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Effective Management of an Image Collection in the Small Museum: Cataloging, Storing, Digitizing Images

and

the Impact of Digitization
on the Museum and the Collection

Submitted in partial fulfillment of the
requirements for the degree of

Masters of Museum Professions

at Seton Hall University
College of Arts and Sciences
Department of Art and Music

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August 2008

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Effective Management of an Image Collection in the Small Museum: Cataloging, Storing, Digitizing Images
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the Impact of Digitization on the Museum and the Collection

Lynne K. Ranieri

Dr. Charlotte Nichols, Advisor

Abstract

The thesis examines ways in which small museums or institutions administer, catalogue and store their collections of local-interest images that typically feature regional architecture, residents, and community views. Media to be considered include print and digital photographs, slides, and glass plate negatives. The results of the author's survey of twelve institutions from the basis of her recommendations for the application of sound image collection practices in the small museum. The thesis further considers what impact digitization of the images will have on the collection, on the museum, and the visitor.

Acknowledgments

It is with heartfelt thanks that I acknowledge my indebtedness to the entire staff of Seton Hall's museum professions graduate program, and particularly to Dr. Charlotte Nichols for her patient and expert advice and encouragement with this thesis and for her exceptional courses which conferred upon me a more discriminating eye for the museum's collection and my own.

The daunting prospect of returning to school – and countless 20-page papers -- at an age when I was older than all of my fellow students and my professors was completely assuaged by the expert guidance of and instruction by the museum professions faculty. Within minutes of my initial interview at the school, Barbara Cate eased my concerns about what I was proposing doing and buoyed my spirits when she invited me to enroll. My first and very stimulating and absorbing course with Dr. Susan Leshnoff also made it clear that no one could have been kinder about easing me into the academic discipline I had long ago forgotten. Dr. Jurgen Heinrich's erudition and gentle humor steered me expertly through the unfamiliar territory of art history and museum theory while simultaneously bringing to me a new and more informed look at our country's history. It was an honor and a joy to learn the tenets of museum registration from Rebecca Buck, the person who literally wrote the book about museum registration. Dr. Petra Chu's History and Theory of Museums course gave me a valuable understanding of the *why* of museums and enabled me to compile a much-needed history of the Millburn-Short Hills Historical Society museum. The legal matters we discussed in Teresa Koncick's Legal Issues for Museums course have enabled me to apply a more reasoned approach to collection conundrums and even matters outside of the museum. Lori Beth Finkelstein's course on Topics in History Museums challenged me, over my strenuous objections, to look at what needed to be done with

our exhibitions and they will be far better now because of that. Jo Ann Cotz, formerly of the Seton Hall University Walsh Library, encouraged me as I explored the unfamiliar territory of mounting an exhibition and gave me a unique opportunity to work on the charming Crayola exhibition. I welcomed, with great appreciation, the series of experts that Katherine Witzig brought to the object care course, who have enabled me to finally give a reassuring level of basic care to the many items in the collections of the Millburn-Short Hills Historical Society. In the course of a five-month internship at the Museum of Early Trades and Crafts, curator Peter Rothenberg generously shared his expertise and very practical and creative instruction in the professional execution of his curatorial duties.

I am also indebted to the many kind museum curators, collections managers, etc., who took invaluable time from their work to help me with my inquiry into how they administer their image collection. For their inestimable help, I would like to thank Ellen Callahan of the New Jersey State Archives, David Haberstich of the Archives Center of the National Museum of American History, Jean Kuras of the Historical Society of Bloomfield (NJ), Stanley Lipson of the Westfield Historical Society (NJ), Susan Moore of the Historical Society of the Township of Chatham (NJ), Eileen Morales of the Historical Society of Princeton (NJ), Joanne Nestor of the New Jersey State Archives, Candace Perry of the Schwenkfelder Library and Heritage Center (PA), Mary Prendergast of the Harding Township Historical Society (NJ), Wendy Rejan of Fort Monmouth (NJ), Phil Reynolds of the Historical Society of the Rockaways (NJ), Elizabeth Shepard of the Montclair Historical Society (NJ) and Medical Archives Center of NY-Presbyterian/Weill Cornell, Myra Snook of the Sussex County Historical Society and Township of Fredon Historian (NJ), Walter Stochel of the Metuchen-Edison Historical Society (NJ), Dr. L.

Allen Viehmeyer of the Schwenkfelder Library and Heritage Center (PA), Craig Williams of the New York State Museum, and David Wooters of the George Eastman House Inc (NY).

As I hope this academic pursuit and this paper will serve to improve collection management – and particularly the photo collection -- at the Millburn-Short Hills Historical Society museum, I would be grateful if the society and its patrons find long-term benefits from the wisdom of the many people cited here, who have given generously of their time and expertise.

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Chapter 1: Introduction

The wish to give permanent visual form to the memory of an evanescent moment was sated dramatically by the invention of photography some 180 years ago. The persistence of that desire may be demonstrated by the volume of photographic images with which we are confronted daily by circumstance or by choice at home or in cultural institutions. Image collections in museums – and particularly history museums – give intransience to otherwise ephemeral images while simultaneously communicating the institution's *raison d'etre* to the viewer. Image collections in the form of photographs play a special role within the context of the small history museum, where they are critical to the success of exhibition and education initiatives. This thesis addresses issues associated with sound image collection practices in the history museum.

It is the responsibility of the museum to use its image collection to interpret these intransient images for the patron and to preserve them for posterity. The two objectives of interpretation and preservation are advocated by the American Association of Museums (AAM) Code of Ethics for Museums:

> It is incumbent on museums to be resources for humankind and in all their activities to foster an informed appreciation of the rich and diverse world we have inherited. It is also incumbent upon them to preserve that inheritance for posterity.[1]

The greater challenge that these directives present is that the two mandates are antagonistic. The museum is generally based upon a collection, or collections, which must be cared for and preserved in such a way as to ensure the maximum longevity of the items in the collection. At the same time, those collections must be as accessible as possible, in order to serve the educational needs of the museum patrons. Invariably that educational service exposes the collection to elements that will hasten the degradation of the collection and therein lies the

conflict. This inquiry examines the current best practices by which museums are managing their image collections so as to satisfy that code of ethics challenge. It will be demonstrated that contemporary technology, and specifically digitization, offers one practical solution to the inherent antagonism in the museum mission and will be addressed in chapter five.

This inquiry will establish what the current best practices are for cataloging and storing the photo or image collection. For the purposes of this essay, the photo or image collection is defined as the collection of images primarily of documentary interest (rather than of significant aesthetic value), such as local-interest images of regional architecture, residents, community views, etc. and comprising such forms as print and digital photographs, slides, glass plate negatives, etc. The further objective is to assess the ways in which those practices can be most effectively applied to the photo collection in a small institution, in what ways the museum might anticipate how technology will advance those practices, what impact that might have on the museum's and the virtual visitor's relationship with the collection, and how to enhance that impact.

Because of the preponderance and proliferation of history museums in the United States since the 1976 Bicentennial, survey questions (see Appendix I) were brought to sixteen history museums in order to assess current approaches to managing image collections.[2] Interviews were conducted at institutions of wide-ranging size, from the Smithsonian in Washington, DC and the George Eastman House International Museum of Photography and Film (GEH) in Rochester, New York, to small local history museums with two filing cabinet drawers of images. GEH and the Smithsonian were included in the study in order to research the ways in which those prominent museums manage their very important collection of photographs. Research began at

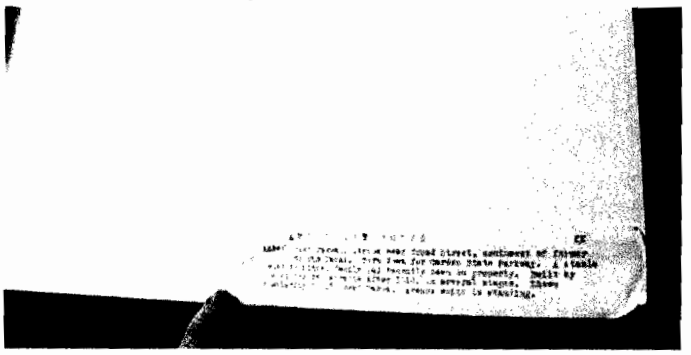
the Smithsonian because it is America's national educational facility, is the world's largest museum complex, with 19 museums and nine research centers. The National Museum of American History, which collects and preserves more than three million artifacts, includes the Archives Center that houses a remarkable array of American history in documents, photographs, and other works. The George Eastman House, established after World War II, was renamed the International Museum of Photography in 1972 and is "… an educational institution that tells the story of photography and motion pictures."[3] The museum keeps and cares for "images, literature, and technology to tell the story of photography and the motion picture in history and in culture" and according to *Administration of Photographic Collections*, it "exerted a major influence on the collection of art and historical images and on scholarly research."[4] Small local history museums were examined in order to determine how image collections are managed in institutions with severe budgetary and storage constraints. The questions asked of the person responsible for overseeing the image collection(s) were intended to determine how, or if, the images are accessioned, tracked, stored, retrieved by researchers, and digitized. The best practices were culled from the responses and are presented here in chapters that address each of those areas.

The additional challenge for the small museum – or even the larger institution -- is to find effective and sound procedures for cataloging, conserving, and storing an image collection that may comprise images in forms as diverse as slides, film, Polaroid pictures, CDVs, posters, tintypes, glass plates, daguerreotypes, black and white photos, color photos, and digital images. Because of the highly technical nature of and scope of the field of conservation of items in a collection, this inquiry does not address in-depth conservation measures, other than as they relate to secure storage of images.

Chapter 2: Object History and Accession Numbers

The New Museum Registration Methods by Rebecca Buck and Jean Allman Gilmore notes that "The two most important parts of the museum registration system are the registration documents on each object and the object itself. Without some means to tie the particular object to its particular documentation, there is no registration system. The accession number is that means."[5] Assigning a unique accession number to each item in a collection enables the museum to associate important details about the object, such as the history of the donation (for example, the identity of the donor or the value of the item), the history of the item (such as the age, producer, or subject of the item), and usually the location of the item in storage. The survey questions revealed that there is still some disparity in the registration methods used by the museums. This chapter assesses various registration methods used by museums for their image collections.

The importance of the issue of accession numbers to image collections may be demonstrated by example. A photograph of an unidentified house is going to have considerably less efficacy in a history museum collection than an identified photograph of the home associated with an important historical figure. Unless a complete history of the photo is permanently written somewhere on it, the image is at risk of becoming disassociated from its history or documentation – not an uncommon phenomenon in small history museums with collections that predate the installation of the current professional standards for collections management. As can be seen in the photo to the right, of the back of a photo in the



collection of the Historical Society of Bloomfield (NJ) museum, the history of a photograph of a house is affixed to the back of the photo but is at risk of becoming separated from the image. Using an accession number permanently affixed to the object, rather than a label such as that on the prior page, enables the museum to more permanently associate the image with its history, thereby making the image and its history more valuable to the museum and the patron for fulfilling the museum's mission to exhibit and interpret history through the collection.

Accession Numbering Configuration

The earliest collection records seen at the majority of the small local history museums visited for this inquiry indicate that most of the museums first used a simple sequential numbering system (e.g., 1, 2, 3 ...) for the images in the collection. Because that simple sequential numbering imposes inflexible restraints on accessioning, as when additional items in a single donation are found after numbers have been assigned and subsequent donations have been assigned the next number, most museums now use the standard three-part accession number such as 2008.02.5. The first number refers to the year accessioned, followed by the sequential number of that accession in that year, then the number of the item in that accession. Some museums retain the original numbering for reference, by creating an additional field in the database for the original number, although none of the surveyed museums indicated that they were doing so.

The museum should use a simple ledger to immediately assign the object a number in order to minimize the risk of having an object separated from its provenance when it is not possible to accession it into the collection immediately. The item can be assigned a temporary number until a decision is made as to whether to formerly accession the item into the collection,

or in the case of a small museum the number can be the permanent three-part accession number, if the item will go directly into the collection. The ledger should note the accession number, a brief description of the item, the date it came to the museum, and the name of the donor. As the second part of the traditional three-part number is the number of that donation for that year, any objects associated with that particular donation can always be assigned the next number in that group, even if a subsequent donation was entered in the ledger. Items with that same first and second number will then always be associated with the donor of that collection -- something that is not possible to do with simple sequential numbers.

Of the sixteen institutions surveyed for this paper, five assign to their images the traditional three-number system. The George Eastman House, in Rochester, New York, uses a three-part number assigned by the registrar (year accessioned/lot number/sub-number). The Historical Society of Bloomfield and the Historical Society of the Rockaways use simple sequential numbering and the Smithsonian's Archives Center and Cornell's Medical Center use archival numbering. The archivists at the Smithsonian and Cornell explained that as the management of archives is concerned with relationships within the collection, archival numbering numbers things at the group level, as with a number for a donation, and not at the individual item level. Three institutions use the number assigned by their database, which may not be in the traditional three-part format, and the Schwenkfelder Library and Heritage Center noted that they may have up to three different numbering systems, including a simple classification-type number or a conventional three-part accession number, the latter of which they noted is never used to retrieve an item.[6] Finally, Fort Monmouth and the Historical Society of Princeton noted that they have no numbering system. Because Fort Monmouth's image collection comprises only images related to Fort Monmouth or that of one of the satellite sites,

the collection occupies a fairly small square footage (see photo below). Their photo collection is stored by topic, on prominently labeled shelves, to expedite image retrieval without depending upon retrieval by accession number.

(Fort Monmouth storage shelving topically labeled)

The unnumbered Historical Society of Princeton collection comprises about 100,000 images which are found through printed finding aids (see samples in Appendix II). Finding aids can be electronic or printed and facilitate access to the collection by providing detailed information about the items in the collection.

Numbering Related Photos

One of the numbering dilemmas that a registrar may need to address is the selection of a number to assign to photos in an album. Of the institutions that use accession numbers and have albums in the collection, all noted that they assign a unique number to each photo on the page.

Museums may append a letter to the accession number, to reflect a part of a whole, as with a pair of gloves that may be numbered 2008.13.3a and 2008.13.3b. As the photos in an album are part of that whole, the organizations interviewed were asked if they add a letter to each of the numbers assigned to the photos in an album and none of them do. One respondent, who oversees one archival collection and one museum collection, commented that either assigning a unique number or appending a letter to the album number is correct.[7] Storage of photograph albums is addressed in the next chapter.

Of note is that fact that problems may arise with some databases if the accession number has both numeric and alpha characters, as the database field may not be able to sort numerically if there are alpha characters in a field designated numeric only.

Marking the Image

The authors of *Administration of Photographic Collections* advise "Non-destructive means of marking photographs must be employed …As little information as possible should be recorded on the backs of paper prints; normally the accession and image numbers will suffice. Notations should be written lightly with a lead pencil (#2 or softer) while the photographs are supported on a clean hard surface. If too much pressure is exerted when writing, an impression or indentation will be forced into the emulsion layer, thus damaging it."[8]

Documentation Organization

Administration of Photographic Collections notes that proper subject headings are critical to the organization and retrieval of photographs.[9] As will be seen in subsequent chapters, much of the difficulty of organizing and retrieving non-digital photographs has abated as a result of the application of the database to the management of the photo collection. Nonetheless, the retrieval of images depends upon a degree of standardization in the vocabulary used for searching a database. Chenhall's *Nomenclature for Museum Cataloging*, while not complete for all museum needs (it only deals with manmade items), is one vehicle for standardization of the classification hierarchy. [10] One other field of unevenness that continues to cause confusion, particularly for patrons of history museums with a broader scope than local history only, is the country associated with the image. One of the conundrums for museum registrars is that in war and in peace the borders and the name of a country may change. As a result, the country of origin or subject of the image may not be known by the name it had when the photograph was taken.

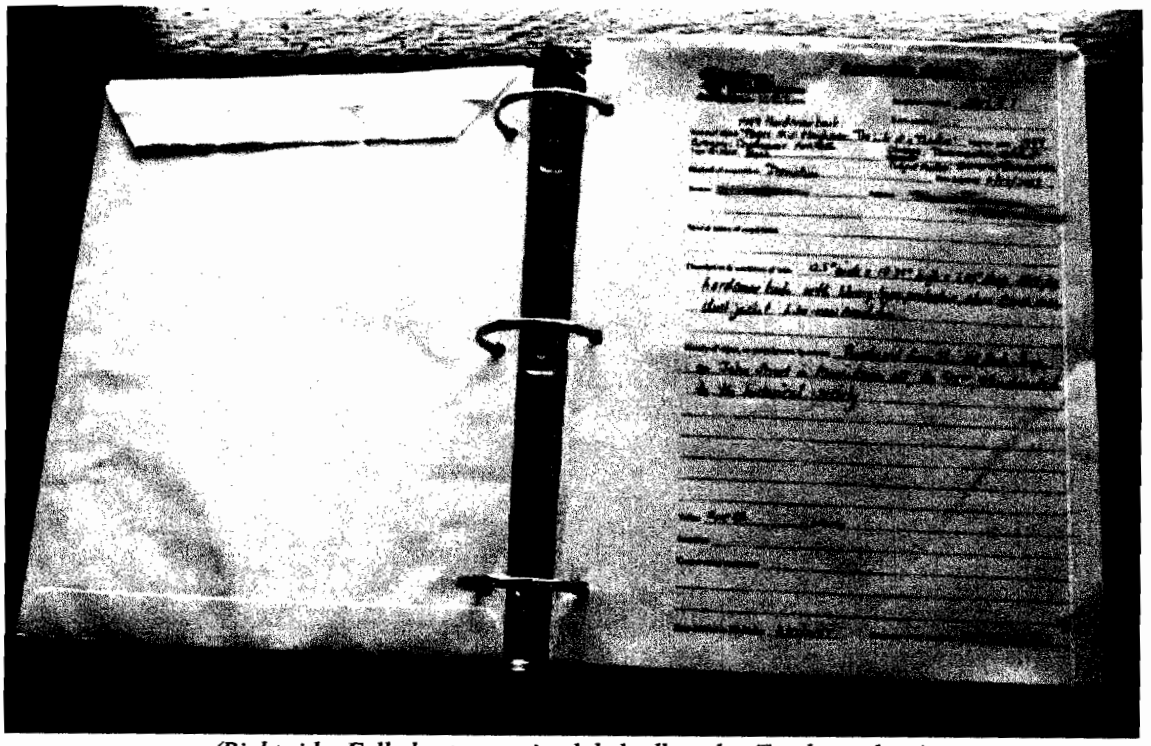
In response to the author's query about how Eastman House identifies the country associated with an image, the archivist of the George Eastman House photo collection, David Wooters, noted that Eastman House catalogs according to the country at the time the photo was made.[11] This author also proposes that geographic consistency can be assured by assigning (fixed) global coordinates to the photograph records.

Storage of Accession and Registration Records

Once the accession number has been assigned, recorded in the ledger, marked on the object, and entered in a database, it is necessary to associate the item's history and/or provenance with that number. As was noted earlier, the history of the collection object may be as significant

as the item, thus paperwork linked to that object needs preservation principles applied to it, too. The AAM booklet *Caring for Collections* indicates that "Documentation must be thought of and treated in the same manner as objects in the collection. It must be collected, preserved, and interpreted ... As with objects themselves, there must also be concern for the physical safety of the documentation and its properly controlled environment."[12]

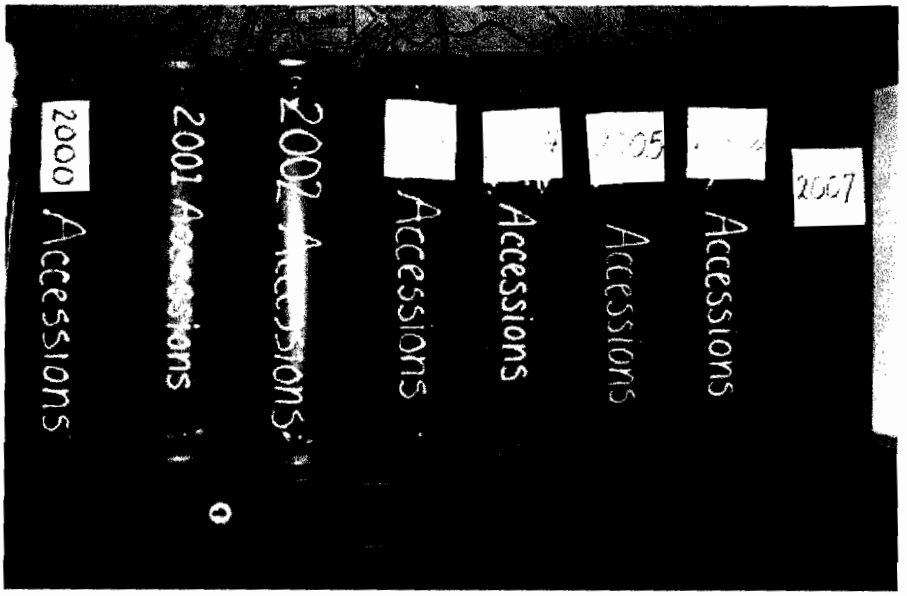
In the large museum there may be multiple files associated with an object, as, for example, a file on the donor, a collection file, and a research file. For the very small museum, staff and space constraints likely preclude according multiple files and filing drawers to one object. For the constrained storage space in very small museums, as in small historic house museums, the author devised a record storage system that consigns all item-related paperwork, such as history, condition reports and photos to a single, movable, filing system (see Appendix III).



(Right side: Full-sheet accession label adhered to Tyvek envelope)

A material used by many museums to store or protect collection items is Tyvek because, as a post to the Conservation DistList notes: "... from everything I have read and heard, tyvek is conservationally sound. It is made of the same stuff as polyester except that it is spun into thin threads. It therefore, has some qualities of both mylar and paper."[13] For that reason, 9" x 12" Tyvek envelopes were selected for record storage. Full-sheet labels are printed with the necessary accession information and affixed to the Tyvek envelope, as seen in the sample in the Appendix III. A three-hole punch is used along the left side of the Tyvek envelope and the full-sheet label is aligned with the right edge.

