewed upon by rodents and/or insects, resulting in varying degrees of loss. Nearly all of the checklists had a small hole in each corner where they were originally posted for inspection. Most of the checklists suffered from minor to moderate peripheral tears, often with small to mid-size associated losses to the paper. Many of the tears and breaks had been previously repaired with a variety of harmful pressure sensitive tapes (Scotch tapes, Filmoplast type tapes, masking tapes, etc.), usually on the reverse but occasionally on both the front and back of the checklist. This damage made the checklists quite fragile and hazardous to handle in their pre-conservation state.

The papers had all discolored to varying degrees due to the development of acidity in the paper. Many of the checklists had become quite brittle and remained susceptible to further deterioration if not addressed by conservation treatment. Scattered brown stains were present on many of the checklists and a heavy layer of surface soil covered the front and back of each sheet. Surface soil was typically heavier along the edges and/or the outer section of paper when folded.

Several documents showed heavy accumulations of animal feces and urine and several had food stains, coffee rings and other unknown accretions.

In some cases the inks had smeared and this usually appeared to be original to the documents (i.e. the inks smeared before they dried). Water stains were present on approximately half of the 19<sup>th</sup>-century checklists.

#### Condition of partial 19<sup>th</sup>-century checklists and fragments and severely mold damaged checklists (stored in separate box)

Three large manila envelopes containing complete checklists (integrated chronologically into the inventory list) and many fragments of various checklists were also sent to our studio for examination. They all appeared to be from the late 19<sup>th</sup> century based on the format and materials used. These documents suffered from severe mold damage in the form of visible black powdery mold growths as well as black and pink mold stains. Many of the fragments had heavy deposits of soil as well as insect debris and casings. It seemed likely these items were salvaged at a later date in a different location given the extensive amounts of mold and soil present throughout this part of the collection. It was not impossible to tell how many checklists were present (or partially present) prior to conservation treatment. Conservation treatment allowed the fragments to be treated for mold and surface soil, making it possible to then determine how the many fragments might be reassembled to create complete or partial checklists.

The condition of these checklists and fragments were otherwise similar to the later 19<sup>th</sup>-century checklists described above.

#### Objectives of conservation treatment

Prior to conservation treatment, the Town of Unity voter checklists were considered unsafe to handle or display due to the presence of mold and the often severe physical and chemical weaknesses of the papers found throughout the collection. They also represented a likely mold contamination threat to the rest of the collection and the building in which they were to be stored.

The primary objectives of conservation treatment for the Unity Voter Checklists were:

- a) address the mold presence, making them safe to handle and safe to reintegrate into the rest of the collection
- b) physically and chemically stabilize the documents through the conservation treatment steps listed below, including rejoining of partial checklists and fragments to the extent possible
- c) provide conservation-quality housing for long-term storage and safe accessibility
- d) provide storage, handling and exhibit guidelines for the voter checklists

#### Objectives of digital imaging of each checklist/partial checklist/groups of fragments

a) create high-resolution digital facsimiles of each checklist (or part thereof) after conservation treatment to improve access to the collection and ensure greater protection for the original documents.

## Conservation treatment performed on 19<sup>th</sup>-century voter checklists and partial checklists/fragments

1. **Conservation Treatment Documentation:** Documented conservation treatment with representative before and after digital photography and with a detailed written report. Generated an itemized inventory list for the collection including: collation number/date, dimensions, condition notes, treatments performed, and storage box location. Provided the client with high-resolution digital images on a disk and archival-quality reference prints of these representative treatment documentation photographs as well as copies of all written reports.
2. **Collation:** Collated each checklist (or part thereof) by applying the date in soft graphite pencil in the verso lower left corner. These numbers coincide with the dates found on the itemized inventory list.
3. **Dry Treatments to Address Mold and Surface Soil – Vacuuming, Surface Cleaning, Deodorizing Chamber:** Vacuumed the recto and verso of each checklist (or part thereof) with a HEPA-filtered vacuum and soft brush attachment to remove mold spores and fungal structures. Removed surface dirt and soil with a vulcanized rubber sponge, followed by a second round of vacuuming. Placed checklists and fragments in a closed chamber suspended over an odor-absorbing material for 4 to 6 weeks to reduce the musty odor.
4. **Testing:** Tested all media for solubility in a solution of 70% ethanol:30% water and in pure water. Tested with the appropriate organic solvent(s) if use was necessary for tape removal treatment. Acetone was found to be the best solvent to aid in the removal of pressure-sensitive tapes. Solubility issues for individual checklists were noted in the itemized inventory.
5. **Tape Removal:** Removed all old tape repairs and related adhesives from the checklists using a combination of locally applied acetone and locally applied controlled heat and mechanical manipulation. Solvent treatment was performed while the document was placed over a suction platen.
6. **Wet Treatment to Address Mold, Acidity and Discoloration:** When the media tested as stable in the 70% ethanol solution, immersed the checklist (or part thereof) in a 70% ethanol solution to deactivate remaining mold spores. This was followed with immersion in a series of water baths to remove soluble acids and reduce discoloration from the paper for all of the complete checklists that could be wetted with the ethanol solution.

