

# Conservation of Documents in an Exhibit

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**Abstract:** Original document exhibits meeting sound preservation criteria are difficult to achieve and should not be undertaken lightly. Basic criteria for preservation procedures must first be firmly defined, including conservation work on the materials to be displayed and establishment of a suitable display environment. Once the criteria are fixed, implementation requires constant attention by a trained staff capable of enforcing the criteria while meeting design and content needs of exhibitors. Even when these standards are included in the planning, there are no guarantees of success. Factors beyond the control of the archivist often arise, and the Kennedy Library experience illustrates many of the difficulties that may be encountered. The archivist not only must be an expert in preservation but also must understand the complexities of executing and fabricating the exhibit and must be included in making the manifold decisions concerning the exhibit. Only then can some degree of success in meeting sound preservation criteria be assured.

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Paper is one of the most fragile of all substances. The chemical and physical characteristics of paper cause it to interact adversely with its environment. Paper deteriorates in the presence of heat, light, moisture, and air pollution. To retard this deterioration, paper conservators recommend that every attempt be made to control these elements of the environment—to keep them within a moderate range that will have the least damaging effects on paper documents.

The use of documents in an exhibit complicates the task of the paper conservator. Documents on display are subject to an environment that is generally more difficult to control than that of a document storage area. They are, for example, exposed to light for long periods; they are usually more susceptible to air pollution; and temperature and humidity are more difficult to maintain in a display case than in a storage area.

If documents on exhibit are to survive, the archivist must educate the designer in the environmental conditions and preservation procedures essential to long-term conservation of documents in display conditions. Exhibit designers usually have different goals than do archivists. The primary concern of the designer is the aesthetic appearance of the exhibit and whether or not the integrity of the design concept is maintained. To the designer, preservation of the documents in the exhibit usually is a peripheral concern. In contrast, the chief concern of the archivist, in whose care the document collections reside, must be to preserve the integrity of the documents themselves.

### **Preparation of Documents For Exhibit**

There was an obvious need for some sort of pre-exhibit treatment of the documents to be used in the exhibits at the Kennedy Library Museum, which opened in 1979. Discussion of the extent

of the preservation treatment began a few years before the opening of the museum. The obvious need for preservation steps beyond those included in the library's routine processing procedures resulted in the negotiation of a contract between the exhibit fabricators, Design and Production Company, and the Northeast Document Conservation Center (NEDCC) for paper conservation work. Library staff worked directly with the staff of the NEDCC to determine how the documents would be prepared for exhibit. It was decided that, to retain the original flavor of the documents, a minimal amount of preservation work should be done.

#### *Deacidification*

The most important procedure was to deacidify each document that showed excessive acidity. First the documents were tested, and those that showed a low enough pH were deacidified. This was accomplished either by aqueous or non-aqueous deacidification. The inks on each document were tested to determine which treatment would be best. Documents containing fugitive inks (i.e., from rubber stamps) and other similar substances were treated by nonaqueous deacidification with magnesium salt in methyl alcohol. Aqueous deacidification with magnesium bicarbonate was used on documents without ink problems. This latter treatment had a second beneficial effect: after the salt dries into the document, it serves as a buffer against acid attack in the future.

In another category were documents that could not be deacidified, even by nonaqueous means, because the process might cause the inks to feather. Thus there were some documents whose deterioration could not be retarded by the deacidification process.

A particular problem was posed by a letter by Abraham Lincoln. It was writ-

ten on a light blue paper, which could not be treated. The ink was already faded, but it was decided to take a chance and exhibit the letter anyway. It was positioned in the display case so that only reflected light fell on it. Due to further fading, however, it has since been removed and will be replaced by a facsimile. Some documents simply are not suitable for exhibit without extraordinary supplementary efforts to control the surrounding environment.

### *Repair and Cleaning*

To retain the texture of the original documents, the staffs of the NEDCC and the Kennedy Library decided to do only minimal repair work. Adhesive tape was removed because it accelerates the deterioration of paper. Thumbtack and staple holes, telltale marks of paper clips, and lost corners were not repaired or changed in any way, as they were considered an integral part of the history of the documents. Documents that were obviously dirty were cleaned with a dry-cleaning pad in a process that involves rubbing the pad over the document to remove surface dirt.