The accession sheet on the envelope comprises fields that were culled from the fields in the database, so there is redundancy in the information, but the AAM encourages the museum to have duplication of the object records. Information such as provenance, donor information and deed of gift forms, is stored in the envelope, which is then secured in a binder labeled for that year.



To summarize, the accession number is a critical element in the registration process. Once the image and its associated records have been assigned a unique designation, such as the three-part number, the museum has enabled the permanent association of the history of the item and the image. That unique designation will now also facilitate the storage and retrieval of the single item from the body of the collection.

Chapter 3: Storing the Image Collection

Because of the structure and variety of photographic images, safe storage of image collections necessitates storage conditions that are often dissimilar to the storage conditions required for safe storage of other types of objects. The undersized storage space usually available to the small and/or historic house museums often imposes compromises in storage conditions for the image collections. The majority of the surveyed institutions allowed the author to access collections storage areas, where notable consistency in storage practices was observed. From those observations were culled the following recommendations for image collection storage in the small museum.

Environmental Conditions for Safe Storage of Photographic Images

Museums need to avoid fluctuations in temperature and humidity for a number of reasons. The (non-digital) photographic process entails the application of an emulsion of photosensitive material to a support or ground material. In response to environmental conditions, those two layers will expand and contract at different rates, causing instability in the layers, so the goal for the museum is to avoid fluctuations in the temperature and relative humidity. A cool, dry environment can also prevent the growth of mold and fungi and is less attractive to insects. Other environmental conditions that will damage the photograph collection include exposure to UV light, which causes fading and cumulative damage, pollution, and biological agents.

As the ideal temperature and humidity varies for different types of photographs, an average ideal temperature of 68^0F ($\pm 2^0$) and relative humidity of 35%-40% is suggested. These values are lower than the recommended conditions for non-photo paper items in a collection, so

the museum is advised to store the photograph collection in a separate, cooler area. That is seldom possible in the constrained storage space that is usually available to the small museum, so collections are most often co-mingled and kept at the slightly cooler 68^0 than the 70^0 most often recommended for paper collections, such as books. Of critical importance, however, is a stable environment 24 hours a day and seven days a week. *Administration of Photographic Collections* advises that "Major fluctuations, which occur when rapid cooling follows a shut-down that causes high temperatures, generally result in serious and irreparable damage."[14] All above-ground storage areas visited had heat and air conditioning capability, but only one of the small museums had temperature/humidity monitors, which are recommended to provide information about the environment.

Storage Rooms, Units, and Enclosures

Storage Rooms: Of the local history collections surveyed, those of the Historical Society of Princeton, the Historical Society of Chatham Township, and the Montclair Historical Society were housed in historic buildings. (The other collections were housed in newer and often multi-use buildings.) Historic house museums often have additional pressures from having to house the collection(s) in a building that is itself of historic significance. That usually presents challenges to safe storage because of the historically significant architecture that frequently cannot be brought to the recommended standards for proper storage of a photographic collection. The AAM report *Caring for Collections: Strategies for Conservation, Maintenance and Documentation* addresses historic house museums and "their open, uncontrolled environments … (that) make conservation methods appropriate for other types of

collections impractical for historic structures. Frequently compromises must be made between the integrity of the historic building and its adaptive use. "[15]

Of the eleven storage areas visited, all but one were above ground. The sole basement storage area was in the community's library building, in a room allocated to the local historical society by the town. The authors of *Administration of Photographic Collections* advise that "Photographic collections should be stored in a cool, dry area within the repository, away from overhead steam or water pipes, washrooms, or other sources of water."[16] While that sole basement storage area was at risk of being damaged by the water/waste pipes in the ceiling of the room, it apparently had a relatively stable temperature and humidity because of its underground location.

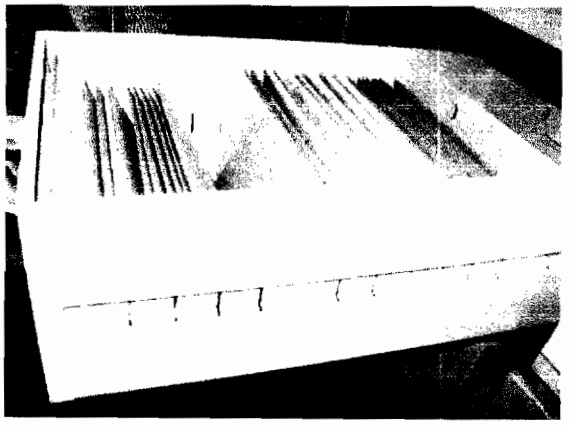
Storage Units-Shelving/Drawers: With only one exception, all of the museums with storage areas that the author was able to enter kept their photo collection in archival boxes on metal shelving or in large drawers in metal cabinets in closets, or in separate storage rooms. (The sole offsite collection was not visited, two other collections were not available as the interviews took place at a site other than that that housed the repositories, and another photo collection was stored in file folders in older metal filing cabinets.) Because of the potential for damage to a collection from off-gassing of volatile organic compounds such as formaldehyde and acetic acid in wood, powder-coated metal shelving is safer for collections storage than wood cabinets or shelving units.

Storage Enclosures Used to House the Images: Gary Albright, former senior paper/photograph conservator for the Northeast Document Conservation Center (NDCC) wrote a

preservation leaflet on *Storage Enclosures for Photographic Materials* that is available online at the NDCC Web site.[17] In the document Albright notes that "All enclosures used to house photographs should meet the specifications provided by the International Organization for Standardization (ISO) ISO Standard 18902: 2001."[18] The ISO Web site states that "ISO 18902:2007 specifies the principal physical and chemical requirements for filing enclosures, containers, albums and frames, particularly designed for storing wet or dry processed films, plates and papers ...ISO 18902:2007 applies to storage copies and ... it applies to visual records for extended-term preservation and to visual records for preservation for moderate periods of time."[19]

The NDCC recommends photograph enclosures that are: 1) free of lignin, 2) 100% rag, and 3) not highly colored. It also cautions against using glassine envelopes because of their wood pulp content. The Albright leaflet adds that acid-free designation does "not guarantee that a material is safe when used with photographs. Even archival papers may be harmful to the photographic image. The only way to be certain of the inertness of the paper is to have materials undergo the Photographic Activity Test (PAT) as specified in ISO 14523: 1999."[20]

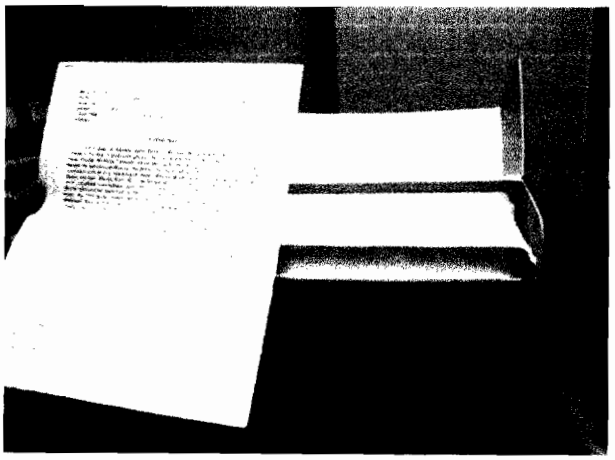
Encapsulation in polyester (Mylar) protects photographs from abrasion and somewhat from harmful environmental factors, but the Northeast Document Conservation Center cautions against encapsulating photographs that are adhered to poor quality mounts or contemporary color photographs.[21]



As is suggested by the photo on page 25 at left, fragile photos that are inappropriately stored in filing drawers are at risk of damage. This may occur when the photo is tall enough to hit the cabinet when the drawer is opened and closed, or from the weight of other items laying on it when the drawer is not full enough to keep all files upright. If it is not possible to store the photos in acid-free folders in archival boxes, photographs in file drawers should be kept upright by using archival fillers and supported with archival board. Hanging folders do not provide enough support for (unsupported) photographs for long-term storage.

Boxes of photos, of acid-free board and with metal-reinforced edges, were found in every storage facility visited. Photo groups stored on shelves should be protected with acid-free folders or encapsulated in Mylar -- with the corners untaped for circulation -- and stored in fitted archival boxes, with blocks of ethafoam or acid-free board spacers if the photos do not fill the boxes. Boxes should not be so full that photos could be damaged when removing them from the box. If space permits, photos are subject to less stress if they are stored flat. Drop front or hinged lid storage boxes enable easy removal of items inside. Clamshell and lidded boxes are most often used for vertical photo storage.

As noted above, file folders for boxed photographs should be made of acid-free board, but may be buffered or unbuffered. Buffered paper has an additional reserve of an agent that



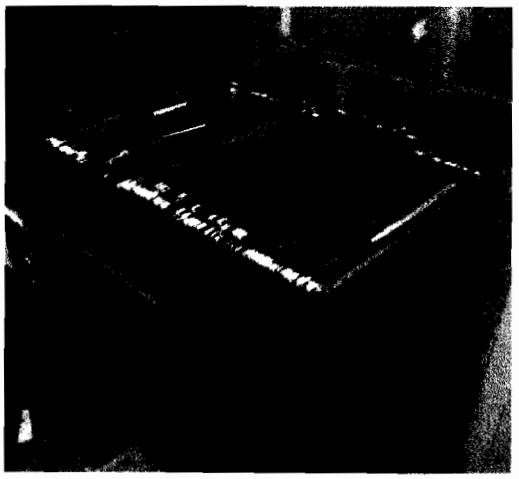
helps neutralize acids in the environment to further protect the item. The buffering agent is usually calcium carbonate, which has long been believed to adversely affect some images. The 1996 Gaylord Preservation Pathfinder No. 3 booklet, *Archival Storage of Photographic*

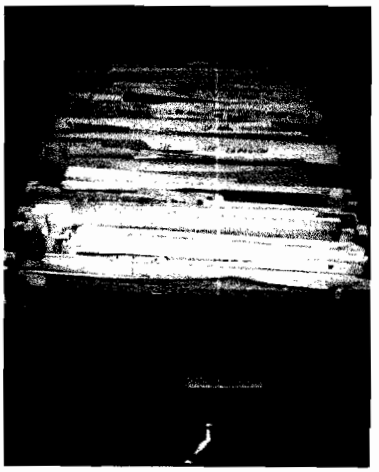
Materials states: "Current research recommends buffered paper for black and white photographs and negatives. All nitrate film should be stored in buffered paper. Unbuffered paper should be used for cyanotypes, including architectural blueprints, and dye transfer prints. The current ANSI standard also recommends unbuffered paper for color photographs and color negatives."[22] A more recent 2007 Northeast Document Conservation Center preservation leaflet, however, notes that "Buffered paper enclosures (pH 7.5-9.5) contain an alkaline material (such as calcium carbonate) that neutralizes acids as they form. In the past, conservators have recommended the use of neutral paper enclosures for storage of color images, cyanotypes, and albumen prints. It was believed that these processes were sensitive to the alkalinity in buffered papers. Recent research has indicated that buffered enclosures are not detrimental to photographs. Therefore whether paper is neutral or buffered is not a major criterion for choosing an enclosure. "[23] As it has long been advised that there is no harm to color photographs stored in unbuffered paper folders and as the caution against buffered paper has only recently been lifted by at least one conservation source, this author's recommendation is to continue to use unbuffered paper file folders until additional research supports the claim that buffered paper does not adversely affect color photographs.

Organization of Images for Storage

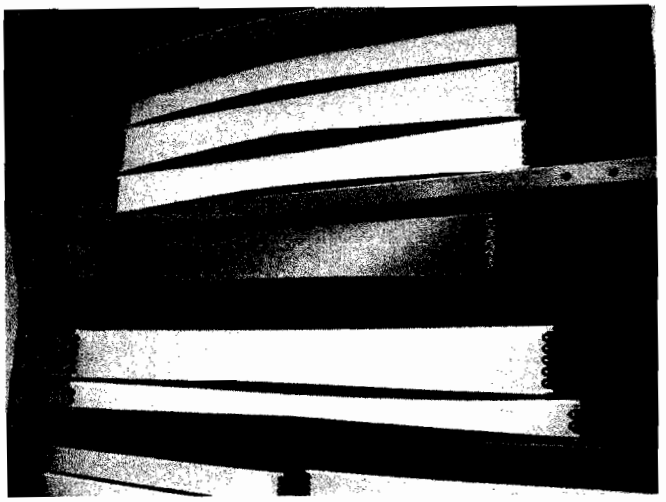
When asked how the museum collection was stored, most interviewees responded "By topic." Examination of the storage areas, however, indicated that the initial sort is apparently by size or type of image, then by topic. What also became apparent in the course of the interviews is that many of the museums address photo collection storage and preservation issues primarily in response to patron inquiries. In two museums the images were being scanned, for digital storage,

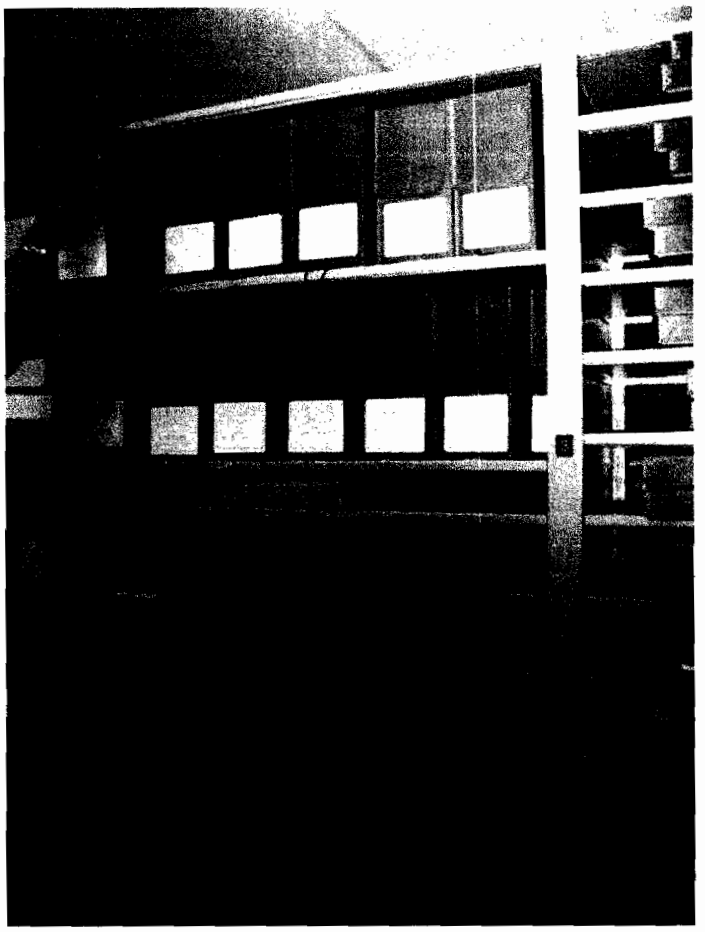
only in response to research requests by visitors. In over half of the museums the photograph collection was stored in a way that reflected the interests and demands of the public. For example, three small local history museums filed their architectural photographs in files for street addresses in the community, rather than together in an architectural collection, as the members of the community typically visit the museum to see the history and old photographs of his or her home. In response to those frequent inquiries, most of the small local history museums have (usually metal) filing cabinets with alphabetic files of streets, then numeric house-address sorts within the streets, as below.

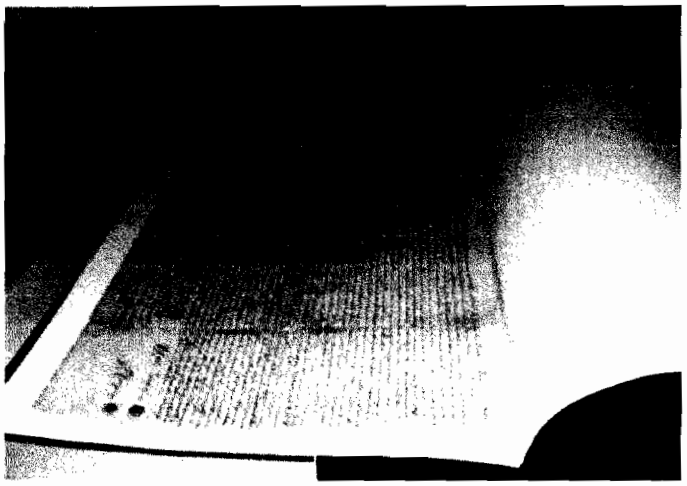




Oversized maps and newspapers cannot be filed in the same small archival boxes with photo albums or glass plate negatives. Because of the necessity of storing those oversized items flat and horizontally, they were typically stored in narrow map-cabinet drawers or on metal shelving in large, flat, archival boxes, as seen on pages 26, 28, and 29. Note that most of the collections in these photos will not be identified, for the security of the collection.



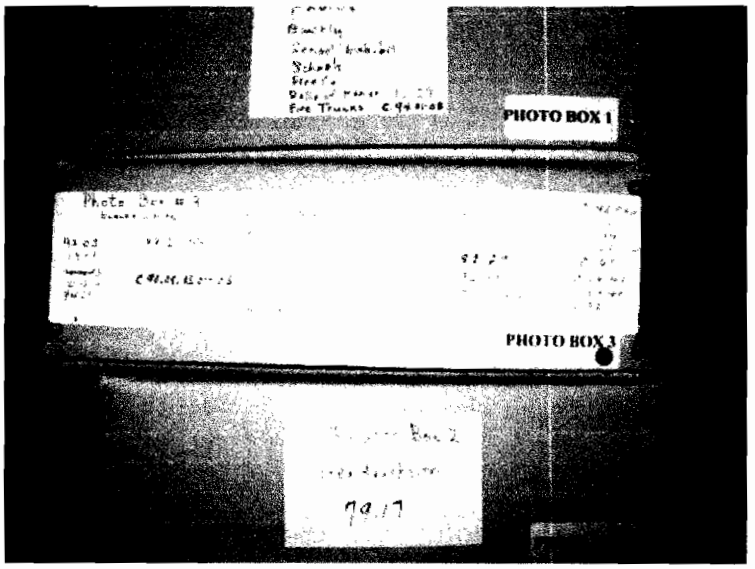


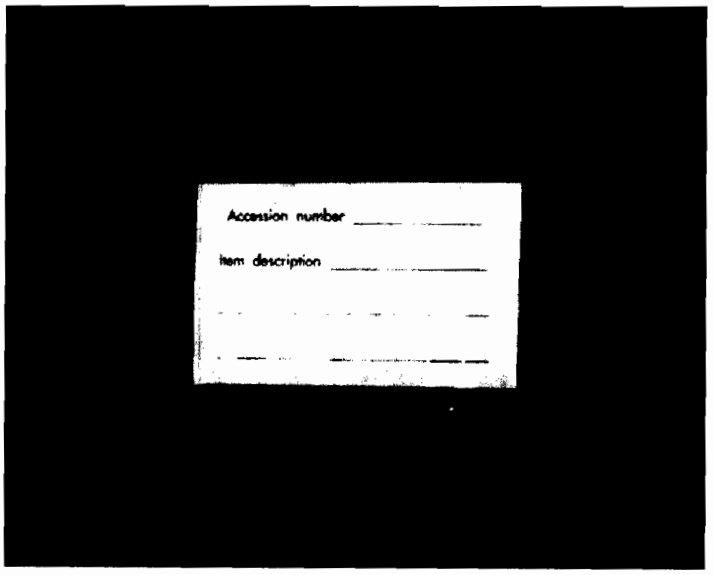


Within the drawers or boxes for oversized images or documents, items were most often stored in heavy archival paper folders that open flat, so that the item is not subject to abrasion by sliding it in and out of an envelope.

Labeling Storage Enclosures

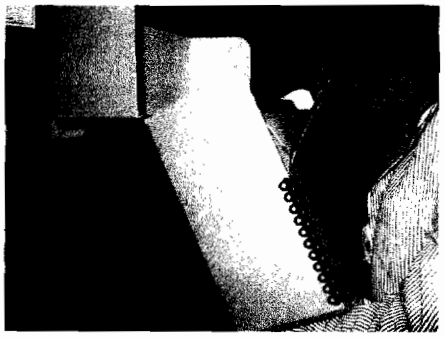
Storage boxes were often labeled with both a box number label and a contents label, as at right. In the author's experience the small museum may find it occasionally necessary to migrate the single-donor contents of a box to another box, to accommodate additional donated items that may be found later. The expanded contents may now require storage in a larger box and the existing labeling may then lead to confusion as to box number or contents. A more flexible labeling was developed by the author, using archivally-safe (for the card inside) polypropylene adhesive pockets that are open on one side.[24] The contents of the box can then be recorded on pieces of card stock that have been cut to fit in the poly pockets. In that way, reorganizing the contents only requires changing the card in the pocket(s).

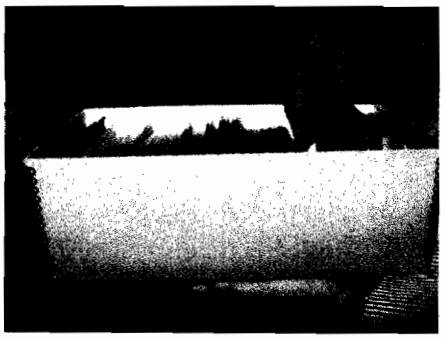


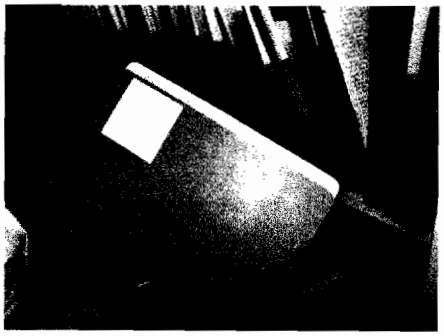


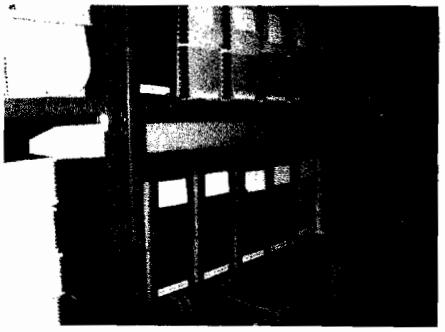
Storage Requirements of Specialized Images

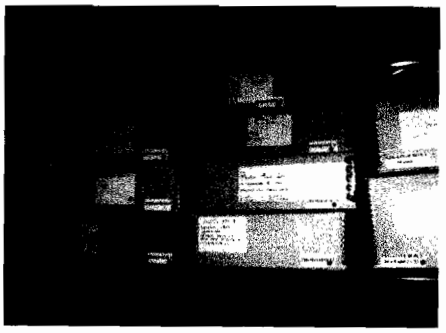
Print Photographs: As expected, the print photograph comprises the bulk of the images in the collections at each of the institutions interviewed for this paper. Although the collections varied in size from hundreds of photographs to hundreds of thousands of photographs, the approach to storage of the photographs was consistent in the majority of the institutions. Print photographs were generally stored by collection/donor on metal shelving, in acid-free file folders in archival metal-edge boxes or in metal filing cabinet drawers, according to the size of the image collection and the available storage space. They were less often found in archival polyester protectors in (archival) 3-ring binder boxes, as can be seen on this page and the top of the next page.