Several of the more deteriorated fragments were washed in the ethanol solution, allowed to dry slightly, and then immersed in a brief calcium hydroxide bath to minimize treatment in water as it caused the paper to become too soft on the test fragment. Checklists with starch wafer seals were also immersed in bath solutions for briefer periods and allowed to dry slightly between immersions to minimize over-softening of the seals.

*Please note that the washing treatments did cause most of the stains to lighten somewhat in appearance, but did not eliminate them entirely. We did not recommend additional stain-reducing treatments for this collection.*

7. **Alkalization of Checklists with Wet Treatment:** For checklists (and parts thereof) that could be immersed, provided a final alkalizing bath (i.e. deacidification) in a solution of calcium hydroxide with pH of 8.5 to further stabilize the paper and provide an alkaline buffer. Checklists on blue papers did not receive the calcium hydroxide bath as alkaline pH can sometimes cause unwanted color shifts.
8. **Alkalization of Checklists without Wet Treatment:** Six of the complete checklists contained media that tested as soluble in both the ethanol solution and water, so no wet treatment was performed. Due to the presence of colored inks, a non-aqueous solution of magnesium bicarbonate (Bookkeeper) was not considered an appropriate method of alkalization for these checklists. A sheet of alkaline-buffered Microchamber was placed behind each checklist in its Melinex sleeve and when inscriptions were present on the verso, a printed copy of the verso was included in the folder.
9. **Repair:** Mended tears, supported weak areas and filled losses with an appropriate weight Japanese *kozo* paper using wheat starch paste to apply the mend on the verso of each checklist. Checklists with a great numbers of tears, losses and/or overall weakness were lined on the verso with a lightweight Japanese *kozo* paper (to ensure inscription on the verso remain visible) when this would provide greater support to the document.  
  
Partial checklists and fragments were rejoined to the extent possible with localized repairs. Most of the fragments appeared to be from the 1880s and a total of 5 checklists were partially reassembled. The fragments which did not appear to fit together were returned separately.
10. **Flattening:** Humidified and pressed each checklist (and parts thereof) between spunbond polyester and blotters under pressure for several weeks to flatten the paper.
11. **Rehousing:** Rehoused each complete and partial checklist in a Melinex L-sleeve. The checklists from each year were placed in a corresponding acid- and lignin-free buffered folder. Partial checklists with large missing areas reconstructed from fragments were placed in double Melinex L-sleeves to prevent pieces from slipping out of the enclosure and to provide additional support during handling. These checklists should not be removed from the sleeves unless absolutely necessary. Fragments were grouped as appropriate and stored in Melinex sleeves and folders and placed in the smaller acid- and lignin-free buffered drop-front storage box. The collation numbers were written on the outside of each folder with a soft graphite pencil. The majority of the rehoused checklists will likely fit into an empty metal flat file owned by the client and those that fit may be transferred in their folders upon their return to the historical society. Checklists that are too large may remain in the oversized acid- and lignin-free buffered drop-front storage boxes.
12. **Packing:** Packed the collection for return to the client.

Materials list for conservation treatment, including rehousing materials

<i>Type of Material</i>	<i>Purpose</i>	<i>Manufacturer/Vendor</i>
Vulcanized sponges	surface cleaning	Quality Rubber
Wheat starch paste – Zen Shofu	repair adhesive	Talas
Barrett repair guard papers	tear repair	UICB/Talas
Kozo lining papers	lining and infills for losses	Hiroimi Papers
Blotters – 100% cotton, 100pt	flattening	Talas
Hollytex – No 3257 – 1 yard roll	support material for treatments	Talas
Calcium hydroxide	alkalizing wet treatments	Talas
Ethyl alcohol (ACH Grade)	increased stabilization of iron gall inks during wet treatment and mold remediation	Pharmco-AAPER/Talas
4mil Melinex L-sleeves (20" x 24")	long-term storage & increased protection during handling	Gaylord Archival
4mil Melinex L-sleeves (30" x 36")	long-term storage & increased protection during handling	Gaylord Archival
Microchamber paper	aid in neutralizing acids in checklists that could not receive wet treatment; long-term storage	Conservation Resources
Buffered, acid-and lignin-free folders (20"x 24")	long-term storage	Gaylord Archival
Buffered, acid-and lignin-free folders (24" x 36")	long-term storage	Gaylord Archival
Drop-front archival print box (24" x 36" x 3")	long-term storage for oversized checklists	Gaylord Archival
Barrier board deep lid archival Print Box (20" x 24" x 3")	long-term storage of fragments	Gaylord Archival

Digital imaging

Each of the 54 complete voter checklists, partial checklists and groups of fragmented checklists were photographed after conservation treatment to create a high-quality digital image. Works On Paper used a Canon EOS Rebel T1i DSLR camera and oversize copy stand for all digital photography. Each photograph included identifying information for the checklist as well as an inch scale and an X-Rite Color Checker for color reference. Digital images were captured in RAW and then converted to TIFF and JPEG formats using Adobe Photoshop Lightroom software. Files were named with the checklists' identifying information in a consistent format. TIFF and JPEG files were then burned to Archival Grade DVD-Rs for the client and will also be kept on permanent file at Works on Paper. The client's DVDs were housed in PVC-free sleeves and a PVC-free binder suitable for long-term storage.