Several documents needed considerable preservation work. Rose Fitzgerald Kennedy's high school diploma had been folded for many years, and it fell into six pieces along the fold lines. It was mended with reinforcing tissue. The diaries of President Kennedy and his mother had to be taken apart; the pages were treated and the diaries were reassembled. In addition, a new cover had to be made for Rose Kennedy's diary. A similar treatment was given to the Hannon family Bible.

For continued maintenance of these volumes, the NEDCC recommended that the pages be turned frequently. In addition, conservators recommend as

routine procedure that a book displayed open be closed for at least twenty-four hours each month in order to limit the damage caused by keeping it in an unnatural (open) position for extended periods of time.<sup>1</sup>

### *Mounting*

After these basic steps were taken, the documents were ready for mounting. The NEDCC recommended mounting on four-ply ragboard, leaving a one-inch border around the document for safer handling. An alternate NEDCC suggestion was to cover each document with a mylar slip sheet as a means of protecting and preserving it. The designers, Chermayeff & Geismar Associates (C&GA), did not like either suggestion. In order to work within the space limitations and design configurations as conceived by C&GA, the library and NEDCC staffs decided to mount each document by one-inch mulberry-paper hinges affixed with nonacidic wheat paste onto four-ply ragboard, cut to the exact size of the document.

Initially all documents were hinged at the top only. When it was learned that some documents were to be exhibited vertically, hinges were added at the bottom of those as well. Eight months after the documents were set in place in the cases, the bottom corners of some of the documents displayed horizontally had curled up. Carbon copies on lightweight paper were particularly prone to this problem. Thus it probably would have been wise to hinge all documents at top and bottom. The number of hinges used does not pose a conservation problem because the process is completely reversible with water.

Multi-page documents, and pamphlets in particular, were a problem to

<sup>1</sup>Gail Farr Casterline, *Archives & Manuscripts: Exhibits*, SAA Basic Manual Series (Chicago: Society of American Archivists, 1980), p. 21.

display. To keep them from buckling from their own weight, a sling was made from mulberry paper cut to the size of each pamphlet. This was then placed over the entire document, except for the cover, and attached on the back of the ragboard backing with wheat paste. Thus the pamphlets are displayed at different angles in the cases, even vertically, without any unnecessary stress on the document.

The next step was to place each prepared document in its assigned position in the exhibit. The ragboard backing was affixed to the wall of the display case or to display easels with double-sided pressure-sensitive adhesive tape. The ragboard serves as a buffer between the document and the surface on which it is mounted. The adhesive stains, however, and will definitely stain the back of the ragboard. Since this mounting process was not thoroughly tested before installation, it is not known whether the stain will migrate through to the front of the ragboard. Thus the ragboard should be checked periodically to determine whether this is, in fact, happening.

#### *Conservator's Recommendations*

In order to best preserve documents used in an exhibit, the NEDCC recommends that they be displayed for a period not to exceed two months, and then only under ideal environmental conditions. The Kennedy Library exhibit is considered permanent, and there are no plans to change it for many years. The environment of display cases is even more difficult to control, and it is expected that deterioration of documents on display in cases will be more accelerated than if they had been kept in a document storage area.

To alleviate the deleterious effects of exhibits on a document collection, the

NEDCC urges increased use of facsimiles in display cases. The quality of facsimiles is improving all the time. A facsimile can now be made that comes very close in appearance to the original. The Kennedy Library used facsimiles in some instances, at the original installation of the exhibits, in order to show both sides of a document. One possible long-term solution to this problem of accelerated deterioration would be to have facsimiles made of all documents on exhibit and then to rotate them with original documents in the cases. There would always be some original documents, with wrinkles, torn corners, and staple marks to add some flavor and texture to what might otherwise be a rather flat exhibition of only facsimiles. Exhibiting documents for shorter periods of time would not stop deterioration, it would just slow it down somewhat by allowing intermittent "rest periods" in a more suitable environment, i.e., in the absence of light. The Kennedy Library archives staff is currently exploring these possibilities.