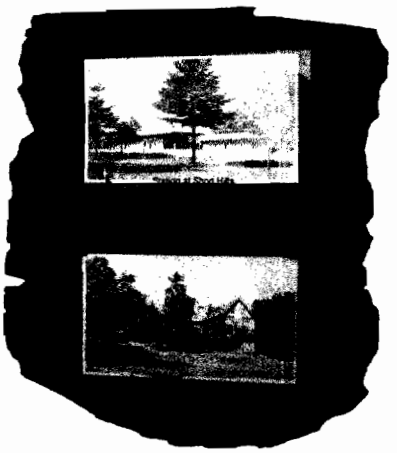








Photograph Albums: When a photograph arrives in the collection in an album it brings with it a history by its relationship to the other images in the album and that history is often as important to the museum as the image is. The authors of *Administration of Photographic Collections* advise careful consideration before dismantling albums and thereby destroying not only the order in which they were kept but also their integrity as a collection.[27]

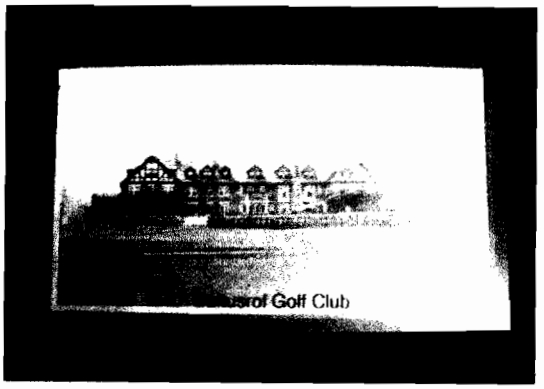


(Sample of damaged album page)

There may also be significant identifying information written on the album pages, but this frequently presents a storage dilemma because of the potential for damage to the photos from non-archival pages of the album. For albums from which photos cannot be removed and in which the photos are mounted on facing pages or face unstable material in the pages, the pages should be interleaved with unbuffered or buffered paper (see pages 23-24).

Of the institutions interviewed that had photograph albums in their photo collections, the majority indicated that they store the photos as they were originally received in the albums. For newer photo albums, the New York State Museum removes the photographs from the album and puts them in numbered sleeves. The Metuchen-Edison Historical Society removes the photos from their albums, but stores them together outside of the album. The Westfield Historical Society keeps the photos in the album but scans each page before any preservation work is attempted.

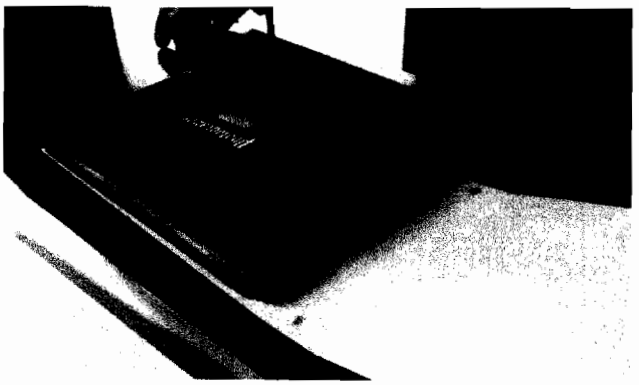
Two albums in the collection of the Millburn-Short Hills Historical Society comprised photos glued to black-paper pages in poor condition with captions handwritten on the black paper. In order to preserve the context of the photos in the albums and the handwritten captions for them, the photos were removed one at a time from the damaging black-paper pages, using dental floss to gently saw them off the pages. Once each photo was removed it was placed in a Mylar pocket that was then reattached to the page, in the same place, with small pieces of narrow double-coated tape. The handwritten captions were transcribed to transparent labels made with a label maker, then applied to the bottom edge of the Mylar photo pocket, as can be seen here. In this way, should the album page become embrittled to the point that



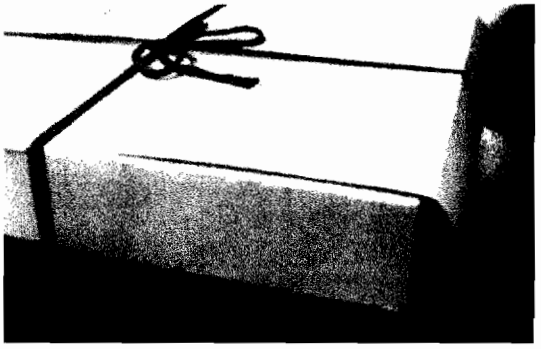
the photo pocket becomes entirely detached from the album the photograph will not be separated from the caption history.

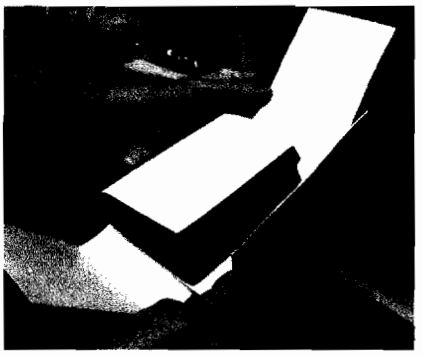
Note that because of the fragile nature of the pages of these albums and the wear to which they are subjected from patron use, the pages are rapidly breaking down, as can be seen in the photo on the bottom of page 29. The album pages should be photographically copied, with a camera, rather than photocopied, for longevity. The researcher can then refer to the surrogate pages and the original album can be securely placed in storage in archival wraps.

Photograph albums often present a particular storage challenge because the album is often wider at the spine and narrower at the fore edge (see photo at left below) and it is usually necessary to create custom storage enclosures. David Wooters of the George Eastman House Inc. shared two archival album wraps used at GEH. [28] Wooters first cut a custom piece of heavy acid-free board, to fold over the album for support. The album was then placed in a four-flap wrap made from a vertical piece and a horizontal piece of acid-free folder stock that have been glued together where they intersect.

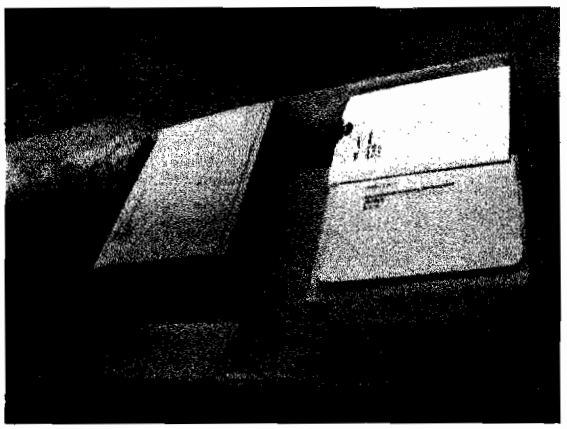


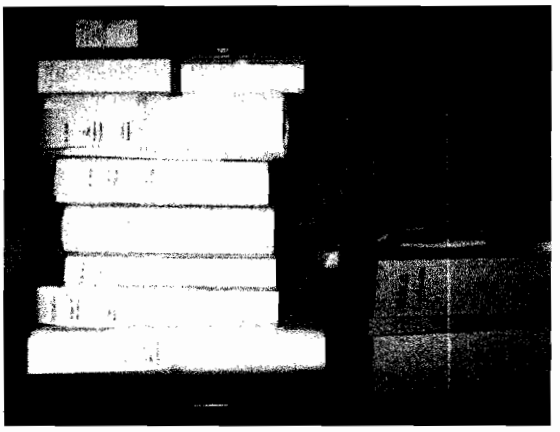
For albums that are the same width at the spine and at the fore edge, a simple four-flap wrap of folder stock was wrapped around the album, as below at right.





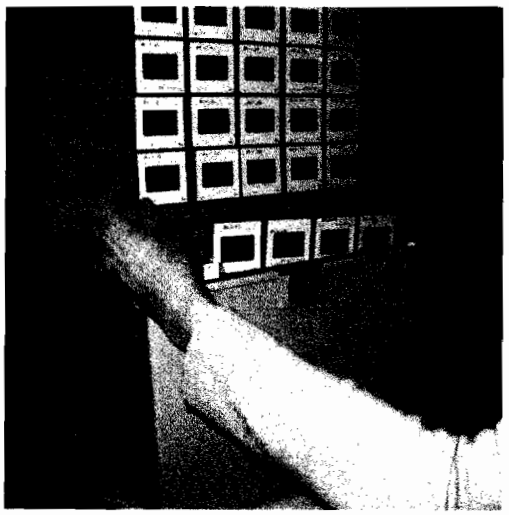
Albums – and books – that are sturdy and well-protected with secure wraps can be stored upright on a shelf (see photo below). However they should be kept upright with bookends or archival filler to prevent shelf skew, wherein the book leans diagonally and forces one cover up and torques the spine.

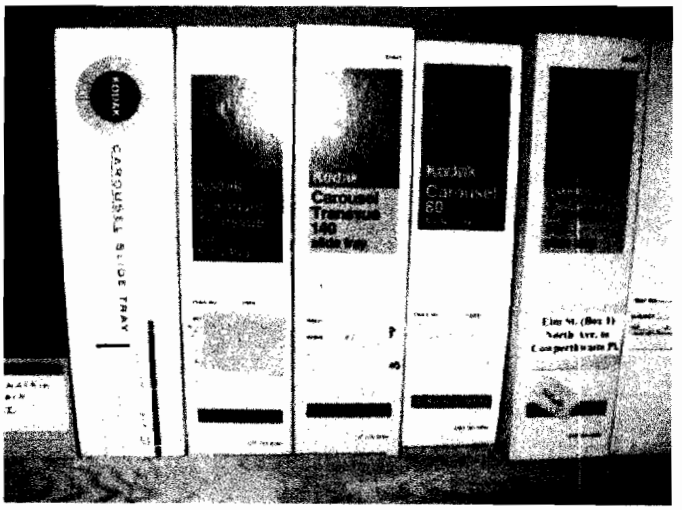




Fragile books or albums should be stored horizontally on the shelf or in boxes, as seen above.

Slides: Because slide film is somewhat protected from abrasion by the paper frame that surrounds it, slides may be stored in polyester slide storage sleeves and viewed without handling the film. The sleeve pockets below left are attached to a hanger that rests on the lip of this box. Care should be taken to assure that the bottom row of slides does not curl on the bottom of the box.

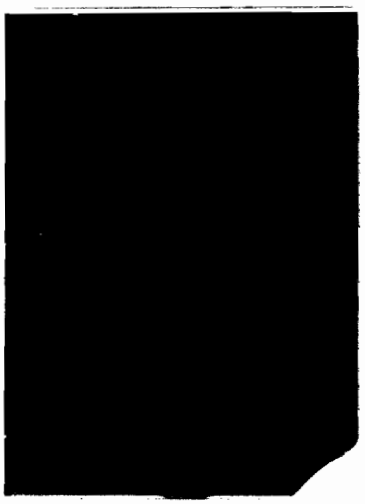


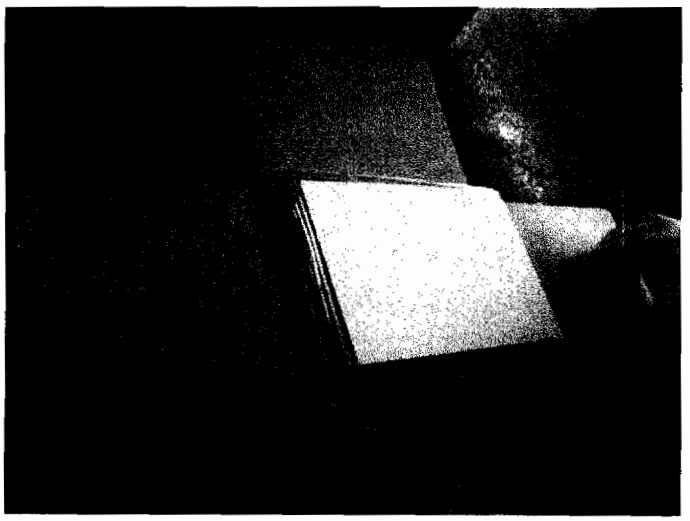


In many small museums, slides can also be found stored in carousels by topic or organized for public presentations. The slide film is not exposed to direct contact while in the

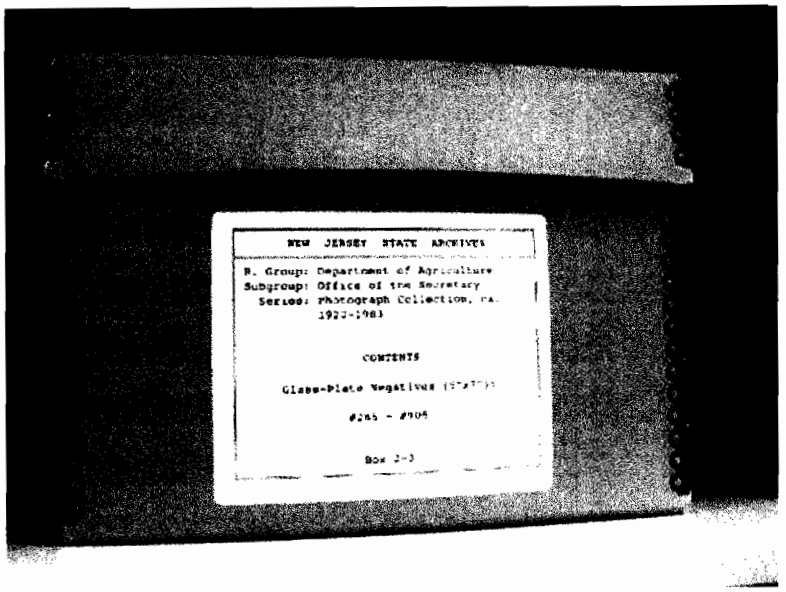
carousel, but this method of storage subjects the slides to damaging handling if a particular image is being sought and slides are repeatedly pulled from the carousel to search for and retrieve an image.

Glass Plate Negatives: For additional safety in handling or storage, images are usually stored by type, as with glass plate negatives, which are glass plate bases to which a light sensitive emulsion has been affixed with a binder.[25] Glass plate negatives are at risk of having the surface abraded by being slid in and out of an envelope. For that reason they should be stored in buffered-paper four-flap envelopes that unfold, much like the container used for the collection of photographs on the right below. Note that because cotton gloves may make it difficult to handle glass plate negatives, archivists recommend wearing nitrile or latex gloves for better tactile response.[26]





Because of the weight of glass plate negatives they should not be stored flat as the bottom plates could crack from the stress of plates above. Once each plate is wrapped in a four-fold flap they should be stored along their long edge with similarly-sized glass plates, in boxes that are close to the size of the plates. Each archival box should be reinforced with metal edges and



should hold quantities of glass plates that are easy to lift. Between every few plates a buffer piece of same-size, acid-free corrugated board should be interleaved. If the box is not full, archival spacer material should be carefully placed in the box to fill the void. Because of the weight of the filled boxes and the problems of removing a bottom box safely the boxes should not be stacked atop each other.

Broken glass plate negatives can be sandwiched between two pieces of glass that are cut to the same size with the edges taped with Filmoplast tape, an archival pressure-sensitive tape. Missing pieces can be recreated in acid-free board before encapsulation.

If the glass plate negative came with its original paper sleeve there may be documentation about the image written on that sleeve. A Mylar pocket for the original sleeve, or relevant parts of the sleeve, can be affixed (with narrow, polyester-based, double-coated tape) to the outside of the four-fold envelope that holds the glass plate.

Film: In response to the recognition that film is gaining prominence as documentation for research and that it is becoming a part of the archives of a significant number of institutions that do not specialize in film, the National Film Preservation Foundation in San Francisco CA has compiled and made available a free online PDF publication titled *The Film Preservation Guide: The Basics for Archives, Libraries and Museums.* The 121-page publication is intended to help

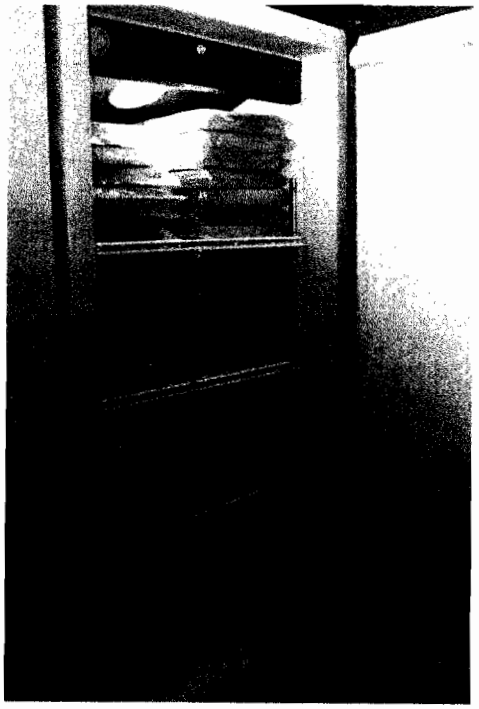
"nonspecialists working with film in regional archives, historical societies, libraries, and museums."[29] Many historic house and small museums have accessioned non-commercial films, such as local home movies, for which the guide offers valuable basic information about types of film and current recommendations for condition assessment, preservation, storage, and duplication.

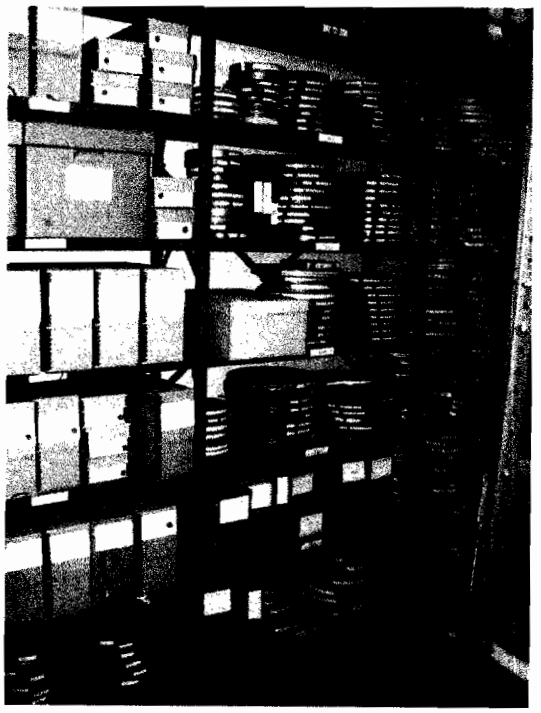
As with other forms of images, film stock has a layer of photosensitive material supported on a base material. Early transparent film base was cellulose nitrate, which was not made after 1952 domestically (although foreign production continued as late as 1955) because of the flammability of the base.[30] As early as 1909 a safer cellulose diacetate base began to replace nitrate film, especially in non-professional formats, and in 1948 the stronger and more stable cellulose triacetate film stock was introduced. Of greatest concern to the archivist is the hazard to the collection that nitrate film presents; not only is it flammable but as it decomposes it can destroy other non-nitrate base film in the storage area.

Nitrate-based film was used primarily by the motion picture industry and was not produced after 1952, so it is less likely to be found in the small museum collection. The actetate- or polyester-based film that is most likely to be found in the small museum collection should be 28 mm wide or smaller, since only nitrate film was manufactured only 35 mm wide or larger. In the unlikely event that the museum finds 35 mm nitrate film in the collection, it requires special storage off site in steel cabinets with built in sprinklers and outside venting and special handling, particularly if it must be disposed of, which requires the help of a federally authorized hazardous waste disposal facility.

Cold (40^0 or colder) and dry storage will extend the life of nitrate, acetate, and polyester film. Acetate film stock is more stable than nitrate film, but if stored at room temperature with

uncontrolled humidity it, too, will decompose into acetic acid, giving off a vinegar odor as it does. Frost-free freezing will even further extend the life of those films, but precautions must be taken to keep the film dry. According to the film preservation guide, black and white polyester film "may be OK" when stored at room temperature and with 30%-50% relative humidity, but storing nitrate or acetate film under those conditions is likely to cause significant damage. The freezer in the photo on the left below houses acetate film in the collection of the archives of the Smithsonian's Museum of Natural History. As noted, polyester film may survive when stored at room temperature, so it is presumed that the film cans in the photo on the right below hold polyester-based film.



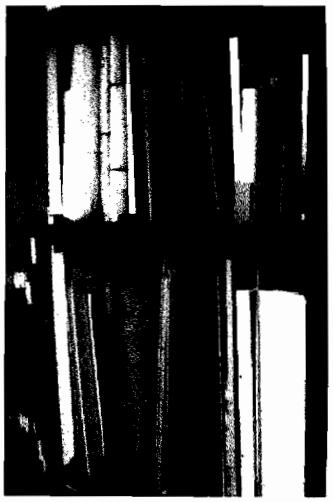


The Film Preservation Guide notes that "The challenge for film is finding ways to provide intellectual access to it without endangering the original."[31] Indeed, that is the challenge

for all archivists and curators, as was noted earlier. In many instances that challenge can be addressed by making access copies of the original and keeping the originals in storage. The 2004 publication advised that copying film to film is the preferred preservation method for film: "For historically and culturally significant titles, repositories invest in film-to-film duplication, creating a new viewing print, access copies, and masters that will safeguard the film for years to come"[32] but added that film-to-film duplication is time consuming, exacting, and expensive. The guide suggested that copying to VHS tape is the next most preferred method. With the current paucity of VHS-reading equipment, digital duplication is likely to become the recommended format, until a next generation of duplication techniques materializes.