Materials list for digital imaging

<i>Type of Material</i>	<i>Purpose</i>	<i>Manufacturer/Vendor</i>
Archival Gold™ DVD-R Discs in Binder	Long-term storage of large image files	Dellkin Devices/Gaylord Archival

*Carolyn E. Frisa*

Carolyn Frisa, Head Conservator

September 7, 2016

Date

## Storage, handling and exhibit guidelines

Poor quality storage enclosures, matting, and framing materials can be particularly harmful to the objects they were intended to protect. Unstable components of these materials can result in chemical and/or physical damage to the object. The voter checklists have been housed in chemically stable materials suitable for long-term storage and should not be removed from these enclosures unless necessary. The checklists should remain in their Melinex sleeves when handled, examined and displayed (if not framed for exhibition).

Temperature, relative humidity, light, and air quality all affect the longevity of works on paper. Ideal environmental conditions for historic documents on paper include stable temperatures no higher than 70°F with relative humidity kept at a stable level between 30 and 50% RH ( $\pm$  5%). Lower temperature and relative humidity are preferred as these conditions will slow down deterioration processes. Documents such as these can be very sensitive to light and many of the manuscript inks found on this collection are particularly susceptible to fading. Therefore, exposure to both natural and artificial light sources should be limited as much as possible. The checklists should remain in dark storage when not in use.

For checklists on display, this can be partially accomplished by using a UV-filtering glazing (glass or Plexiglas) in the frame or display case and by ensuring the document is never in contact with direct sunlight. Exposure to light of checklists on display can be reduced further by covering windows with shades or draperies and by ensuring lights are turned off whenever possible. Acid-free, buffered matboard should be used for checklists if framed for display. They should never be placed directly against the glass or Plexiglas - window mats or spacers should be used. Copies of the checklists should be displayed whenever possible and original checklists should never be displayed "permanently". Ideally, original documents should not be displayed for longer than 3 months and should be rested for at least 2 years between exhibit cycles. The Northeast Document Conservation Center's *Technical Leaflet 2.5 Protecting Paper and Book Collections During Exhibition* (<https://www.nedcc.org/free-resources/preservation-leaflets/2.-the-environment/2.5-protecting-paper-and-book-collections-during-exhibition>) is an excellent resource for detailed information on the lux hour concept and exposure guidelines. The National Park Service's *Guidelines for Exhibition Light Levels for Photographic Materials* (<https://www.nps.gov/hfc/pdf/ex-cons/guidelines-exhibit-light-levels.pdf>) provides a more concise explanation for displaying light sensitive photographs and these recommendations could also be followed for the checklists since many of them contain very light sensitive manuscript inks.

Before removing any checklist for study or examination, first ensure that a large flat clean surface has been cleared on which to examine it. Ensure hands are clean and keep all food, drinks and pens away from the study area. Carefully remove the checklist from its folder, leaving it in the protective Melinex L-sleeve at all times. The checklist should not be left out on a table longer than necessary to prevent unnecessary exposure to light. The checklist should then be returned to its proper folder and box when examination/study is complete.

## Mold contamination information

Mold contamination and remediation are complex problems. Research is still needed to develop standards for effective treatment and safe storage and use of materials affected by mold. **The best way to inhibit fungal activity is to prevent mold activation by means of controlling environment conditions, especially relative humidity. Relative humidity should be kept at a stable level between 30% and 50% RH ( $\pm$  5%) and temperature should be no higher than 70°F.**

The most effective treatment for the mold-damaged documents is to surface clean them with a HEPA-filtered vacuum to remove as many fungal structures as possible, followed by immersion to 70% ethanol when possible. Nevertheless, the mold damage makes the checklists more susceptible to mold growth in the future. **Storage or display under carefully managed environmental conditions and with close monitoring of the print is imperative to prevent a regrowth.**

There are no specific guidelines or regulations for handling artifacts after removing mold, but you should adopt a cautious approach when handling and using these materials. Checklists should remain in their Melinex sleeves at all times. If a checklist must be removed from its protective sleeve, disposable nitrile gloves should be worn when handling the artifact and hands should be washed with soap and water afterwards. Additional information can be found in the Canadian Conservation Institute (CCI) – "Mould Prevention and Collection Recovery: Guidelines for Heritage Collections", Technical Bulletin No. 26, 2004 (<https://www.cci-icc.gc.ca/resources-ressources/publications/downloads/technicalbulletins/eng/TB26-MouldPrevention.pdf>) and by searching for mold on The American Institute for Conservation's Conservation OnLine website (<http://cool.conservation-us.org>).