#### **The Importance of the Exhibit Environment**

Once the NEDCC's preservation work was completed and the documents were mounted in place, the environment of the display cases became the most important influence upon the life of the documents. The environment consists chiefly of temperature, relative humidity, ultraviolet radiation from lights, and air quality. The closer these factors are to the "ideal" range suggested by paper conservators, the slower the rate of deterioration of the documents.

##### *Temperature*

Excessive heat causes paper to deteriorate more rapidly by increasing the rate

of damaging chemical reactions.<sup>2</sup> The rate of chemical reaction in paper doubles for each increase in temperature of 18 degrees Fahrenheit.<sup>3</sup> Thus, maintaining the temperature of the document display cases at the proper level is important. Most experts in the field generally agree upon a temperature within the range of 55 to 75 degrees Fahrenheit. The presidential libraries handbook, for example, suggests 70 degrees Fahrenheit, plus or minus 2 degrees daily variation, as the proper temperature for document storage.

Temperature readings taken in sample mock-up cases before the library opened showed 75 degrees Fahrenheit at the tops of the cases, close to the light sources, and 60 degrees Fahrenheit, plus or minus 5 degrees, at the bottoms of the cases, where most documents are displayed. The exhibit cases are designed so that when the temperature in a case exceeds 72 degrees Fahrenheit, thermostatically controlled cooling fans automatically turn on and stay on until the temperature drops back to 68 degrees Fahrenheit. This is to prevent excessive heat from building up in the cases and to prevent too great a temperature fluctuation. In addition, heat shields are in place on top of most cases, just below the lights.

Temperature readings taken at the library over a period of four months in 1981 in the "Political Beginnings" exhibit case (the first exhibit upon entering the museum) showed a range of 66 to 77

degrees Fahrenheit. This almost falls within the 55 to 75 degree range generally agreed upon by most experts.

Over the past eighteen months temperature readings have also been taken in the "Interests and Concerns" exhibit. Though the majority of the readings fall within a range of 60 to 79 degrees, during a period of three months the temperature was registering in the upper 80s and even as high as 90 degrees. The large, irregular shape of the case for the "Interests and Concerns" exhibit may affect the efficiency of the cooling fans. In addition, this exhibit case was initially lighted by 150-watt PAR Cool Beam lamps. They have been replaced with 50-watt lamps in an effort to bring the temperature into line.

### *Humidity*

It is even more important that document exhibit cases be maintained at a constant and moderate level of relative humidity (RH).<sup>4</sup> Paper conservators disagree about the desirable RH, but it is generally agreed that there should be sufficient moisture in the air for paper to retain its normal flexibility. If the RH goes below 40 percent, paper becomes brittle and the corners begin to curl.<sup>5</sup> RH above 65-70 percent causes paper to cockle<sup>6</sup> and creates inviting conditions for mold growth.<sup>7</sup> The Library of Congress recommends 50 percent RH.

In the fall of 1979, just after the library opened, corners of documents began to curl, indicating a serious prob-

<sup>2</sup>Conservation Administration (North Andover, Mass.: New England Document Conservation Center and Library of the Boston Athenaeum, 1975); The 1973 Seminar on the Theoretical Aspects of the Conservation of Library and Archival Materials and the Establishment of Conservation Programs, 1-5 October 1973, p. 54.

<sup>3</sup>B.L. Browning, "The Nature of Paper," *Deterioration and Preservation of Library Materials*, Howard W. Winger and Richard D. Smith, eds. (Chicago: University of Chicago Press, 1970), p. 33.

<sup>4</sup>Garry Thomson, *The Museum Environment. Conservation in the Arts, Archaeology and Architecture* (London: Butterworths, 1978), p. 64.

<sup>5</sup>Casterline, *Archives & Manuscripts*, p. 21.

<sup>6</sup>Conservation Administration, p. 21.