In addition to these preservation recommendations, metal storage cans and metal cores on the reel increase the possibility of exposing the film to rust when the moisture level in the environment rises. Preservation guidelines advise replacing the metal reel in the center of the coil of film with a polyester core and storing the film horizontally in non-rusting metal or polypropylene or polyethylene plastic film containers.

Framed Photographs: For the small institution with limited storage space, framed photographs, paintings, or documents present an additional storage challenge. Framed



photographs or documents may present an obstacle to storage or harm the framed object and surrounding objects. If the photograph is matted and framed, the mat will damage the photo if it is not acid-free material. Raw wood in a frame may pose an additional threat from acidic lignin in the wood; glass may break and puncture the photograph; and the hangers or picture-hanging wire may damage the framed material or others in contact with it (see drawer in photograph on prior page).

Despite the potential for harm from storing framed photographs or documents, some institutions choose to keep them. Archivist Wooters, of the George Eastman House, noted that "If it comes with a frame we keep it (the frame) because we can lose important information if the frame is taken off."[33] For many photographs or documents in a collection, however, the frame is not likely to convey important information, such as labels that identify the artist or the framer. For photographs or documents with frames or mat board that do not convey additional information about the contents and for which retention of the frame presents a greater hazard than benefit, the museum will almost certainly need to dispose of the frame for the protection of the photograph.

Chapter 4: Reproductions and Fees

Before an image reproduction is made for sale or distribution, the museum must ascertain that the institution has the right to reproduce the image. In the matter of copyrights, Marie Malaro, author of *A Legal Primer on Managing Museum Collections*, counsels that "Under current law, if a museum acquires a work that could have copyright protection without clear evidence of the museum's ability or inability to exercise the enumerated rights, there is a serious potential for copyright infringement."[34] Malaro adds that all copyright protections will eventually expire and that the terms of copyright expiration depend upon whether the item was created before January 1, 1978. For details of copyright expiration, Malaro's book should be consulted, as the copyright protection rights are complex.

For requests for permission to reproduce images in a museum collection, Malaro advises adding the following cautionary clause to request forms for reproductions:

> The Museum can grant the permission requested only to the extent of its ownership of the rights relating to the request. Certain works of art as well as the photographs of those works of art may be protected by copyright, trademark, or related interests not owned by the Museum. The responsibility for ascertaining whether any such rights exist, and for obtaining all other necessary permissions, remains with the applicant.[35]

Regarding the assessment of fees for digital and non-digital image reproduction, of the institutions surveyed for this paper 60% noted that they charge to reproduce images in their collection. One third of the institutions that charge for reproductions have a variable fee schedule, with reduced charges for personal or non-profit use of the image. A very small percentage of those same institutions charge only for their reproduction expenses. Image reproduction fees at the surveyed institutions range from five to hundreds of dollars and are

usually determined by the intended use of the image (i.e., personal or commercial). Sample fee schedules are included in Appendix IV.

Approximately twenty percent of the institutions surveyed noted that they do not yet charge for any image reproductions, as the number of annual requests for that service is very few, but all added that they are considering instituting a fee schedule for photo reproductions. The institutions that are financed by the state or federal government indicated that they do not charge for digitized photo reproductions of photos for which there are no restrictions. For printed reproductions they charge for expenses only.

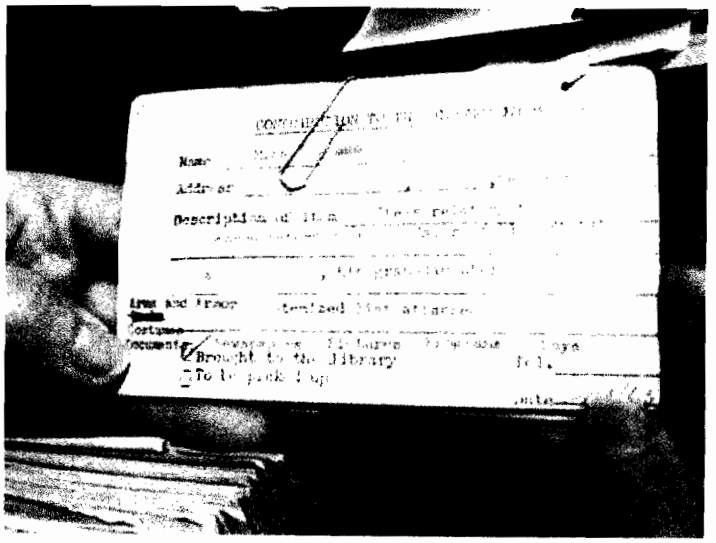
The matter of copyright and reproduction becomes particularly problematical when dealing with digital images. The museum may own only the digital surrogate and not the original analog image, which often clouds the intellectual property issues as the digital reproduction is an entirely different format from the original analog image. With analog-to-analog reproductions of images, the potential for copyright infringement is usually more unequivocal. As will be addressed in chapter five, the courts have not yet established sufficient and consistent rulings on the matter of copyright protection of digital derivatives.

Chapter 5: Managing the Digital Collection

The museum is generally based upon a collection or collections that must be cared for and preserved in such a way as to ensure maximum longevity of items in the collection. At the same time the collections must be as accessible as possible to serve the educational needs of the museum patron. As has been noted, educational service exposes the collection to elements that will hasten the disintegration of the collection. Contemporary technology and digitization may present a solution to this inherent antagonism, but there are limitations to the use of digital surrogates of the original images. This chapter surveys the benefits of and drawbacks to digitization of the image collection.

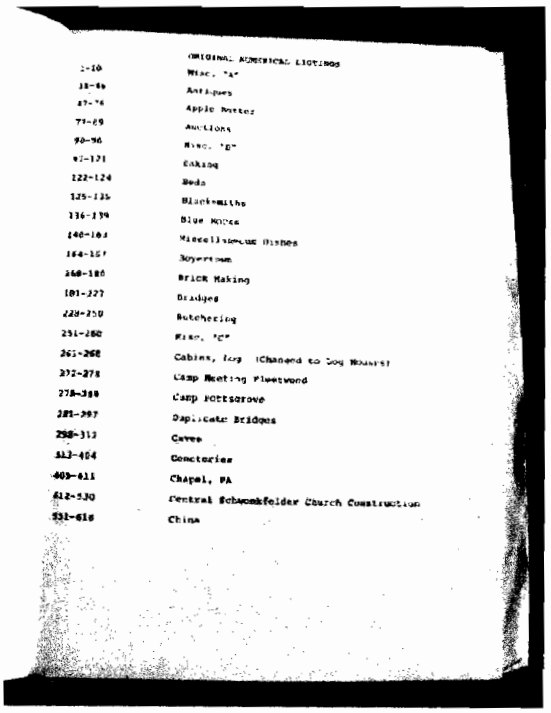
Benefits of Digitization

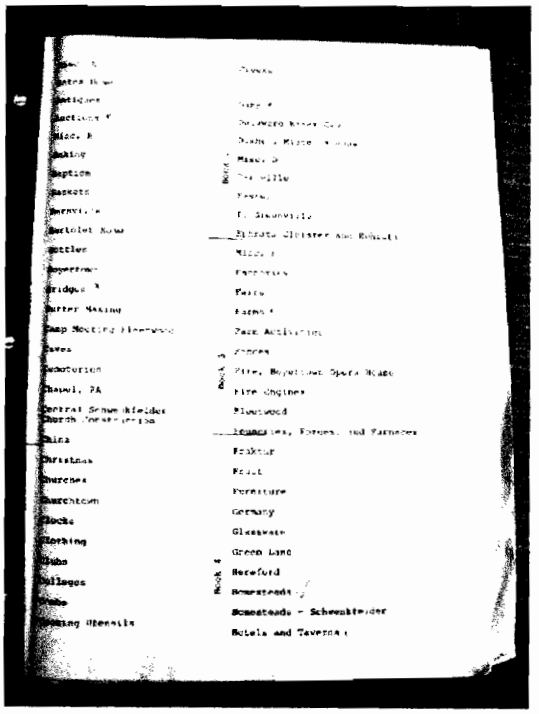
Image Retrieval and the Transition to Electronic Databases: In order for a museum to fulfill its mission of using the image collection to inform the public about the museum mission, the museum and the public need to know what the collection comprises. Prior to the introduction of electronic databases for collections management, museum staff and patrons depended upon finding aids and/or library-type organizational practices, such as a card catalog, to search the collection. With the introduction of electronic databases and digitization, the museum patron has access to a significantly faster and more efficient way to browse the collection. Some of the sixteen

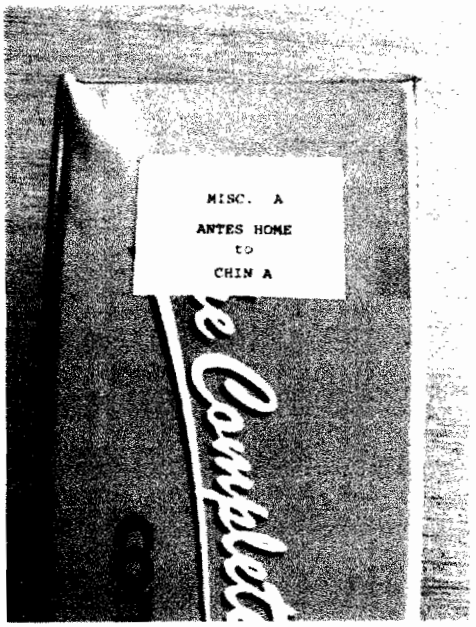


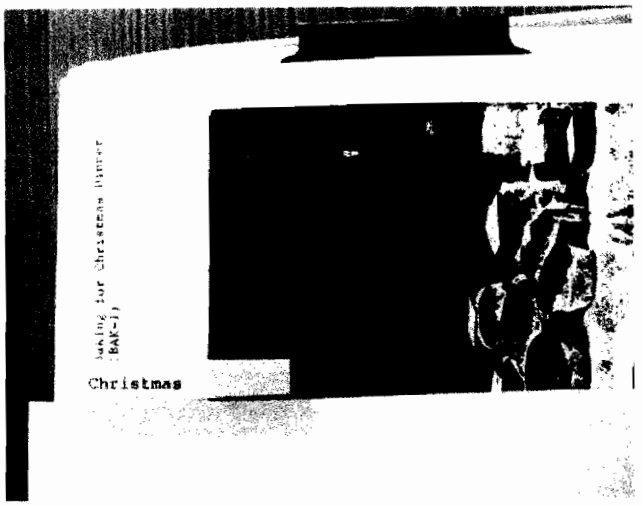
museums surveyed for this thesis, including the smallest and one of the largest, still use finding aids or card catalogs for item information or retrieval. Every one of these museums, however, has begun – or completed -- the process of transferring the finding aid and card catalog data to an electronic collection database.

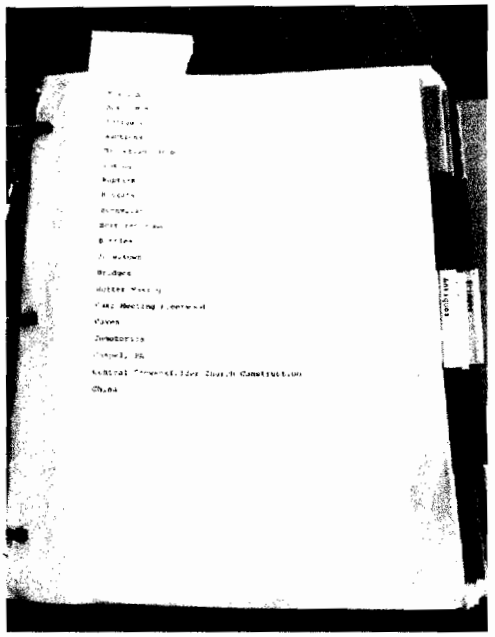
An example of word-processed finding aids that are not available online and are still used for searching a photograph collection can be found at the Schwenkfelder Library and Heritage Center in Pennsburg PA, where an index of topics, in a binder (see photos below), directs the inquirer to another binder with photocopies of photos in the collection.

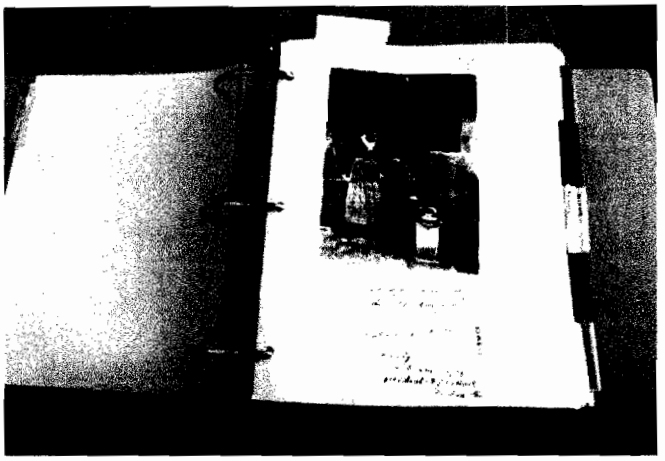






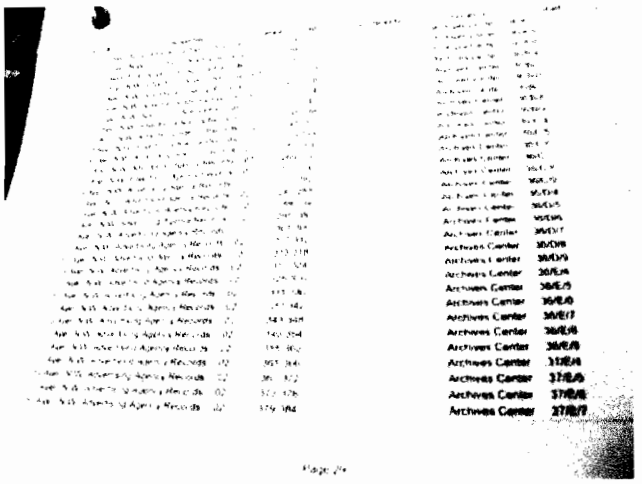


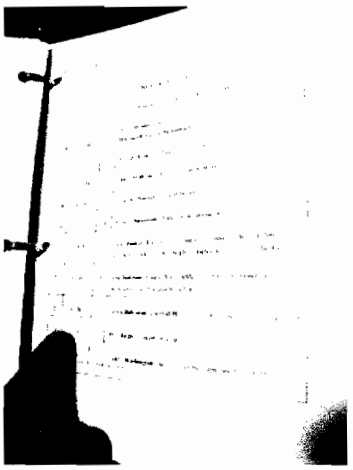




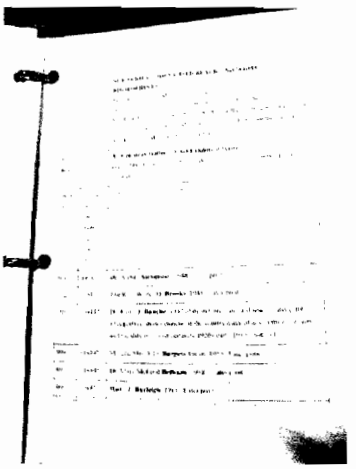
The associate director of research at the Schwenkfelder Library and Heritage Center noted that a photocopy may have as many as three identification tags: a simple number (e.g., 1279), a topic code (e.g., BAK-1), and a conventional accession number (which, he noted, was never used to retrieve an object).[36]

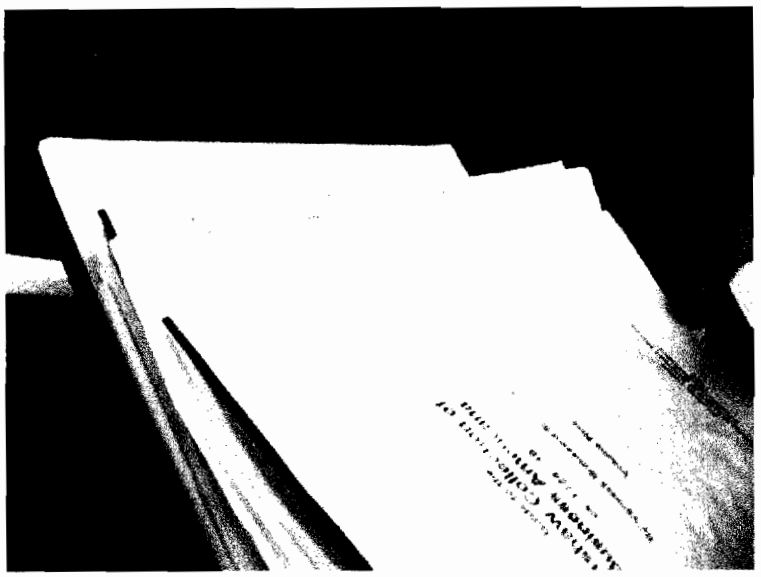
The Archives Center of the Smithsonian's National Museum of American History (NMAH) also uses finding aids in the form of word-processed lists, which identify characteristics such as the size of the item, the photographic process and a description of the image content, etc. (see photos).[37] Some of the center's finding aids are online and are linked to the Smithsonian Institution Research Information System (SIRIS). The archivist noted that the goal is to have a finding aid linked to every SIRIS record, but added that "The public wants to see the object and thus gets confused by finding aids and asks 'Where's the picture?' "[38]





When an electronic database is used for a keyword search, the computer can track the words used in the search and the museum can use that information to more closely tailor the keyword information to the needs of the public, thereby enabling more effective search results. (The finding aid is most effective when the keywords used in the finding aid and the keywords used to search for the item are identical.) As comparable constructive feedback cannot be gathered, without difficulty, from searches through non-electronic finding aids, the non-digital finding aid may create an impediment for the



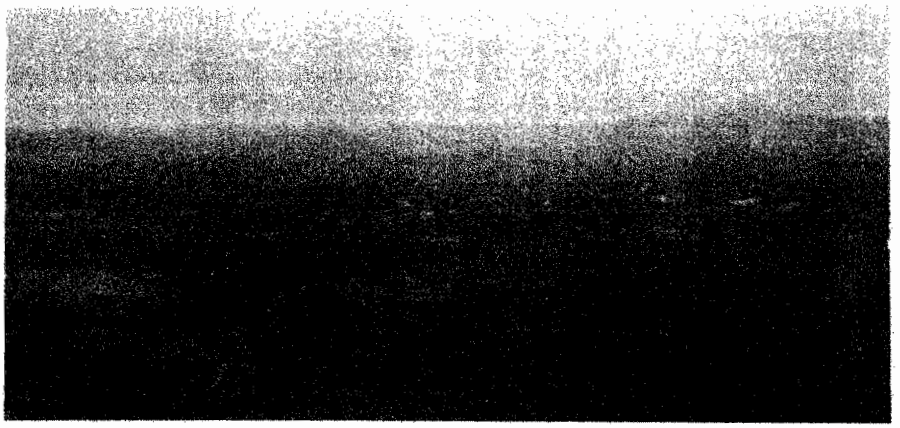


researcher and, thus, thwart the goal of the institution to use the collection to educate the public about the museum's mission. Using an electronic database to aid the researcher or patron in his or her search of the collection is therefore one of the many ways in which digitization of the collection and collection management can be impacted and enhanced by the consumer. As the archivist of the archives center of the Smithsonian's NMAH noted, "In this age of computers, it is anachronistic to be accumulating binders of prints of images."[39]

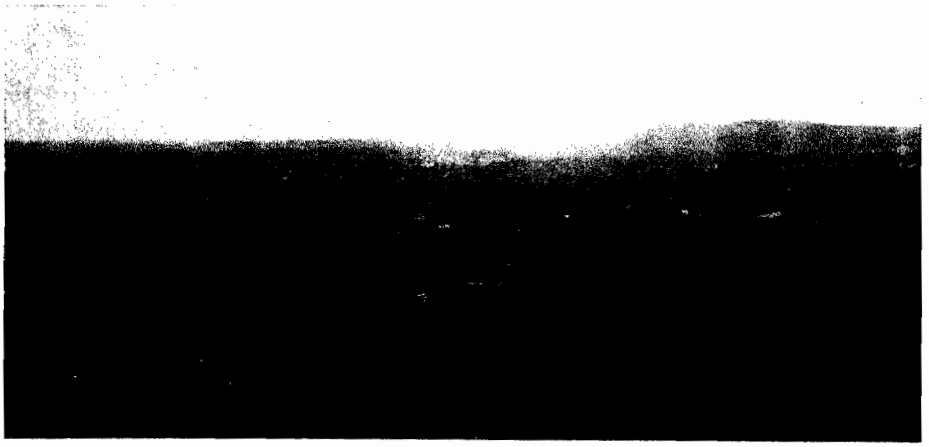
Digitization for Preservation: The image collections of the small history museum are typically of documentary rather than aesthetic importance. Therefore, digitization of the images does not usually impede the use of the collection to advance the mission. In contrast, visitors to the George Eastman House image collection are invariably researching photographic processes used to create the original photograph, rather than the subject of the photos, so digitization is less compatible with their mission to "keep and care for images, literature, and technology to tell the story of photography and the motion picture in history and in culture."[40]

One of the ways in which digital surrogates can enhance an historical image collection can be seen in the examples here. The top image on the next page is an unedited scan of a photograph in the collection of the Millburn-Short Hills Historical Society. The original photograph of what seems to be a landscape has no identifying text or notes, and it has faded to

such an extent that little of the image gives an indication as to the content. Trees, a line of the horizon, roads, and distant hills are barely discernible in the image. When the photo was scanned at a high resolution and modestly edited with Adobe Photoshop Elements, the society was able to distinguish enough features and manmade structures to identify the subject and the place from which the photo was likely taken.



(Unedited scan of original,photograph in Millburn-Short Hills Historical Society collection)



(Photoedited scan of the faded photograph above, now with identifiable landmarks)

The Nebraska State Historical Society records a similar discovery as a result of scanning images in their collection.[41] For fifty years they used glass plate negatives in their collection to study the homesteading experience. When advanced digital

imaging technology became available, the glass plate negatives were scanned and enhanced, making it possible for the historical society to see previously hidden information in the doorway of the sod house (see photos below).

While digitization has the obvious potential to increase access to the collection significantly without further exposing it to the factors that degrade the collection, the process of digital conversion necessitates briefly exposing the item to light and handling, after which the original item can be securely stored away from those elements. Precautions must be taken to assure that the scanning process does not further damage fragile items.

Digitization for Education: Internet access to digitized images enables the small museum to support diverse interests, such as the history or social studies curriculum in the classroom for the very youngest scholars or the research needs of adult researchers. Digitization can also deliver collections by the Internet from small, remote museums to researchers who

might not otherwise have access to the collection. The majority of the surveyed institutions that are in the process of digitizing their photo collection commented that the original images that are being digitized first are the ones requested for research by visitors. The museum and the digital imaging technology, then, are already responding with visitor-driven digital content.

Before a digitization plan is implemented, however, an assessment of the target audience(s) should be made prior to undertaking digitization, as the anticipated needs of the users should direct the structure of the data and metadata. For example, will low-resolution-only thumbnails be sufficient for both elementary school students and adult researchers?

Consideration also needs to be given to the social-networking prospective museum audience, as it will likely be the driving force behind much of the future content in the virtual museum collection. As one unattributed online resource noted: "The increasing popularity of Web-visitor expectation of making content contributions may warrant a Wiki-type (i.e., Wikipedia-type) ability for visitors to leave comments or share memories triggered by a photo." An unrelated May 3, 2008 Wall Street Journal article also noted that "...[many young Americans] are part of a Web generation accustomed to sharing minute-to-minute details of their personal lives online and getting instant feedback and comments from friends. As the Facebook crowd reaches marrying age, they are holding onto their social-networking habits."[42]

One suggestion for accommodating future audiences is the creation of a moderated (to prevent abuse of the feature) online interactive image collection, to which viewers can contribute memories or additional content, thereby potentially educating the museum staff and other virtual visitors about the collection. The digital museum will need to prepare for much more interaction with the online audience.

Drawbacks to Digitization

As digital-image databases become the changing face of the collection with which the public will interact, those images will bring with them a number of disadvantages, one of which is related to resolution. Conversion of images to digital format means rendering the original analog continuous-tone image to pixels, as with newspaper images created with dots. Resolution is the number of pixels in an area and is usually expressed as a ratio. The resolution of a printed digital image is expressed in dots per inch (dpi). The image is converted to pixels when it is scanned or photographed with a digital camera. Only one of the curators interviewed for this study indicated that he prefers to use a camera for digitizing the images in that historical society collection, rather than a scanner, as it avoids the scanned lines of pixels that a flatbed scanner creates.

The choice of equipment for digital conversion should reflect the projected needs of the patron and the institution. Documentation of the equipment and process(es) used for the conversion should be recorded and kept with the file – and perhaps embedded within the file. This data about the data is known as metadata and may be of considerable use when it becomes necessary to migrate the digital file to the next emergent format.

Technological Obsolescence: In order to read a microfilm, the viewer needs only a lens and a light, but to access digital images an assortment of electronic equipment is needed to convert the file to a visible image. That dependency upon a rapidly-developing technology and assortment of ever-changing equipment is one of the greatest threats to the longevity of a digital-image database. In order to keep that database viable, a considerable investment of human and financial resources will be called upon to continually migrate the files to the next technological generation. In addition, if the image collection is digitized, the patron will need a way to view or

print the digitized images if they visit the museum. In order to do so, he or she will need to have access to a computer, monitor, the image database, and a printer that will render that digital file as close to the original as is possible.

Data Loss: The process of compression and decompression of a digital image, in order to transmit large files over the Internet or for storage, will entail data loss, which threatens the integrity of the transmitted image. Although JPEG is the most widely used format for saving, storing, and transmitting digital images, it is not recommended for digital surrogates of the museum's original photographs. An online digital-photography Web site advised photographers to note that: "Since JPG compression is lossy compression, with every save you lose data. The loss is set up in a way that it tries to remove data the eye cannot quite see (two pixels with almost same color and brightness). So every time you open a JPG, do something with it and save it as JPG again you lose data. That also means when you press the 'rotate' button in windows, you already lose data (the image is opened, rotated and saved again)."[43] TIFF- or Photoshop's PSD-format files can be saved and copied with virtually no data loss. For these reasons, the museum is encouraged to create a high-resolution archival/master TIFF-format file that will be reserved for preservation of the first-generation digital image.

Nonetheless, author Abby Smith advocates in *Why Digitize*? the "continuing use of tried-and-true preservation techniques such as microfilming to ensure the longevity of imperiled information," although Smith also notes that microfilm "loses about 10 percent of its information with each copy."[44] The value of the collection, to the museum and to the patron, would certainly need to be assessed for the investment in preservation of the original image and creation and preservation of surrogate images.

Copyright and Intellectual Property Claims: Copyright and intellectual property issues are not only a concern for original analog images, as discussed in chapter four. When an image will be converted to another format, then considered for accessioning into a collection, the copyright(s) must be resolved for the surrogate image as well. An online publication on intellectual property, at the Archives & Museum Informatics (Archimuse) Web site, advises readers that a digital image is many 'generations' removed from the original work that it reproduces. It may have been "scanned from a slide, that was copied from a published book, that printed a photographic transparency, that reproduced an original work of art" and "each stage of reproduction in this chain may involve an additional layer of rights. The rights in each of these images may be held by different rightsholders; obtaining rights to one does not automatically grant rights to use another."[45]

Almost without exception, the museums examined for this paper acknowledged having one or more digital-only image copies in the collection; in other words they possess a digital copy of an original not owned by the museum. The museum had either accessioned the digital copy as they would an actual image or said they would do so if they hadn't already. As an example, a local historical society was given a 1950s 16 mm home movie, of a local event, that was apparently among the debris at the town recycling center. A town employee had found it and kept it for many years until he decided to take the film to a local camera shop and have it converted to a digital format and saved to a DVD. That person gave the historical society the original 16 mm film and one copy of the DVD surrogate (the society reimbursed the donor for the reproduction expense and the donor also kept a copy of the DVD). When the town administrator saw the DVD, he proposed having copies of it made for sale to residents. It was suggested, however, that not only are the intellectual property rights for the original film unclear,

but the digital version may be considered the intellectual property of the camera shop owner, who did the conversion. In *A Legal Primer on Managing Museum Collections*, author Marie Malaro notes that the courts have ruled both ways on this issue and she advises having the party who will do the conversion sign an agreement, before the conversion, acknowledging that the museum will have the rights to the digital conversion.

If a digitized image is published on the Internet, it is likely to enhance significantly the researcher's access to the museum collection, but images published on the Internet are also subject to copyright issues, including privacy laws. Internet publication may need to be confined to images without copyright, donor, or privacy restrictions. In addition, the potential for worldwide exposure may advance the museum's mission to use the collection to educate the public about the mission, but it may increase the likelihood of abuse of the images. Once the images are digitized and published on the Internet, they can be copied and/or easily changed by the viewer, so the institution may want to examine ways in which these potential problems can be avoided or minimized. Abby Smith, author of *Why Digitize*? notes that "In contravention of a core principle of archival authenticity, one can change the bit stream of a file and leave no record of its having been altered."[46] The ease with which a digital image can be altered may make the authenticity of the image suspect. Watermarking an image or publishing only low-resolution thumbnail images are two solutions for preventing abuse, although they may both interfere with scholarly research.

Preparation for Digitization

In preparation for a digitization effort the museum should outline the needs of the institution, the collection, and the audience. Consideration also needs to be given to the following factors, which will affect the quality of a digitization effort, including:

- the quality of the original image
- the equipment used to create the digital file
- the degree of attention to the precision of the output
- the degree to which the needs of the potential audience are addressed
- the equipment used to read the digital file
- available budget

The image collection needs to be surveyed prior to digitization to establish how many items are in the collection, how much of the collection will be digitized, and the condition of each item to be digitized so that conservation can be done before conversion. As with most projects undertaken by the institution, the costs for the process will have to be assessed in relationship to the anticipated benefits to the present and future audiences. For most of the museums interviewed, digitization was done in-house to expedite the process and to minimize costs.

An assessment of the scope of the collection will also enable the museum to ascertain what needs the audience may have for the sundry items in the collection. For example, if the items to be digitized include a diary with sketches, the conversion may necessitate Optical Character Recognition (OCR) applications for the text and digitization of accompanying images. The audience may want to see the image and the text side by side or separately, or to search a table of contents, or to be able to navigate to a particular page or topic in the diary. If the item is

table of contents, or to be able to navigate to a particular page or topic in the diary. If the item is a photo album, the audience may want to see details of the separate images on the page, to have the separate images linked, or to be able to see the image in its original position on the page, in order to establish a context for the image. These navigation issues should be addressed before commencement of the project. Navigation of the digitized image, as above, is the structural metadata that can be associated with the digital file, in addition to the technical administrative metadata that records the date the file was created, the equipment on which it was created, etc.

Formulating a Digitization Policy

Museums need to develop standards for a digitization policy. However, the constant flux generated by emerging technologies makes it difficult to fix a policy. The process of creating digital surrogates of the original images and entering them into a database is underway at all of the surveyed museums, but the process varies considerably from institution to institution and would benefit from standardization. One solution is for museums to adopt the relevant Library of Congress standards for digitization.

Library of Congress Standards for Digitization: The Library of Congress (LoC) began digitizing items from its collection in the 1980s. Its Web site notes that "With the advent of the National Digital Library Program, the Library staff began to develop a series of standards and best practices that have guided the Library's digital conversion programs."[47] Its standards are modified and updated as needed and the latest compilation is available in a PDF format at their Web site. A copy of the standards is included in Appendix V. As the LoC collection comprises standards for the digitization of images, the following relevant guidelines have been extracted from the 28 pages of standards for consideration for incorporation into a digitization policy:[48]

- Material to be digitized is selected and project goals defined
- Copyright and privacy issues are addressed and resolved before conversion
- A conservation assessment is made prior to scanning, to determine if the item to be digitized is in need of conservation and/or able to be scanned without damaging it
- Digitization equipment is approved: "No equipment used for image capture shall damage original materials nor shall the manner of its use cause damage"
- Specific instructions for handling of the original materials are outlined
- International Organization for Standardization (ISO) standards for the measurement of the appropriate image quality elements are approved by the LoC
- A minimum resolution of 400 ppi (pixels per inch) is considered standard practice with 300 ppi generally only used for large format materials where lower resolution is mandated by device limitations and stitching is not practical or desirable
- For images that contain text that will be OCR'ed (Optical Character Recognition), the standard will be 400 ppi for both visual and Modulation Transfer Function (MTF) measurements
- Sample scans of selected material are done for tonal and noise analysis
- The Gretag Macbeth ColorChecker is used for color accuracy analysis
- The LoC also outlines post-processing standards:
    - "In no event shall the actual document be cropped. Researchers using … digital documents often wish to be reassured that the entire document has been

captured. A 'border zone' approximately ¼" or less of surface behind the scanned document shall be provided wherever possible"

- "The image may need to be rotated or deskewed. These processes are not generally applied unless the skew exceeds 3 degrees"
- "Image sharpening may be applied if necessary to increase the match between the image and the original. This process should not be used to overcome defects in the scanner quality or … to increase the apparent resolution beyond the resolution of the original. Currently the Library prefers using the 'unsharp mask' method"
- "Color images should be placed in standard RGB (sRGB) space. After this transformation the image should be saved as a 24-bit TIFF file …"

- Three types of metadata are identified by the LoC:
  - Descriptive: Used to find and identify an object
  - Structural: Information on how an object is organized, as with the components of an album or diary
  - Administrative: Information about the digital-surrogate creation, such as when it was created, with what equipment, in what format, etc.

Storage of the Digital Surrogates

The small museum should make a surrogate digital copy, for backup and preservation, of at least 300 dpi and save it as a TIFF file. The museum should also consider an external hard drive dedicated to storage of the original TIFF files. The external hard drive has the advantages of portability, greater flexibility for migration to a new computer, and less susceptibility to failure because it is not usually subject to as much use as the internal hard drive with the operating system. In addition, a second copy of the TIFF files should be stored on CDs or DVDs. For a browsable online image database, the small museum may want to store on the server low-resolution thumbnail images and higher resolution JPG versions of the images while reserving the very high-resolution TIFF files for archival digital copies stored on the external hard drive at the museum.

The longevity of the digital file is affected by the medium on which the digital file is stored. The Optical Storage Technology Association reports that "The unrecorded shelf life of a CD-R or CD-RW disc is conservatively estimated to be between 5 and 10 years."[49] Gold CDs and DVDs, such as the KODAK Gold Preservation CDs and DVDs have been recommended by a number of preservation resources and the KODAK Web site notes that: "Using superior burn technology, KODAK Gold Preservation CDs have been tested under light and accelerated aging to preserve data, photos and documents up to 300 years with proper handling. KODAK Gold Preservation DVDs have been tested to preserve data, photos and documents 80-100 years with proper handling."[50]

Printed Digital Surrogates

As began to be apparent in the course of the series of interviews conducted by the author, the digital part of the collection that is stored in the computer itself may soon comprise a significant portion of the image collection. It appears that dramatically fewer digital images are being printed than was – or is – the case with printed analog images. Just as digital correspondence (e-mail) has supplanted handwritten exchanges, so, too, do digital images appear to be forcing a dramatic decline in the number of printed images. Unless the museum makes a print of each digital image in its collection, the museum can most likely anticipate little growth in the size of the collection of printed images, thus also subtly changing the status of the original analog image collection as those analog images apparently become obsolete and presumably more precious because of that.

The museum collection of analog images appears to be static as digital photographic technology supplants the analog photographic process. In response to the emerging technology and as photographic film and photographic film cameras disappear gradually, the contemporary image collections of museums and their patrons are becoming increasingly digital only. Informal ongoing surveys of digital camera users indicate that few users print his or her digital images. Even if digital images are printed they may be very short-lived, as some color-print inks in ink jet printers fade in only a matter of months. Longevity information should be obtained from the ink and paper manufacturers and images printed by the museum must be deemed temporary until more stable inks are available. The challenge for the small museum is to preserve the analog images that appear to be in danger of extinction, while making them available for research. The creation of digital surrogates of those analog images will enable museum to do both, but a

digitization policy must be developed in order to assure longevity for the digital copies and print copies of the digital-image collection, to the extent that contemporary technology permits.

Chapter 6: Conclusion

Collection Practices and Analog Images

The museum is charged with the preservation of the artifacts of our cultural heritage. The image collection, including print photographs, slides, film, and glass plate negatives, in the small history museum is often the most valuable component of the collection because of its local-interest or historic content. In order to serve the needs of the researcher or patron, the collection needs to be preserved by application of the current best practices for management of collection items as diverse as color and black and white photographs, glass plate negatives, albums, maps, film, daguerreotypes, tintypes, slides, and postcards. The objective of this inquiry has been to establish those current best practices, with applications for the small museum, and to appraise the projected changes in the nature and form of the image collection.

In order to identify and retrieve images from the collection effectively and in order to associate the image and its history, accession numbers should be assigned to each image. Although two of the subject museums have not assigned accession numbers to the bulk of the images in their collections, all other institutions have done so and most use the conventional three-part accession number only. Of the two museums without accession numbers one has a small, manageable collection that can be searched quickly, without accession numbers, because of that size. However, as both museums begin digitization of those collections the items will be given the number assigned by the database.

The ideal storage environment for various types of photographs is stable and has an average temperature of 68^0F ($\pm 2^0$) and relative humidity of 35%-40%. This is cooler than the recommended environment for other items in the collection, such as books, but the photograph collection is more dramatically impacted by fluctuations in the temperature and humidity. For that reason, most of the collections surveyed were stored on non-rusting metal shelving in

climate-controlled rooms. Because of its flammability, nitrate-based film should be stored off-site, in closed steel containers.

The printed images were generally stored first by type or size, then by topic or donor collection and while photos are subject to less stress when stored flat, most collections were stored vertically in acid-free board, metal-edge boxes. Within the boxes most photographs were stored in acid-free file folders or encapsulated in Mylar.

All museums surveyed are in the process of digitizing their image collections, but only two have completed the process. Prior to the incorporation of a digital-image database, most museums relied upon finding-aid binders to help the researcher find, and help the museum retrieve, images from the collection. Those finding aids are now becoming redundant as electronic image databases replace them and enable the patron to search the collection with greater ease, speed, and precision.

Collection Practices and Digitization

Surveys of the sixteen museums indicate that even small museums are becoming "virtual museums" by digitizing their photo collections for patron consumption. Small, often inaccessible, image collections are gradually becoming available to a worldwide audience of researchers and virtual museum patrons.

As digital-image databases facilitate storage and retrieval of the original images and assure less handling of and damage to the originals, it is clear that digital conversion will benefit and enhance the collection. Analog images are better representatives of the original source, because that source was directly etched on light-sensitive material. The pixellated nature of

digital images are less accurate representations of the original source, but they can be more reliably reproduced than analog images.

Before beginning a program of digitization, the museum must evaluate the anticipated audience and what that audience may expect or require of a digital-image database in the future. With that assessment in hand, a digitization policy should be prepared, to direct the conversion with standards that will help avoid or minimize the losses that are to be expected in the course of the compression and media degradation.

When the analog image is recreated digitally and put online, it loses the context of its relationship to the institution or other items with which it may have been associated, as with its position in an album. Online image exhibitions can reestablish some of the context that is lost in digitization. For example, the digital copy in a virtual exhibition can be presented with digital copies of the other items with which the original image was associated. Such uses for digital surrogates obviously circumvent the degradation that impacts an original image when it is on exhibition in a museum and the online image can easily accommodate the information interaction that future audiences will apparently expect.

Digital-image databases also have the potential to extend dramatically the museum's relationship to the virtual patron. Through virtual online collections museums will likely interact more often with and learn from patrons. Unlike the interaction with analog images, the virtual visitor may have the potential to use the Internet to add to or manipulate the digital information or image, thereby also subtly changing the role the visitor or researcher usually plays in the museum's relationship with its non-digital patrons.

Digitization is also beginning to change the nature of the museum's prospective image collection and acquisition of images, as the accessioning of digital-only images is already taking

place in museums. Existing analog image collections will likely become increasingly static and need to be very carefully conserved and preserved as a result. Because of the accoutrements necessary to render digital images readable, if the museum can afford to have both a microfilm backup and a digital surrogate made, the image collection will be protected to the degree that contemporary technology will accommodate.

The image collection(s) of small museums, and particularly those of history museums, are distinctive because of their subject matter rather than their aesthetic value. They also tend to be less accessible because the content of small collections may not be available through finding aids or in a database or because of pressures due to budget and staff limitations. The resource may also be remote and, thus, inaccessible to most researchers. Digitization of the image collection provides a remedy for overcoming obstacles to delivering that collection to the audience without further imperiling the items, but the museum needs to be aware of the drawbacks in the process, such as the potential for digital data loss or the impact on the digital collection of technological obsolescence.

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Appendix I:

Survey Questions for Curators of Photographs

Appendix I

Author's Survey Questions for Photograph Collections Curator

1 -- What numbering system do you use for your image collection? Is it the same as the accession numbers used for non-image items? Is the number the same for all forms of visual media (slides, film, etc)?

2 – Do you number photos in an album separately? If so, how do you number them (e.g. 2007.36.3a, 2007.36.3b)?

3 -- How do you store your photographic collection?
- -- by topic?
- -- by size?
- -- by type?
- -- by collection (i.e., all items from one donor stored together; see question 4)?
- -- by accession number?
- -- vertically (as in hanging folders in file drawers)? horizontally?

4 – When you accession a collection of diverse image subjects from one donor, do you keep the collection together? If the answer is "sometimes," what criteria do you have for dispersing a collection or for keeping it together?

5 – Do you put the accessioned images into a database? If so, which database do you use?

6 – Do you scan the images in-house? At how many dpi do you scan them? In what format do you save them (TIF? JPG? Something else?)

7 – Do you ever accession digital-only images? Do you ever accession digital images wherein the owner keeps the original (hardcopy) image? If so, do you have the donor sign a deed of gift form that gives you the right to reproduce the image?

8 – How does the visitor (either online or in person) know what images are in your collection? How would the visitor retrieve a particular image?

9 – Are any of your images available online? If so, how do you protect the copyright?

10 – Do you charge to reproduce your images? Do you have a fee schedule available to the public?

11 – Do you ever e-mail digital versions of the images to an inquirer? If so, do you charge for that service?

12 – What parameters do you have on what you will or will not accession into your photo collection?