<sup>7</sup>Casterline, p. 21.

lem with maintaining a constant level of humidity in some of the cases. Since there was no equipment in place at that time to monitor the humidity, the problem was not discovered until the changes in appearance of the documents were noted. Investigation revealed that the air conditioning system had not been fully installed. Hygrothermograph readings showed that the RH had dropped to between 30 and 35 percent. As soon as installation was completed, the RH returned to around 50 percent. There was no permanent damage to any documents.

This humidity problem underlines the fact that it is essential that the humidity level be monitored day and night. The simplest way to do this is by positioning hygrothermographs in each display case. The proliferation of these instruments in museums throughout the world is testimony to the increasing awareness of the importance of climate control. A hygrothermograph records temperature and relative humidity for eight days and then it has to be reset. There is one drawback, however. A hygrothermograph can slip out of calibration very easily, either by slow drift or because of a sudden jolt. Thus its calibration should be checked at least monthly against sling hygrometer readings.

In July 1980, eight hygrothermographs were purchased by the Kennedy Library. They were positioned throughout the library on floors where original documents are kept, such as stack areas and research room. Two of them are rotated in the museum area to monitor the temperature and humidity in the exhibit cases.

The pattern of humidity readings has been similar to that of the temperature

readings described above. The readings in the "Political Beginnings" exhibit fell roughly within archival range for RH, while in the "Interest and Concerns" case there were wide fluctuations. The archives staff is currently seeking ways to remedy this situation.

### *Air Quality*

In the urban environment of today there are ever increasing amounts of pollutants in the air. Ideally, an HVAC system, which removes 100 percent of the sulphur dioxide and other oxidents and filters out dust and other small particles down to two microns, should be installed in a museum area. Although this is not feasible in most areas, an attempt should be made to come as close as possible to this standard.

### *Ultraviolet Radiation*

All natural organic material is affected by light. Paper is particularly sensitive to the ultraviolet radiation present in nearly all light sources.<sup>8</sup> Ultraviolet light reacts photochemically on paper. Also, paper becomes more vulnerable to other forms of deterioration after extended periods of exposure to light. Ultraviolet radiation causes fading, discoloration, and structural damage such as embrittlement.<sup>9</sup> Since daylight is the most damaging source of ultraviolet radiation, it should be filtered or not used at all in an exhibit area. This is not a problem at the Kennedy Library, as there are no windows in the museum. The next greatest source of ultraviolet radiation is fluorescent lighting; thus, it also should be filtered. Incandescent lighting, on the other hand, emits minimal amounts of ultraviolet radiation, so filtering is not obligatory.<sup>10</sup>

<sup>8</sup>Thomson, *Museum Environment*, p. 14.

<sup>9</sup>J.B. Harris, "Practical Aspects of Lighting as Related to Conservation," *1967 Conference on Museum Climatology*, Garry Thomson, ed. (London: The International Institute for Conservation of Historic and Artistic Works), p. 133.

<sup>10</sup>*Ibid.*



The Kennedy Library exhibits are illuminated by both fluorescent and incandescent lights. Fluorescents are used to backlight the large photomurals, the time line, and the small transparencies in the individual display cases. Since the murals and transparencies are backlit, fluorescent light does not fall directly on any of the documents in the exhibit. The fluorescent tubes that light the time line have all been boxed in to prevent spillage. Thus the documents on display are not subjected to ultraviolet radiation from the fluorescent lighting.

### *Lighting*

Improper lighting presents a serious threat to exhibited documents. Both paper and ink undergo photochemical changes such as yellowing, fading, and accelerated physical deterioration when subjected to light; and light damage is irreversible. The amount of damage produced by light is directly proportional to the level of illumination and the length of exposure time. Thus, one way to reduce light damage is to keep the illumination level as low as possible.<sup>11</sup>

Professional associations of conservators have adopted a level of five footcandles as a sufficient light level for museums.<sup>12</sup> This corresponds approximately to the output of one 150-watt reading lamp at a distance of three or four feet.<sup>13</sup> Many exhibitors feel, however, that this level is too low for adequate viewing.<sup>14</sup>

There are several ways to create a viewing situation in which this low level of illumination becomes acceptable. First, visitors should not have to go from a very bright area directly into an area that is dimly lit.<sup>15</sup> At the Kennedy Library the visitor enters the exhibit area after viewing a thirty-minute film in a darkened theater.