Appendix II:

Finding Aids

Historical Society of Princeton

Photo Archives Category List

A. Buildings
B. Businesses
C. Civic Organizations
D. Events
E. Outlying Communities
F. People
G. Princeton
H. Schools
I. Sports – Recreation
J. Streets
K. Transportation
L. Miscellaneous
M. Princeton University: Buildings
N. Princeton University: Events
O. Princeton University: Environs
P. Princeton University: Miscellaneous
Q. Princeton University: People
R. Princeton University: Sports

A. Buildings (See also specific STREETS and STORMS)

1. Commercial (see Businesses)
2. Community (Library, Town Hall…)
3. Construction
4. Demolition
5. House Moving (See also Milton Halsey Thomas Papers manuscript # 573 for pictures)
6. Interiors
7. Involved in Fire
8. Religious
   a. Baptist
   b. First and Second Presbyterian
   c. Methodist
   d. Miller Chapel (Seminary)
   e. Quaker Meeting House
   f. St. Andrew's
   g. St. Paul's
   h. Trinity
   i. University Chapel
   j. Unidentified and Others A-Z
9. Residential A-Z AgI and AgII
   a. Avalon
   b. Bainbridge House
   c. The Barracks
   d. Beatty House
   e. Drumthwacket
   f. Edgerstoune
   g. Einstein
   h. Greenland
   i. Guernsey Hall
   j. Hageman
   k. Joseph Henry
   l. Maclean
   m. Maybury Hill
   n. Morven
   o. Olden Manor
   p. Prospect (See M1 – Princeton University Buildings)
   q. Rockingham
   r. Sheldon House
   s. Springdale
   t. Thomson Hall (Belgarde)
   u. Tusculum

v. Westland
w. Dorthea's House
x. Dignan House
y. Pardee House
z. Gummere House (Rosedale House)
aa. Thomas Clarke House
bb. George Goldie House – University Pl. and Edwards

10. Residential – Unidentified
11. Rural Farms

B. Businesses

1. Commercial Buildings A-Z
2. Delivery Wagons
3. Hotels, Inns
4. Machinery
5. Mills
6. State Fair (Business at, see also Events)
7. Working People
8. Unidentified Businesses

C. Civic Organizations

1. Fire
2. Military (Company L, etc.)
3. Police
4. Service – Rotary, Elks etc.
5. Unidentified

D. Events

1. Fairs
2. Fires
3. Historical, Commemorative ceremonies, etc.
4. Parades
5. Parties, Dinners
6. Religious – Weddings, Funerals, Picnics, Pageants
7. Special Events
8. Storms

E. Outlying Communities

1. Aqueduct
2. Cedar Grove
3. Cranbury
4. Dutch Neck
5. Griggstown
6. Grovers Mill
7. Hopewell
8. Kingston

9. Lawrenceville
10. Mount Lucas
11. Mount Rose
12. New Brunswick
13. Pennington
14. Penns Neck
15. Plainsboro
16. Port Mercer
17. Princeton Junction
18. Rocky Hill
19. Skillman
20. Stony Brook
21. Trenton
22. West Windsor
23. Miscellaneous

F. People (See also Businesses – Working People [B-7])

1. Identified A-Z
2. Grover Cleveland
3. Woodrow Wilson
4. Family Group – Identified
5. Men – Unidentified
6. Women – Unidentified
7. Family Group – Unidentified
8. Mixed Group – Unidentified
9. Children – Unidentified
10. Boys – Unidentified
11. Girls – Unidentified
12. Babies – Unidentified
13. Black (includes Emma Epps)
14. In Costume

G. Princeton

1. Bridges
2. Carnegie Lake
3. D & R Canal
4. Gardens
5. Graves – Cemeteries
6. Jugtown
7. Landscapes
8. Monuments
9. Palmer Square (See also Thomas Stapleton Papers)
10. Princeton Basin
11. Princeton Battlefield (Quarries; See also Landscapes)
12. Water Tower

H. Schools

1. Schools A-Z
2. Students
3. Carter School
4. Cedar Grove
5. Evelyn College
6. Hun
7. Institute for Advanced Study
8. Miss Fine's
9. Miss Gildner's, Rosdale Road
10. Miss Mason's
11. Mt. Lucas
12. Mt. Merch's
13. Princeton Country Day
14. Princeton Elementary, Nassau Street
15. Princeton Preparatory
16. Princeton Theological Seminary
17. Quarry Street (Witherspoon Street)
18. Rocky Hill (See also Herbert R. Brush Collection – Atlantic Terra Cotta Co. Manuscript Collection)
19. St. Joseph's College
20. St. Paul's
21. Stony Brook
22. Unidentified

I. Sports and Recreation

1. Baseball
2. Basketball
3. Boating
4. Camping
5. Football
6. Miscellaneous

J. Streets

1. Streets A-Z
2. Alexander Street
3. Battle Road
4. Bayard Lane
5. Boudinot Street
6. Charlton Street
7. Cleveland Lane
8. Dickinson Street
9. Greenholm
10. Hamilton Avenue
11. Harrison Street
12. Hodge Road

13. Jefferson Road
14. Leigh Avenue
15. Library Place
16. Mercer Street
17. Nassau Street (See also Storms)
18. Prospect Avenue
19. Rosedale Road
20. Spring Street
21. State Road (Rt. 206)
22. Stockton Street
23. University Place (See also Storms)
24. Wiggins Street
25. Williams Street
26. Witherspoon street
27. Vandeventer St.
28. Unidentified

K. Transportation

1. Air
2. Auto
3. Bicycle
4. Boat
5. Bus
6. Horse drawn
   a. Carriages
   b. Delivery Wagons
   c. Sleighs
7. Railroad
8. Trolley
9. Trucks
10. Miscellaneous

L. Miscellaneous

1. Animals
2. Christmas Trees
3. Organs
4. Toys (See also CHRISTMAS TREES)
5. Miscellaneous

M. Princeton University: Buildings

1. Buildings A-Z
2. Construction
3. Demolition
4. Interiors: Students Rooms
5. Interiors: Other
6. Involved in Fire

7. Unidentified

N. Princeton University: Events
1. Bonfires
2. Parades
3. Reunions
4. Riots
5. Storms
6. Miscellaneous

O. Princeton University: Environs
1. Gates & Archways
2. Sculptures
3. General Views

P. Princeton University: Miscellaneous

Q. Princeton University: People
1. Identified Groups: A-Z
2. Unidentified Groups
3. Faculty: Identified
4. Faculty: Unidentified
5. In Costume
6. Individual Students: Identified
7. Individual Students: Unidentified
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R. Princeton University: Sports
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7. Miscellaneous

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Pastors	602

Appendix III:

Accession Envelope and Condition Report

Accession sheet

Millburn~
Short Hills
Historical Society
P.O. BOX 243
Short Hills, NJ 07078

Accession number: _____

Loan number: _____

Name of object: _____ Approx. Year: _____

Category: _____ Classification: _____

Type of object: _____ Subj. matter: _____

Method of acquisition: _____ Date acquired: _____

Source: _____ Address: _____

_____

Special terms of acquisition: _____

_____

Description & condition of item: _____

_____

_____

_____

_____

History of object, as given/known by source: _____

_____

_____

_____

_____

Value: _____ Authority: _____

Location: _____

Conservation treatment: _____

_____

_____

Date entered in FileMaker _____ Accession sheet compiler: _____

Print Condition Report

Collection/Title:

Length:

Black & White _____ **Color** _____

Silent _____ **Sound** _____

Gauge:

Material: ____ Triacetate ____ Diacetate ____ Polyester

Generation: ____ Positive ____ Reversal

____ Fine Grain ____ Soundtrack Only ____ Image Only

Language/Head Titles/Intertitles/Subtitles:

Physical Damage

Marked on a scale of 1 (slight) to 4 (heavy)

_____ **Emulsion Scratches** _____ **Projector Oil & Dirt**

_____ **Base Scatches** _____ **Warpage**

_____ **Perforation Damage** _____ **Shrinkage**

_____ **Edge/Perforation Repair** _____ **Color Fading**

Number of Splices:

Vinegar Syndrome (Acetate Decomposition Level)* ____

*Marked on a scale of 0 (no deterioration) to 3 (critical)

Notes:

Completed by _____ **Date** _____

Appendix IV:

Reproduction and Use Fee Schedules

Smithsonian Institution — Services & Fees

National Museum of American History, Behring Center

Archives Center

The Archives Center provides these fee-based services. For more details please contact the AC at:

Archives Center
Smithsonian Institution
PO Box 37012
NMAH, MRC 601
Washington, DC 20013-7012

TEL: (202) 633-3270
FAX: (202)786-2453

archivescenter@si.edu

Research - Commercial clients	$50.00 per hour
Private individuals & non-profit organizations	$25.00 per hour
Photocopying -	$0.25 per page*
Color copy	$5.00 per page
*if copies are made by the researcher or an Archives Center volunteer. Hourly research fees are added for copies made by Archives Center staff.	
Digital Scans - Scans of Archives Center images no greater than 600 dpi.	$20.00 per scan
Scans of Archives Center images greater than 600 dpi.	$40.00 per scan
Previously scanned Archives Center images at 300 dpi or less	$10.00 per scan
Handling fee added to each scan order	$20.00 per order
Audio/Video Duplication - for research or personal use	$25.00 per title
Usage fees for-	
All rights / All media	$200.00 per title
Television/Radio broadcast only	$125.00 per title
Commercial home video/DVD/CD only	$150.00 per title
Educational screening (museums, libraries, schools)	$60.00 per title
If there is no intermediate master copy the fee will be -	negotiated
For use in advertising, permission is subject to review by Smithsonian General Counsel.	negotiated
For titles with multiple tapes, an additional -	$10.00 per tape
Usage Permission for Still Images* -	
One time editorial use	$75.00 per image
One time non-editorial	$150.00 per image
* a waiver may be requested for scholarly publications of less than 8000 print run.	
Shipping - regular US mail (takes 1 to 4 weeks)	Free
Federal Express fees can be charged to your Federal Express account or added to your order.	

HISTORIC PRINCETON PHOTOS ORDER FORM

If you see a photograph on our website that you would like to order as a print, just fill out this form below and send to the Historical Society of Princeton, 158 Nassau Street, Princeton, NJ 08542, Attn: Jeanette Cafaro, or fax to 609.921.6939.

What Category did you find your photo?
(categories are the keywords in red underline)

_____

Please provide a description of the photograph and attach print-out of image.

_____

Size of print: please circle one

- 8 x 10- $40
- 11 x 14- $55
- 16 x 20- $70

All photos will be black and white.
Please allow 4 weeks for order process.
Photos may be picked up at HSP.
If you wish to have the photo mailed shipping and handling fees may apply.

Reason for purchase

_____

(separate permission fees may apply, if for publication)

Name:_____

Address:_____

_____

Phone:_____

E:mail:_____

Type of payment:
_____ Check Enclosed
_____ Please charge my credit card

Amex MasterCard Visa

Card Number:_____

_____

Exp. Date:_____

Historical Society of Princeton, 158 Nassau Street, Princeton, NJ 08542
For questions please call 609.921.6748 or e-mail Jeanette@princetonhistory.org

Historical Society of Princeton

Library

Library Hours: Tuesdays and Saturdays from 1-4pm

Highlights of the Library Collections
Over 800 manuscript collections are described in *A Guide to Manuscript Collections in the Historical Society of Princeton, New Jersey* (compiled by Joseph J. Felcone), and its regularly updated companion document. Family papers, records of Princeton businesses and institutions, oral history transcripts and scrapbooks are some of the things a researcher is likely to find in the Historical Society's manuscript holdings.

Photographic collections include the Rose Collection, a group of 10,000 glass-plate negatives featuring almost every aspect of Princeton life primarily in the late 19th and early 20th century; the Recollector photographs, images collected and organized by subject, used in the production of *The Recollector* newspaper; portrait photographs by local photographer Laurie Vance Johnson; and photographs from the 1980s and 1990s taken by *Princeton Packet* photographers.

More than 2,000 architectural drawings represent the work of Howard Russell Butler, Kenneth Kassler, Rolf Bauhan, James A. Kerr and other prominent architects working in Princeton.

The Historical Society's vertical files consist of newspaper clippings, brochures, pamphlets and other secondary source material on virtually every aspect of Princeton's history, from the Aaron Burr Association to Vladimir K. Zworykin.

Researchers can utilize microfilm reels of the United States and New Jersey state census from the 19th century through the early 20th century.

- Locations
  - Bainbridge House
  - Updike Farmstead
- School Programs
- Corporate Supporters
- 2008 Preservation Awards
- Links
- Library
- Shop
- Volunteer
- About Us
- Contact Us
- Board
- Special Events
- Princeton Fall Antiques and Fine Arts Show
- 2008 Historic House Tour

Access to the Collections
Located on the second floor of Bainbridge House and accessible only by stairs, the Historical Society's library is open on Tuesdays and Saturdays from 1 to 4 pm. Accommodations to use library materials on the first floor of Bainbridge House for patrons with physical disabilities may be made on Monday afternoons by appointment. Access on other weekdays also can be arranged by appointment.

Research and photocopying fees:
On-site use of collections:

- Free for HSP members!
- $5 for non-members
- $15 per hour plus photocopies if not present at Bainbridge House

Photocopying is permitted (within copyright limitations) if library materials are in good condition.

- 35 cents per 8 ½ x 11 sheet (letter size)
- 50 cents per 8 ½ x 14 sheet (legal size)

Photographic reproductions:
Photographic reproductions of images and manuscript materials in the Historical Society's collections can be provided for a fee. Public display or publication (in books, articles, feature films, websites, and other media) requires permission from the Historical Society (separate fees may apply).

Photo Reproduction Fees:

- Historic Sites
- Historic People
- Historic Photos
- A Brief History

Historic Princeton Photos
Click to Order

Become a Member
Join the HSP Today!

- 8 x 10 black and white- $40.00
- 11 x 14 black and white- $55.00
- 16 x 20 black and white- $70.00
- Scanned image file- $40.00 (usual specifications 300 dpi, Tiff file on CD)

Library staff:
Curator: Eileen Morales, eileen@princetonhistory.org
Assistant (F/T): Jeanette Cafaro, jeanette@princetonhistory.org
Assistant (P/T): Marcia Lopez

Princeton History Bibliography

To begin studying Princeton history, the following titles will be helpful:

Axtell, James. *The Making of Princeton University : from Woodrow Wilson to the Present* / Princeton, N.J. : Princeton University Press, 2006

Breese, Gerald William. *Footprints on Edgehill Street : Glimpses of Princeton Life, 1684-1990* / Princeton, N.J. : Darwin Press, 1991

Greenwald, Alice M. *Old Traditions, New Beginnings: Two Hundred Fifty Years of Princeton Jewish History* / Princeton, N.J.: Historical Society of Princeton, 2002

Greiff, Constance M. and Wanda S. Gunning. *Morven : Memory, Myth & Reality* / Princeton, N.J.: Historic Morven, Inc., 2004

Greiff, Constance M., Mary W. Gibbons, and Elizabeth G.C. Menzies. *Princeton Architecture: a Pictorial History of Town and Campus.* Princeton, N.J., Princeton University Press, 1967

Hageman, John F. *History of Princeton and its Institutions* / Philadelphia : J.B. Lippincott & Co., 1879

Rhinehart, Raymond P. *Princeton University* / New York : Princeton Architectural Press, 1999

Smith, Richard D. *Princeton* / Dover, N.H. : Arcadia, 1997

Smith, Richard D., *Princeton University* /Charleston, SC : Arcadia, 2005

Washington, Jack. *The Long Journey Home : a Bicentennial History of the Black Community of Princeton, New Jersey 1776-1976* / Trenton, N.J. : Africa World Press, 2005

Researchers can supplement their work at the Historical Society by contacting other local institutions, including the Princeton Public Library.

Click here to see our other library services.

PRINT TOP

The Historical Society of Princeton
Bainbridge House
158 Nassau Street
Princeton, NJ 08542
Tuesday - Sunday from 12 to 4 p.m.
609.921.6748
information@princetonhistory.org

The Historical Society of Princeton
Updike Farmstead
Princeton Township

Historical Society of Princeton

The Historical Society of Princeton (HSP) is a museum and library dedicated to interpreting the history of Princeton, with community support and involvement. Its activities are inspired by the past with the goal of informing the future.

"This is my favorite stop in the Borough." - Jeremiah Crystal, *Garden State Town & Country Living,* Summer 2008

The Historical Society of Princeton received an operating support grant from the New Jersey Historical Commission, a division of the Department of State

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HISTORICAL SOCIETY OF PRINCETON

Welcome to the Library! Please note the following procedures:

- Library hours: Tuesdays and Saturdays, 1pm to 4pm
- Coats, bags and other non-research materials must be stored.
- Research fees: Free to Society members
  (due at start of visit) $5 for non-members
- Staff will retrieve all materials for you. Only one file at a time will be provided. A record of materials requested will be kept by library staff.
- Staff can make photocopies if materials are judged to be in good condition.
- Photocopy fees: $0.35 for each 8 ½ x 11 inch sheet (up to 20 copies)
  (due at end of visit) $0.50 for each 8 ½ x 14 inch sheet (up to 20 copies)
  $10 base charge + cost of copies for more than 20 copies
- Photocopies are for research only and are not to be reproduced for any other purpose.
- Photographic reproductions for publication, gift, decoration or any other use can be purchased for a fee from the Society. Speak to the staff member for more information.
- No scanning or photography of any kind is allowed during library hours.
- Please help us take care of these materials:
  No food or drink allowed.
  Wear gloves when handling original photographs.
  Use pencil only.

I have read and understood these procedures.

_____ _____
Signed Date

_____

Name_____

Company (if applicable)_____ School (if student)_____

Address_____

E-mail address_____ Telephone_____

Are you a member of HSP? _____ Drivers' license # (if not a member)_____

BRIEF SUMMARY OF RESEARCH REQUEST:_____

_____

_____

Staff use only: Materials retrieved:_____

_____

Research fee Photocopy fee Total Payment method

Historical Society of Princeton

Photo Reproduction Fees

PHOTOGRAPHS

8 x 10 black and white	$40.00
11 x 14 black and white	$55.00
16 x 20 black and white	$70.00
Scanned Image file Usual specifications: 300 dpi, Tiff file on CD	$40.00

RUSH FEES
100 % if order is needed before 3 weeks

- **All current HSP members receive a 10% discount on photo orders.**
- **If Research is required there is a $15 research fee per hour.**
- **All prices are subject to change; please check with HSP staff.**
- **Reproduction orders may be subject to use fees- see separate price list.**

JMC 1/06

Bainbridge House, 158 Nassau Street, Princeton, New Jersey 08542-7006 • Tel. (609) 921-6748 • Fax (609) 921-6939
www.princetonhistory.org

Historical Society of Princeton

Use Fees

	Non Profit/Scholarly	Commercial
Publication	$30.00 (print run under 5,000)	$60.00 (print run over 5,000)
Exhibition	$10.00	$75.00
Website	$50.00	$125.00
Film	$50.00	$125.00

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- **Personal use does not require payment of a permission fee, but does not grant the right to reproduce HSP images in any form.**

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www.princetonhistory.org

Researcher Requests for
Sandy Hook Technical Reference Library
Sandy Hook Education Center-Building 102

Researcher use Technical Reference Library.

1. Contact Museum Curator to make an appointment to visit. Hours are arranged by appointment. (732) 872-5953.
2. Researcher must present a specific request for information.
3. This is a reference library. No materials are allowed to leave the building.
4. Copies of materials can be requested. Researchers are not allowed to make their own copies. The order form and price list is attached for all requests.

Items Available in Technical Reference Library

1. Reports, planning documents, publications, and videos pertaining to Sandy Hook produced by the National Park Service, contractors, and outside interests. Several of these are also available for free from the NPS website, http://www.cr.nps.gov/history/park_histories/index.htm#g
2. Photocopies of historic photographs in museum collection. These images of Sandy Hook are in binders and on disk as 300 dpi jpeg images.
3. Paper copies of historic blueprints and maps of Sandy Hook.

Researcher Handling of Materials

1. Reports, planning documents, and publications pertaining to Sandy Hook can be read in library.
2. Photocopied photographs are in binders and are available to review.
3. If the image or information needed is not located, ask museum curator to perform a search of the entire museum collection.
4. Museum curator must remove the blueprints from the map cases and bring them to table for review.

Reproduction of Materials

1. Reproductions will be completed in 10 working days.
2. The photographic images or blueprints acquired here should be credited in publications: *Courtesy of NPS/Gateway NRA, Sandy Hook* or as otherwise specified. If being used in a publication, please inform curator. Some images in collection are owned by other repositories.
3. Photocopies of printed reports are available by providing name of report and page numbers on the order form. Some are available electronically.
4. Reproduction of any photographs or blueprints may be obtained by using the order form provided. Use order form to write down catalog number and/or other information about the photograph or blueprint.
5. Prices for reproductions are on attached order form. Revised mr 1/07

NATIONAL PARK SERVICE
SANDY HOOK, GATEWAY NRA
MUSEUM COLLECTION
P.O BOX 530
FORT HANCOCK, NJ 07732

HISTORIC MATERIALS PRICE SHEET

DATE:
NAME:
ADDRESS:
TELEPHONE/ FAX NUMBER/EMAIL ADDRESS:
FULL SIZE BLUEPRINTS: Hard copies of blueprints are $10.00 per sheet. Scans of blueprints will be $5.00 per blueprint. CDs will be burned at a cost of $10 per CD.
PHOTOCOPIES OF PRINTED MATERIALS: Black and white 8 ½ x 11 copies are $0.25 per item.
PHOTOGRAPHS: New scans or electronic copies of photographs will be made at a cost of $5.00 per image. Existing electronic copies are provided free of charge. Cost per CD burned is $10.00
SHIPPING AND HANDLING: Will be charged.
CHECKS MADE PAYABLE TO: National Park Service Please include on check Social Security Number or Company TIN Payment will be made by check or money order only. Payment required before order is processed. Credit Line: Courtesy of Gateway NRA/NPS

Mr 3/07

HISTORIC MATERIALS ORDER FORM

Blueprints requested: (Include catalog number, building number, title)

Photographs requested: (Include catalog number)

Photocopies requested: (Include page numbers and report title)

Scans requested: (Include catalog number or other information.)

Metuchen-Edison Historical Society

Hosted by www.jhalpin.com

Publications, Merchandise, and Photographs

03/09/2008

Did you know that copies of photographs and written documents in our archives are also available? We have over 3,000 images of Metuchen, Edison, Plainfield, South Plainfield, and Highland Park including many homes.

Call Walter Stochel 732-906-0529, wstochel@earthlink.net for prices and more information.

The Metuchen Edison Historical Society Publications & Merchandise Price List

The Metuchen-Edison Historical Society offers a variety of publications and merchandise to help expand the public's knowledge of our local history. Your purchase of these items helps us maintain our archives and acquire more items.

Those items with a (T-E) next to them include information about our most famous resident...Thomas Edison.

For more information, call 732-906-0529.

To order: For Books, Maps, Posters, please add $2.00 for postage. Send us a letter with the item you want to order, plus a check payable to: Metuchen-Edison Historical Society, and mail to: Metuchen-Edison Historical Society, PO Box 61, Metuchen, NJ 08840.

MEHS Online Store! In addition to the merchandise listed below, the Society now has an online store with tons of local history items. Check it out on a regular basis; we're adding new products all of the time.

Books:

- Boyhood Days in Old Metuchen (David Trumbull Marshall, 1930)....$15.00
    - o A classic tale about growing up in Metuchen in the 1890's. (T-E)

- Crumbs of Comfort (Reproduction of 1888 cookbook)....$7.00

    o Includes a History of Metuchen & Her Churches (1888) by Rev. JG Mason, and a recipe for cooking husbands. Plus advertisements of local businesses.

- The Hole in the Doughnut (Allen C Hansen)....$20.00

    o Growing up in Pre-World War II Metuchen. Only 5 left!

- Guide to Edison Township (Ian Durand/April Cormaci).....$6.00

    o Current information about Edison, plus history and maps.(T-E)

- Images of America: Edison (Stacy Spies)....$19.00 (T-E)

- Images of America: Fords (Joanne DeAmicis Bulla)....$19.00 Only 6 left!

- Images of America: Metuchen (Stacy Spies)....$19.00

- Researching Your Old House Workbook (2006)....$15.00 Only 3 left!

- Booklet: How to research a house....$1.00

Maps:

- Metuchen (1868)(17.5"w X 23"h)....$3.00

- Raritan Township (1876)(18"w X 25"h)....$3.00

    o Including an insert map showing the Menlo Park Neighborhood before Thomas Edison arrived. (T-E)

Posters:

- Poster: Toonerville Trolley, Metuchen (14"w X 21"h)....$3.00

    o A photo and description of the one car trolley that ran down Main St. Metuchen until 1922.

Postcards:

- Allen-Ayers House, Metuchen (black and white)....$1.00

- Horse Trough, Metuchen (black and white)....$1.00

- Pennsylvania Railroad Station, Metuchen (black and white)....$1.00

- Shotwell House, Edison (black and white)....$1.00

- St. James Episcopal Church, Edison (black and white)....$1.00

• Thomas Edison's Laboratory, Menlo Park....$1.00 (T-E)

• NJ Turnpike in Middlesex County COLOR…$1.00

Print:

• Franklin School, Metuchen (matted watercolor)....$20.00

o This fine art print of the old High School which was on Middlesex Ave. until the late 1990's.

Note Cards:

• Four Historic Houses, Metuchen (box of 12 cards, 4 of each house)....$5.00

o DeMott/Henning House, 1901 (no longer existing);

o Mary Wilkins Freeman House, Lake Avenue (no longer existing);

o 280 Amboy Avenue (structure predates Revolutionary War);

o Robins Estate, Woodbridge Avenue, 1800s (current site of Redfield Village).

Video Tape:

• Scenes of Historic Metuchen....$5.00 Only 3 left!

Photograph Reproductions:

• 4"x 6" reprints…$7.50

• 8" x 10" reprints…$12.00

Call Walter Stochel 732-906-0529 for more information.

Support the Society by making a small donation • MEHS Home

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Internet Explorer 6+
FireFox 1+
Netscape 6+

Fees

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Photocopies and digital files are created at the archives itself, and their mailing or email transmission generally occurs within one business day of order. The Medical Art & Photography Department at Weill Cornell Medical College produces slides and prints, and their mailing generally occurs within three to five business days of order. FedEx delivery is available for researchers who provide their own customer number. There is a $10.00 service/handling charge for all orders.

Slides	$07.50 each
Prints (5x7 inches)	$17.50 each
Prints (8x10 inches)	$20.00 each
Digital Files (300 dpi)	$05.00 each
Photocopies	25¢ per copy

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Theses/Dissertations

(No fee)

Books	**Print Run:**	**Print Run:**	**Print Run:**
	2500 or less	**2501-25,000**	**25,000+**
Worldwide—One Language	$50.00	$100.00	$150.00
Worldwide—Multiple Languages	$75.00	$150.00	$250.00
Jackets/Covers	$100.00	$200.00	$350.00
Magazines, Journals, Newspapers	**Circulation:**	**Circulation:**	**Circulation:**
	1001-10,000	**10,001-99,999**	**100,000+**
(No fee for circulation of 1000 or less)			
Worldwide—One Language	$50.00	$150.00	$250.00
Worldwide—Multiple Languages	$75.00	$200.00	$350.00
Covers	$100.00	$250.00	$450.00
Exhibition	**One Year or Less**	**Permanent**	
Commercial	$100.00	$150.00	
Non-Profit	No Fee	$50.00	
Catalogs, Brochures, Posters, Etc.			
Commercial	$50.00		
Non-Profit	$25.00		
Television/Cable/Satellite Broadcast	**10-Year Period**		
Local	$100.00		
National	$125.00		
Worldwide	$150.00		

Public Television	$50.00
Films/Videos	
Commercial	$150.00
Feature Documentary	$100.00
Educational/Non-Theatrical	$50.00
On-Line/Website	
Commercial Site	$100.00
Educational/Non-Profit Site	$50.00

Features
This box can be used for "Health A - Z" or links to service line, department, physician, or practice web sites.

Feature Link 1
Feature Link 2
Feature Link 3
Feature Link 4

FEATURE BOX (GRAPHIC)
165 X 100 pixels
- Photo in background
- Use same font family

NAME OF ANIMATION
Macromedia Flash required

Related Internal Links
Link to condition 1
Link to condition 2
Link to condition 3
Link to condition 4
Related External Links
Link to condition 1
Link to condition 2
Link to condition 3
Link to condition 4
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New Jersey State Archives
Division of Archives and Records Management
Department of State

Guide to Reproduction and Research Services, Policies and Fees

rev. March 2003

The mission of the New Jersey State Archives is twofold: first, to preserve the permanent historical public records of the state and colony of New Jersey; and second, to provide and ensure public access to these records. This guide provides a summary and explanation of research and reproduction services offered by the Archives under New Jersey's public records law (N.J.S. Title 47) and the Open Public Records Act of 2001. Statutory and/or regulatory authority is cited for each type of reproduction or search service, along with an explanation of special service charges when applicable.

I. Legal Basis for Services
II. General Considerations
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I. **Legal Basis for Services** - Search and reproduction services and fees are based, generally, on the following statutes or regulations:

a) **N.J.S. 22A:4-1a, Fees for miscellaneous documents, Section 11e**, which stipulates: "For services herein enumerated the [Secretary of State] shall collect the following fees ... For a paper copy of any document on file, $1.00 per page. If a roll of microfilm images is requested, the [Secretary of State] shall collect a fee of $1.00 for each image on the microfilm roll. If a microfiche copy of a microfiche is requested, $3.00."

b) **N.J.S. 47:1A-5c (New Jersey Open Public Records Act, P.L. 2001, c. 404), Special service charges**, which stipulates: "Whenever the nature, format, manner of collation, or volume of a government record ... is such that the record cannot be reproduced by ordinary document copying equipment ... or involves an extraordinary expenditure of time and effort to accommodate the request, the public agency may charge, in addition to the actual cost of duplicating the record, a special service charge that shall be reasonable and shall be based upon the actual direct cost of providing the copy or copies ..."

c) **N.J.S. 47:2-4, Examination of records ...; indexing and preservation**, which stipulates that "Any public official may ... establish such rules and regulations concerning the care and preservation of such records as to him shall seem proper in any department of which he is in charge."

d) **N.J.S 47:2-5, Preservation and restoration of certain records**, which stipulates that "The [Division of Archives and Records Management] shall take such action as may be necessary to put the records ... into the custody and condition contemplated by the various laws relating thereto, and shall provide for their restoration and preservation."

II. **General Considerations** – Given the statutory mission of the State Archives to preserve New Jersey's public documents, the following general considerations apply to our reproduction services and policies:

a) The State Archives maintains accessioned public records that have been legally transferred into the ownership of the Archives. It is the statutory obligation of the Archives to provide access and reproduction of such materials under the public records law and the Open Public Records Act of 2001.

b) The State Archives also maintains—as reference material—printed books, microfilm of county records, federal censuses, vital records, etc., and other materials including database and CD-ROM resources. Reproduction and printing from these media is discretionary on the part of the Archives management and not subject to public records law. While photocopying from printed books and microfilm is available on premises, we do not offer color photocopying or photographic reproduction of published sources, illustrations from books, or copyrighted material.

c) In accordance with citation I-c) and I-d) above, the Archives professional staff have been authorized by the Director to make a determination as to the fragility of manuscript and graphic material and, when appropriate, to deny direct photocopying requests. It is generally the Archives' policy to allow photocopying whenever possible in cases where an alternate media such as microfilm of the original does not exist. However, manuscript and graphic material (including photographs) suffers damage from repeated light exposure and requests for multiple photocopies of such material may be denied for this reason.

d) In accordance with citation I-c) and I-d) above, in order to protect original materials the Archives prohibits the use of outside scanning and photography equipment other than a non-lighted/non-flash hand-held camera. Special arrangements must be made in advance of a visit for non-flash photography and non-lighted video. In accordance with citation I-b above, special service charges may apply in cases where extensive staff time is required (see below). The State Archives' photographic equipment is for use by Archives staff only.

e) Reproduced images used in publications and websites or otherwise widely distributed should credit **New Jersey State Archives, Department of State.**

f) All payments (except for professional photographers' charges as explained below) should be payable to **New Jersey General Treasury**.

III. **Standard B&W Photocopying** – In consideration of citation I-a) above, the State Archives charges the following for standard black-and-white photocopying:

a) $.10 per page for up to 8.5"x14" copies of printed material from the Archives' reference book collection

b) $.50 per page for up to 11"x17" copies of manuscript material provided in response to in-person requests for specific materials already retrieved from the stack areas

c) $1.00 per page for up to 11"x17" copies of manuscript material provided in response to mail or other requests from offsite users, or in cases which require Archives staff to pull or copy material beyond the in-person visit of the requestor

d) $.50 per page for up to 11"x17" copies made from microfilm reader-printers

IV. **Color Photocopying** – The State Archives offers color photocopy services for original materials in our collection, including manuscripts, small maps and photographs. We do not offer color photocopying of printed materials from our reference collection, illustrations from books, or copyrighted materials.

It is important to note that the color photocopy process is considerably more expensive than B&W photocopying in terms of supply costs. It also requires extraordinary effort and staff time to ensure acceptable color balance, resolution and image clarity while at the same time minimizing light exposure. In accordance with citation I-b) above, the State Archives charges fees as shown below. In accordance with I-c), I-d) and II-c) above, color photocopying will be limited to three copies of an image provided the staff determines that the condition of the original is such that the document can be photocopied.

a) For 8.5"x11" color photocopies: $3.50 for the first copy of an image; $1.50 for the second and third copies of the same image

b) For 11"x17" color photocopies: $4.50 for the first copy of an image; $2.00 for the second and third copies of

the same image

V. **Traditional Photographic Reproduction** - Traditional (film-based) photographic reproduction is available to users in need of B&W or color prints, slide duplication and copy negatives. Such services require the work of a professional photographer, and are therefore considered a special service under the Open Public Records Act; see I-b) above. Further, the Archives may require that offsite photography take place in the presence of an Archives staff person, by appointment with the photographer, in order to provide security and ensure proper handling of original archival materials. In such cases, additional "rush" fees may be charged by the photographer. Based on I-c) and I-d) above, the Archives may also require that a negative, or second negative, be produced for retention by the Archives as a preservation measure to protect the original image or document and to prevent unnecessary repeated future handling and light exposure.

The State Archives has established regular business with several photographers in the Trenton area. Photographers' charges are paid directly to the photographer by the person requesting the work. Contact Archives staff for a list of photographers' prices. In addition, the Archives charges the following special service fees based on actual costs of staff hours (onsite and/or offsite) as authorized by the Open Public Records Act:

a) If no negative or slide exists for an original document or image to be reproduced: $25.00 special service charge for up to 5 items; $5.00 for each additional item. State Archives will retain the negative; a second negative for the researcher can be produced at the researcher's cost, if needed.

b) If the Archives already holds a reproducible negative in additional to the original item or if a copy negative already exists:

   i. *For negatives up to 8"x10"*: $10.00 special service charge for up to 5 negatives; $2.00 for each additional negative.

   ii. *For negatives larger than 8"x10"* ***if the researcher only requires a contact print*** (otherwise, see below): $10.00 special service charge for up to 5 negatives; $2.00 for each additional negative.

c) If the Archives holds an original negative, or if the reproducible negative is larger than 8"x10" and the researcher needs more than a contact print: $25.00 special service charge for up to 5 negatives; $5.00 for each additional negative. The researcher will bear the cost of the archival print to be retained by the Archives for future reproduction use, if no print exists; the researcher will bear the cost of the copy negative to be retained by the Archives for future reproduction use and; the researcher will bear cost of the second copy negative if a negative is required by the researcher.

VI. **Slide Production** – The Archives offers in-house slide production (original photography) for original archival materials up to roughly 24" x 27". This is considered a special service (see I-b above). The Archives charges service fees accordingly based on the cost of film and staff hours (assuming a minimum of one hour studio time), and as authorized by the Open Public Records Act. Slide production charges are $35.00 for the first item and $8.00 for each additional item.

VII. **Electronic Scanning** – The Archives offers in-house scanning of items up to 11" x 17" on an Epson Expression 1640XL (resolution 1600 x 3200 dpi). This produces a JPEG file on 1.4 MB 3.5" diskette, CD-ROM, or ZIP disk. This is considered a special service under the Open Public Records Act, and charges are therefore based on the actual cost of supplies and staff time. The Archives charges $25.00 per item. Additional media costs will depend on the size of the electronic file(s) produced and the researcher's requirements. Charges are as follows: 3.5" diskette, $2.00; CD-ROM (with case): $7.00; ZIP disk, $20.00. The researcher can provide his/her own diskette, CD or Zip disk to avoid media charges.

VIII. **Staff Labor Charges for Video/Documentary Production** – Technical staff are available by appointment for assistance in video/documentary production. As a special service (see I-b above), the charge is $25.00 per hour, per staff person.

IX. **Microfilm Duplication** – The Archives offers vesicular duplication of microfilm reels of archival records filmed by

the Division of Archives and Records Management, including state census records and newspapers. This is a special service (see I-b above); duplication prices based on actual cost of supplies and staff labor are as follows:

a) *35-mm*: $35/reel (certain record series may be discounted to $25/reel if print negatives exist)

b) *16-mm*: $25/reel

X. **Research Services** – In addition to duplication services, the State Archives also offers research services for several genealogical collections. Searches in certain record series are more time-consuming than other series, hence fees vary. Also, in the case of 1848-1878 vital records, an additional cost related to the preservation of the original records is factored into the fee. All fees include search charges and photocopy charges for 8.5"x11" up to 11"x17" B&W photocopies, as appropriate. Varying data elements (search keys) are required in order for the Archives staff to initiate a search. For more information consult Search Services and Fees. Fees are based on the statutes cite d in Section I above as follows:

Record Series	Basis
Birth, Marriage & Death Records, May 1848 – May 1878	I-a, I-b, I-c, I-d
All other records owned by the State Archives	I-a, I-b
Federal census records, obituaries and West Jersey Proprietors surveys	I-a

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GEORGE HOUSE
International Museum of Photography and Film

Collections

Image Rights and Reproduction Fees

8x10 300ppi RGB jpeg files for reproduction are provided via email.

Commercial Use	(Order 80,000 copies)
One time editorial and web, one language	$260.00
Film, Video	$400.00
Cover, Calendar, Postcard, Note card	$600.00
Non-Profit Use	
One time editorial and web, one language	$110.00
Film, Video	$150.00
Cover, Calendar, Postcard, Note card	$200.00
Research Material	
8 x 10 print	$30.00
Low resolution digital file	$15.00

Postage and Handling for one print is $3.00 US and $6.00 overseas.
Additional fees may be charged for shooting of originals.
Additional postage will be charged for larger orders and/or express service.
Advertising rates quoted upon request.
PREPAYMENT IS REQUIRED. FEES ARE NOT REFUNDABLE.

Image Rights and Reproductions
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900 East Avenue, Rochester, NY 14607
images@geh.org
fax 585 271 3970

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Images may be made available on CD-ROM or in print format in color or in black and white.

Fees:

Print and Electronic Publication (black and white or color)

Cover or Dust Jacket:	$150.00
First image	$100.00
Each subsequent image in the same order	$75.00
Advertising Related (print or video)	$200.00 minimum, subject to change depending upon the nature of use.
Web Use	
Each image	$50.00

Non-profit organizations will be charged 50% less for the above fees.

At the discretion of the Society, fees may be waived for purposes of student projects, restoration reference, and display in a Westfield business location, but users will still be subject to processing and supply fees (see below).

Supplies:

There is a surcharge to cover the cost of photographic supplies in the amount of $5.00 per CD-ROM used and $2.00 per print. Special processing will be charged at cost. Users will be charged for all shipping and handling fees.

Payment should be made in the form of a check payable to Westfield Historical Society.

I have read the conditions on the reserve side of this page and agree to them:

_____

Signature of Licensee/Patron

Approved by:_____ _____

Authorized Westfield Historical Society Official Date

Please review our library and archive policy before your visit to the Schwenkfelder Library.

Research Services and Permissions

Photocopies and Reproductions
Research Requests
On Site Research
Archive and Library Access Guidelines

Photocopies and Reproductions

The copyright law of the United States (Title 17, United States Code) governs the making of photocopies or other reproductions of copyrighted material. Copies are permitted for personal and research use only, and Library staff reserve the right to refuse permission.

Self-Service Photocopying

Self service photocopying is permitted with staff approval. Many materials are sensitive and cannot be photocopied, please seek staff assistance if you need a photocopy of an item from our vault and archive. Photocopies of manuscripts and bound materials printed before 1900 are not permitted.
Photocopies are $.25 per sheet, legal and letter size.

Microfilm

Microfilm copies are permitted with staff approval. Copies are permitted for personal and research use only.
Microfilm copies are $.25 per sheet, legal and letter size.

Research Requests

The archivist answers email and mailed inquiries only. Reference requests are handled in the order they are received. Staff directed research rates may apply. See below for more information.

When sending a research request please be specific as possible, include names, locations, denomination and dates that are important to your research. Please list related manuscript collections or print materials.

Address letters with an S.A.S.E. to:
Hunt Schenkel, Archivist, Schwenkfelder Library & Heritage Center, 105 Seminary Street, Pennsburg PA 18073

Send E-mail inquiries to:

hunt@schwenkfelder.com

Staff directed research:

Standard research fees for the first half hour: $25.00
Each additional 15 minutes: $15.00

On site research:

Please call in advance to make an appointment or to ensure that the desired material is available in our reading room, library or archive. Appointments are preferred Tuesday through

Friday. Inquiries are taken in the order of receipt. Researchers must make an appointment to view material in the archive. Walk-in visitors will be asked to make an appointment for a later date if they are viewing materials from our archive.

All researchers and library visitors must sign in at the library desk.

Materials in the reading room and archive are non-circulating. All materials must be used on site. Inter-library loan is available for institutions and researchers unable to visit the library. All materials from the archive must be signed and approved by a staff member. Photocopying of these materials is prohibited.

Archive Access Guidelines:

Our archival access policy is designed to insure the protection of rare and sensitive materials in the Schwenkfelder Library & Heritage Center's collection. Please make an appointment to view materials in our archive. Appointments are preferred Tuesday through Friday.

Food and drink are not permitted.

Cell phone use is not permitted.

Please use pencils.

Coats, jackets, handbags are not permitted in the Library. Lockers and a coat rack are provided in the Library entrance.

All patrons, researchers and visitors are required to sign in at the library desk.

For the courtesy of other library patrons and staff personnel, please speak quietly.

Cotton and or latex gloves need to be worn when handling sensitive material. The SLHC provides gloves for patrons.

One item at a time will be available for use. All materials must be signed out from the vault.

The Schwenkfelder Library & Heritage Center does not appraise materials. Please contact the American Society of Appraisers for more information.

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Appendix V:

Library of Congress Standards for Digital Conversion

The Library of Congress
Technical Standards for Digital Conversion Of Text and Graphic Materials

1 Introduction

"For the general public, the Congress has endorsed the creation of a National Digital Library through a private-public partnership that will create high-quality content in electronic form and thereby provide remote access to the most interesting and educationally valuable core of the Library's Americana collections. Schools, libraries, and homes will have access to new and important material in their own localities along with the same freedom readers have always had within public reading rooms to interpret, rearrange, and use the material for their own individual needs."
James Billington, Librarian of Congress, Fall 1995

By the time Dr. Billington announced the new National Digital Library, there already existed a significant history of digitization at the Library of Congress (hereafter referred to as the Library). The conversion of materials from the collections of the Library of Congress has roots in the pilot projects and programs of the 1980's. With the advent of the National Digital Library Program, the Library staff began to develop a series of standards and best practices that have guided the Library's digital conversion programs. These standards have been modified over time; this document presents the most current digitization standards available to-date at the Library, and also features the historical documents on which the standards are based.

Over time, a digitization process has emerged at the Library that follows a pattern of planning, content production, web assembly and site maintenance. This document focuses on the first two stages of this process. Topics within the scope of this document include planning, digital image capture (including device characterization, document handling, image quality standards, and imaging workflow), digital file management (including file formats, naming and storage), technical metadata (included technical, structural, preservation and descriptive metadata contained in the TIF header tags), and quality assurance.

1.1 Project Planning

The Library sets out a standard procedure for planning the digital conversion of materials from its collections. After specific material has been selected and the project goals defined, the process focuses on a formal requirements analysis that documents each element of the digitization process. In addition to general project descriptive information, the requirements analysis focuses on the materials proposed, the general digitization specifications, copyright, conservation, access, storage, and "digital object behavior" requirements.

The Library of Congress is careful to respect copyright and individual privacy rights. Copyright research and privacy clearances are done outside the actual imaging process. A preliminary assessment of copyright and privacy issues is part of the planning process and materials are not

scanned without an understanding that the project outcomes will be within the legal restrictions of copyright and privacy laws.

Please Note:
This presentation focuses on imaging of text and graphic materials – it does not include audio and video conversion standards. The following activities are also beyond the scope of this web site, including those that take place prior to imaging (materials selection, preservation and conservation), details of digital preservation, the development of descriptive metadata beyond the TIFF header data, the creation of derivative image files and the web design process.