Use of exhibit cases with interior sources of light, combined with dimmed overhead lighting, is another way to make exhibits look brighter.<sup>16</sup> This combination is used throughout the Kennedy Library exhibits. In addition, tungsten filament lamps are the light source in all the cases. Five footcandles of illumination from this warm light appears much brighter than five footcandles of cool fluorescents.<sup>17</sup>

One other way to enhance a low level of illumination is to use some diffuse lighting. Completely diffuse light comes from all directions equally. Objects illuminated by completely diffuse light do not throw any shadows at all, while objects lighted by a point source throw sharp, dark shadows.<sup>18</sup> All the lights in the Kennedy Library exhibit cases are point-source lighting. Thus, shadows cast by three-dimensional objects sometimes make it difficult to read a nearby document. A higher level of illumination is needed to have a display appear well lighted when point-source lighting is used. This was confirmed by footcandle readings taken in several exhibits when

<sup>11</sup>Casterline, p. 20.

<sup>12</sup>Ibid.

<sup>13</sup>Francis W. Doloff and Roy L. Perkinson, *How to Care for Works of Art on Paper* (Boston: Museum of Fine Arts, 1979), p. 17.

<sup>14</sup>Casterline, p. 20.

<sup>15</sup>Michael Brawne, "Museum Design for Conservation," *1967 Conference on Museum Climatology*, Garry Thomson, ed. (London: The International Institute for Conservation of Historic and Artistic Works), p. 77.

<sup>16</sup>Casterline, p. 20.

<sup>17</sup>Thomson, p. 25.

<sup>18</sup>Ibid.

the library first opened. Readings ranged from 25 to 150 footcandles. This is well beyond the five footcandles recommended by conservators. Although the specifications called for 50-watt lamps in most display cases and 150-watt lamps in "Interests and Concerns," they have been replaced with 25-watt and 50-watt lamps respectively. This has helped to ameliorate the problem of excessive light. In addition, there has been a shift from concentrated, highly-focused spotlights to more diffuse floodlamps. Readings in all the cases are now below 50 footcandles.

## Recommendations

Preparation of an exhibit that includes original documents is a difficult task by definition. First, the basic criteria for preservation procedures must be firmly defined:

1. *Paper conservation work*

Evaluate the condition of the materials to determine the extent of cleaning, repair, deacidification, and mounting work necessary before exhibiting them.

2. *Preparation of a suitable environment*

Determine the desirable levels for temperature, humidity, air quality, ultraviolet radiation, and illumination in the exhibit cases.

Once the preservation criteria have been defined, a schedule should be established for handling the various steps in a logical order. Adequate staff time and resources should be committed to ensure that the schedule is followed.

Even with the best, most detailed planning, implementation of these criteria can quickly become complicated. During the several stages of planning, designing, and fabrication,

the following points should be kept in mind:

1. It is vital to impress upon the designers and fabricators the idea that preservation standards are an inherent part of any exhibit using original documents, and that their inclusion need not be in conflict with the goals of the designers. It is extremely helpful if the archival staff has input in selecting the designer.
2. To assure inclusion of necessary preservation standards, be sure that, whenever possible, they are written into the specifications for exhibit cases.
3. When the inevitable cutbacks start due to financial constraints, it is preferable to adhere to the established preservation standards at the cost of cutting back on something else, such as materials.
4. Every effort should be made to maintain conservation standards even when time pressures make it difficult to do so.
5. It is advisable to designate one person who is knowledgeable in document preservation and who has inexhaustible energy and perseverance to monitor the project until its completion, to insure that the exhibit is executed in accordance with sound preservation standards.

Even if all these suggestions are followed to the letter, there are no guarantees of success. In any such undertaking there are always factors beyond the control of the archivist. There will always be delays and breakdowns that interfere with the best planned projects. Being fully cognizant of the complexities of executing a preservationally sound exhibit of documents will enhance the chances for success.