2 Current Technical Standards

These technical standards are intended to summarize current standards and best practices used at the Library. These standards provide guidance for the production of the "master" image to be retained by the Library in its "warehouse" storage area. A variety of derivative files may be prepared from these master images for display on the Library's web site or for distribution.
In the Library's best practices, TIFF master files are produced to different standards depending on the intended usage of the files -

- Grayscale TIFF files are produced where color content does not exist or is not deemed significant. Books, manuscripts and sheet music or books fall into this category.
- Fine quality grayscale or color TIFF image files are produced where color information exists in the content, or where the artifactual value is extremely important. Rare books, maps, and photographs are within this category.
- Rarely, bitonal TIFF files may be accepted when representation of the document content is the sole requirement. This consideration is generally the result of external relationships.

2.1 Document Management and Handling

Library Divisions manage all collection materials and handling requirements set by the Division must be adhered to. Additionally, the Library's Conservation Office must be involved from the beginning of all imaging projects.

2.1.1 Conservation

All materials must have a conservation assessment prior to scanning. Based on the assessment, materials may need conservation treatment or re-housing before they are taken to the scanning workstation. In all cases a complete document collation should be prepared before scanning.

2.1.2 Equipment

The Division curator and Library's Conservation Office staff must approve all equipment used in the scanning process. No equipment used for image capture shall damage original materials nor shall the manner of its use cause damage. This includes, but is not limited to –

Book cradles and other supports for bound materials.

- Weights and special supports for materials.
- The contractor may use other physical supports if approved by the Library such as flexible, wedge-like supports combined with materials to support the book spine as the weight of the text block shifts during scanning.
- The contractor shall not use any materials that may result in tearing or chipping of pages, damage to the spine or to the text block, or damage to the area where the text block is attached to the cover of the book.
- The contractor may use a sheet of glass applied gently by the operator to the single page that is being scanned. Any glass that spans a book gutter must have special approval.

Special supports for unbound materials.

- Certain unbound materials, such as folded sheets of music, may require other types of support. For example, fragile sheet music that has been folded for long periods of time has a tendency to tear at the fold.
- These types of folded sheets shall not be scanned with the crease pressed flat against the scanning bed. While these sheets can normally be inverted and scanned page-by-page on a book scanner and sometimes on a typical flatbed scanner, the area or page that is not being scanned must be supported to prevent damage or undue stress to the crease or to the pages themselves.
- The contractor shall provide a support mechanism that will accommodate these requirements. This support structure need not be elaborate, but must be functionally adequate to meet the requirements.

Lighting equipment of all kinds

- The Division curator and Library's Conservation Office staff must approve both general environmental illumination and scanner specific lighting.

2.1.3 Handling Pictorial Materials

The capture device(s) and production workflow to be utilized shall not cause harm to the materials being scanned. Harm may be caused by such factors as excessive handling, inversion of fragile items, flattening, surface abrasion, excessive illumination, and excessive heat.

Most of the black-and-white photographic negatives to be scanned are medium-format (4x5 and 5x7 inches) safety film. Other negatives range in size from 35mm to 11x14 inches. Any nitrate-based negative materials to be scanned will be identified in each project. Work with nitrate-based film shall be completed in accordance with the special handling rules and requirements as specified by the Library.

Color transparencies and color negatives range in size from mounted 2 x 2-inch slides to 8 x 10-inch sheet films. Color film materials are typically housed in Mylar jackets or sleeves within an additional paper sleeve. All film-based materials, such as black-and-white photonegatives and color transparencies not in Mylar sleeves shall be handled with clean cotton gloves and resleeved into their original housings. When rehousing, the emulsion side of film items shall face the non-sealed side (the side without an adhesive seam) of the sleeve or jacket. It may be required that glass negatives be scanned emulsion side up to prevent surface abrasion or image loss, and laterally reversed during image post processing.

Items identified as either fragile or being curved, cupped, or warped shall not (1) be flattened against or under glass or (2) turned face down for capture.

2.1.4 Other Materials

Specific handling instructions will be specified for each project. In consideration of the safety of the collections, the Library may alter handling rules, workstation handling requirements, or withdraw materials from scanning. In some situations, the Library may require that a Library employee accompany and/or handle the material at the scanning station.

2.2 Scanner Characterization

The evaluation of technical image quality and adherence to standards generally is approached in two stages. First, scanners are "characterized" through the use of sample images and targets designed to measure tonal reproduction, dynamic range, resolution, noise, color accuracy and additional characteristics that are determined to be of particular importance for a given application. This data helps in the selection of an appropriate scanner for the project and helps operators install, configure, and set the equipment controls properly. Second, a target may be included with every image or on specific occasions such as the first and last image of a document. This data helps insure that the ongoing imaging work maintains the original quality specifications. Historically, the Library has used the USAF 1993 Visual Resolution Test Target (and similar derivatives) to establish that visual resolution is in compliance with requirements. Tonal representation has been evaluated through visual inspection of sample and actual images selected from scanner output.

Now ISO standards for the measurement of the appropriate image quality elements have been approved and the Library has begun to test and characterize scanners through the use of Standard ISO targets as well as with sample images. (Note that a more detailed discussion of image evaluation is provided in the section of Quality Assurance later in this document.) The Library is currently implementing test procedures following the standards listed below:

ISO No.	Date	Title	Description
14524	1999	Opto-Electronic Conversion Function (tonal reproduction)	Electronic still-picture cameras -- Methods for measuring optoelectronic conversion functions (OECFs)
16067-1	2003	Resolution -- Spatial resolution measurements	Electronic scanners for photographic images -- Part 1: Scanners for reflective media
16067-2	2004	Resolution -- Spatial resolution measurements	Electronic scanners for photographic images -- Part 2: Film scanners
15739	2003	Noise measurements	Electronic still picture imaging
21550	2004	Dynamic Range	Electronic scanners for photographic images
22028-1	2004	ICC Specification Revision	ICC.1:1998File format for color profiles, version 4.1

2.2.1 Standard Targets and Tests

2.2.1 - A Resolution

In order to verify the calibration of the scanning equipment and to ensure the best possible images, the Library requires that certain standard targets be scanned and that procedures for use of the specified targets be followed. The Library may select targets that are appropriate to the project and these are to be scanned and submitted prior to work commencing. Additionally, the Library will require delivery of specified scanned technical targets during the installation and configuration of scanning equipment, and may require them during the ongoing production of images. Targets to be scanned and delivered will be specified by the Library at the time a project is initiated.

The Library will provide standard targets to be scanned by the service provider. Corporate owned targets may be used upon approval by the Library. The targets shall be delivered as image files for subsequent analysis by the Library. The contractor may include the company analysis and interpretation.

Target images may be required at the following times:

- Prior to the initiation of a project (before a scanner is installed at the Library);
- Upon initial installation of equipment at the Library;
- When new equipment is installed;
- Whenever a new operator is trained to operate the scanning or post-processing equipment;
- Whenever the Library's quality review indicates a significant increase in quality problems. The Library will notify the contractor of this requirement;
- On a regular basis for projects when many batches are delivered over a period of performance greater than one month.

In general the Library expects imaging equipment set to yield images at 1:1 using optical resolution without resampling. Thus a scanner with 6000 pixels in the long dimension (as reported in TIF 256 tag, ImageWidth) might be set at a working height to yield 300 pixels per inch (reported in the 282 tag, XResolution). A document as large as 20" on it's long dimension could be scanned. A straight vertical line 1/100 of an inch wide on a document would then show

on the image as a straight vertical line exactly 3 pixels wide. The line tonality on the image would be uniform and similar to the tonality on the document, the line edges would be straight and precise, and no stray pixels on either side on the line would be darkened. Unfortunately, many scanners that are presented as "300ppi" in manufacturer's literature cannot image the line precisely. Until recently, the standard test of scanner resolution has been a target prepared with pairs of lines of various widths presented for visual inspection. This test is not very rigorous – reviewers can distinguish fine lines that are not uniform in tonality and there may be many stray pixels inaccurately darkened; images from such equipment may look fuzzy and lack fine detail. ISO standard 16067 was designed to overcome this problem. Frequently the results of the ISO standard measurement are considerably lower than reported under the older visual inspection method. Currently the Library uses both visual and ISO 16067 targets to provide a more complete indication of scanner resolution.

2.2.1.A.1 Resolution Targets

The standard measure of resolution is based on Modulation Transfer Function (MTF) per ISO-16067-1 (for reflective materials) or ISO-16067-2 (for transmission materials) using slant-edge targets such as the QA-61 or QA-62 Targets. Visual measurements of resolution based on ISO 12223 Standard targets, on the USAF 1951 test target, or on the RIT Alphanumeric target may be used to supplement the MTF measurements.

2.2.1.A.2 Tests

- Software produced MTF/SFR curves of vertical and horizontal resolution in both center and at least one corner.
- Visual inspection of the center and at least one corner for both vertical and horizontal resolution may supplement the MTF analysis.

2.2.1.A.3 Standards

- For content presentations that will not involve OCR, the current standard is a minimum visual resolution of 300 ppi in the image center (both measurements) with minimal loss of quality in the corners, and a minimum MTF10 resolution of 300 ppi in the image center (both vertical and horizontal measurements) with minimum loss of quality in the corners. A minimum resolution of 400 ppi is considered standard practice with 300 ppi generally only used for large format materials where lower resolution is mandated by device limitations and stitching is not practical or desirable.
- For images that contain text that will be OCR'ed, the standard will be 400 ppi for both visual and MTF measurements.
- For Rare Book and other special materials the standard is a minimum of 400 ppi and may be higher as planned project outcomes require.

2.2.1 - B Tonality

Eight-bit grayscale is the minimum bit depth required for any digital conversion work at the Library. Previous and current standards require a visual comparison between the original and the image. The Library is beginning to formally characterize scanners using the ISO 14524 OECF targets listed below.

Targets for tonal analysis

- Sample scans of selected materials.
- ISO-16067-1 based scanner targets such as the Kodak Q-13 target or the QA-61 and QA-62 targets. (These targets commonly present a 20 step gray scale although specific targets may vary. When different targets are used, the software necessary to analyze the target may be requested by the Library)

2.2.1.B.1 Tests

- Software analysis of a 20 patch grayscale to determine the number of discernable steps, the relationship between steps, and the gamma of the tone curve.
- Visual inspection of the sample images to confirm that the tonal match is very close and that details in the dark and near white areas of the original have not been lost in the image.
- Visual inspection of the target to determine distinction of patches, particularly in the dark grays near black and light grays near white.

2.2.1.B.2 Standards

- No loss of detail in dark and light gray areas of the original.
- A minimum of 18 steps should be visible on a 20 step scale.
- Software analysis should show appropriate density steps and gamma.

2.2.1 - C Dynamic range

The dynamic range of an image is the ratio of the darkest area to the lightest area of the image. The range of reflective materials is limited – a scanner should be able to reproduce a similar range.

2.2.1.C.1 Targets for dynamic range analysis

- The grayscale targets used to analyze tonality will also be used to analyze dynamic ranges.

2.2.1.C.2 Tests

- The density difference between the darkest and lightest discernable patches shall be determined by visual inspection.
- Software will provide similar measurements

2.2.1.C.3 Standards

- For reflective 5.5 f-stops or greater (6 f-stops or 1.9 db is preferred),
- For transmission 8 f-stops, (10 f-stops or 3.0db is preferred),

2.2.1 - D Noise

Noise introduced by the scanner must be limited and well controlled. Noise is most visible in broad areas of tonality such as the sky in a photograph or the page background of a manuscript document.

2.2.1.D.1 Targets for noise analysis

- The grayscale targets used to analyze tonality will also be used to analyze noise.

2.2.1.D.2 Tests

- The dark patches will be inspected for visible noise.
- Software curves and analytics will be generated.

2.2.1.D.3 Standards

- Software analysis should show well-controlled noise with minimal RGB and luminance channel variations.
- An average luminance channel noise of approximately Y <=5% is expected.

2.2.1 - E Color

The Library is creating color images for many projects. Two problems are apparent: capturing accurate color at the scanner and providing information to users that informs them how to display and prints images with reasonably accurate color. The first problem is being analyzed using the targets, tests, and standards listed below. The Library is now examining how color profiles are created, checked, and placed within a TIFF image tagged field so that the user is provided with the necessary data for accurate color information.

2.2.1.E.1 Targets for color accuracy analysis

- Gretag Macbeth ColorChecker - the large patch 8.5" x 11.5" target.
- The Gretag Macbeth Digital Color Checker when appropriate analytic software is available.

2.2.1.E.2 Tests

- Visual inspection under ISO standard viewing conditions.
- Software generated comparative analysis and delta-E.

2.2.1.E.3 Standards

- A delta-E of less than 8 is expected.

2.2.1 - F OCR

2.2.1.F.1 Targets

The Library will supply representative sample page images of text for any project that includes OCR.

2.2.1.F.2 Tests

The Library will OCR and evaluate the supplied sample page images

2.2.1.F.3 Standards

OCR test results on library materials vary greatly.
The Library has found that 400 ppi images produce improved OCR.
The Library's general benchmark is 90% word accuracy on the text sample provided, but different standards may be specified for special materials, such as pre-1820 newspapers .

2.2.1 - G Other Information

The Library is currently experimenting with controlled viewing conditions and monitor calibration to establish standard environment(s) for reviewing and analyzing target and sample images. New standards may be published on these topics soon.

2.3 Image Acquisition

2.3.1 Imaging procedures

Many procedures followed in the Library's digitization process are specific to the resources and policies of the Library. However certain standards are central to all imaging projects, including those performed by contractors either onsite or off.

2.3.1 - A Target and test scans

Every imaging project requires certain target and test scans. Prior to beginning document scanning, equipment operators should image the set of targets necessary to characterize the scanner as described previously. This target set should be repeated as needed to insure that all scanning throughout the project meets the standards set at project startup.

If a significant number of images within a batch fail to meet the project specifications, the Library may require the entire batch be rescanned.

At project startup and on occasion throughout the project, sample scans of typical documents will be requested and evaluated as described below to insure that quality standards are met throughout the project.

Table 1: Summary of LoC Image Quality Standards by Document Type and Expected Outcome

Document Type	Expected Outcome	Image Parameters Standards				Notes
		Resolution	Bit Depth	Grayscale Factors	Color Accuracy	
Printed text: books w/illustrations, pamphlets, typed pages, newspapers,	Image of text	300 ppi minimum	8-bit grayscale	minimum 18 steps minimum 5.5 f-stops Y channel noise <=5%		
	OCR'ed text	400 ppi	8-bit grayscale	minimum 18 steps minimum 5.5 f-stops Y channel noise <=5%		
Music: sheet music, annotated scores, music manuscripts	Access to content	300 ppi minimum	*8-bit grayscale	minimum 18 steps minimum 5.5 f-stops Y channel noise <=5%		*24-bit color should be used where color is an important attribute of the document.
	Recognition of artifactual features	400 ppi	8-bit grayscale	minimum 18 steps minimum 5.5 f-stops Y channel noise <=5%		
Manuscripts: handwritten, typewritten copies	Access to content	300 ppi minimum	*8-bit grayscale	minimum 18 steps minimum 5.5 f-stops Y channel noise <=5%	If 24-bit color Delta-E < 8	*24-bit color should be used where color is an important attribute of the document.
	Recognition of artifactual features	400 ppi	8-bit grayscale	minimum 18 steps minimum 5.5 f-stops Y channel noise <=5%	If 24-bit color Delta-E < 8	
Maps: printed tones printed color up to D-size 22" x 34" *oversized	Content Research	250 ppi minimum	24-bit color		Delta-E < 8	*ppi is dependant on map size – particularly when map sections must be stitched together and map filesize increases to 500 MBs and more
	Map reproduction	400 ppi	24-bit color		Delta-E < 6 ICC Profile	

Document Type	Expected Outcome	Image Parameters Standards				Notes
		Resolution	Bit Depth	Grayscale Factors	Color Accuracy	
Photographs: continuous tone, color	Access to content	300 ppi minimum	*8-bit grayscale	minimum 18 steps minimum 5.5 f-stops Y channel noise <=5%	If 24-bit color Delta-E < 8	*24-bit color should be used where color is an important attribute of the document.
	Reproduction	device maximum	24-bit color minimum		Delta-E < 6 ICC Profile	
Graphic Arts: Limited tone originals Continuous tone Color	Access to content	300 ppi minimum	8-bit grayscale	minimum 18 steps minimum 5.5 f-stops Y channel noise <=5%	If 24-bit color Delta-E < 8	*24-bit color should be used where color is an important attribute of the document.
	Reproduction	device maximum	24-bit color minimum		Delta-E < 6 ICC Profile	
Rare Books: Objects of High Artifactual Value	Recognition of artifactual features	400 ppi minimum	24-bit color		Delta-E < 8 ICC Profile	
	Research on artifactual features	600 ppi minimum	24-bit color minimum		Delta-E < 5 ICC Profile	

2.3.1 - B Delivery

Generally, images will be delivered to OSI Central Receipt directly from the Library's network or on USB portable hard disk drives. At Central Receipt image batches will be reviewed using software that checks for conformity to the required image format (most often TIFF 6.0), following the required naming convention, and with the specific metadata properly placed in the appropriate TIFF tag fields. (*See* Section 2.5 – Technical Metadata)

2.3.1 - C Scanning Instructions

A set of scanning instructions is delivered to the scanning workstation operator prior to the start of scanning for every digital conversion project at the Library. These instructions include all document handling procedures, all technical standards, all naming conventions, and all post processing requirements. A sample set of scanning instructions is provided in Appendix B.

2.3.2 Specialized information

2.3.2 - A Reflective materials

Each object shall be scanned as specified in the task at a specifically stated spatial resolution appropriate for the material being scanned. The resolution requirement will be specified in pixels-per-inch (ppi). Spatial resolution shall be achieved utilizing the optical resolution capabilities of the equipment employed to capture the image. Interpolation of spatial resolution to achieve higher ppi values shall not be permitted.

2.3.2 - B Transmission (see comments on "Reflective")

2.3.2 - C Bound materials

Book Covers. Covers shall be scanned for certain books. When covers are required to be scanned, an instruction will be provided in a note included on the target. If both front and back covers are to be scanned, the front cover image shall be numbered to precede the images for the inside pages and the back cover shall be numbered to follow them.

The general rules for cover scanning are as follows:

- Do scan covers (front and/or back) when the cover includes typography or illustrations that are original to the book, and when a legible image can be produced.
- Do not scan the covers of books that will not render a legible image.
- Do not scan covers that are devoid of any marking except the Library's call number.

Inside Pages. The images of the inside pages shall come after the images for the target and the front cover (if any). The first page of the book to be scanned shall be the first page containing significant information. Examples include a page containing a copyright stamp that precedes the title page, the title page itself, or end papers containing significant information, such as a map. Scanning of the remainder of the book shall continue in sequence, omitting blank pages. However, pages that contain no printed information but that contain handwritten inscriptions,

notes, marginalia or other written ephemera shall be scanned. End papers shall only be scanned if they contain significant information, such as a map. End papers that are merely decorative shall not be scanned. Blank pages or blank pages with stray pen or pencil marks shall not be scanned.

Foldout Pages. Foldout pages present special problems in capture and, if images are segmented, in numbering. These pages shall be removed from book bindings by the Library and scanned by the contractor as unbound pages. They shall be integrated in the delivery sequence of the rest of the bound volume.

2.3.2 - D Maps

Map present special problems because of their size; contact the Digital Conversion Team of the Geography and Map Division for special instructions.

2.3.2 - E Prints

Each object shall be scanned as specified in the task at a specifically stated spatial resolution appropriate for the material being scanned. The resolution requirement will be specified in pixels-per-inch (ppi). Spatial resolution shall be achieved utilizing the optical resolution capabilities of the equipment employed to capture the image. Interpolation of spatial resolution to achieve higher ppi values shall not be permitted. The spatial resolution requirements are anticipated to range from 200 ppi to 5000 ppi.

For mandatory images (8-bit grayscale), the digital values should be linear to the original density. The digital values for each area on the grayscale target shall not deviate by more than 10 from a linear least squares regression line fitted between the densities of the original target and the digital output values. A white area shall have values of r=243-250, g=243-250, and b=243-250, and a black area shall have values of r=5-12, g=5-12, and b=5-12. Care should be taken that no clipping (= loss of details) in either the highlights or the shadows occurs.

For desirable images the digital values should be linear to reflectance / or transmittance. A white area shall have values of r=4070-4086, g=4070-4086, and g=4070-4086, and a black area shall have values of r=5-15, g=5-15, and b=5-15. Care should be taken that no clipping (= loss of details) in either the highlights or the shadows occurs.

2.3.2 - F Manuscripts

The majority of pages range from about 6x9 inches to about 82x11 inches. Because many are from periods before paper sizes were standardized, and because many pieces of personal correspondence are included, document sizes vary considerably, often from one page to the next. In addition, manuscript collections may include extensive quantities of slips of paper or cards on the order of 3x5 inches. These collections may also include folded posters, newspaper pages, or other sheets on the order of 11x17 inches. Collections also contain documents (like sheet music) that consist of folded sheets (creating Apages@) and sheets that exceed 11x17 inches in size. All

of these highly variable materials can appear in historical archival collections and all shall be scanned.

2.3.2 - G Microfilm

The spatial resolution shall be 400 pixels-per-inch (ppi) relative to the original newspaper. If that is technically impossible, due to high reduction ratio of particular reels, the spatial resolution for those reels shall be 300 pixels-per-inch (ppi) relative to the original newspaper.
8-bit grayscale, TIFF 6.0 uncompressed. Two-up film should be split so that there is one page image per file. De-skew images with a skew of greater than 3 degrees.

2.4 Post Processing of Digital Files

The Library recognizes that some post processing in necessary to obtain images that closely match the original document in terms of sharpness, detail, tonal range, and color fidelity. The amount of post processing may be governed by the production expectations set by the nature of the project. Automatic processing of image batches may be appropriate done in batches for projects that produce hundreds of images daily. Manual adjustments for each factor may be done on each individual image for projects that involve rare and valuable materials. In either case the Library considers these standards for image post processing.

2.4.1 Cropping

Cropping of bound and manuscript materials. The Library requires presentation of the entire original sheet or page. In no event shall the actual document be cropped. Researchers using Library of Congress digital documents often wish to be reassured that the entire document has been captured. This is especially desirable for unbound manuscript documents. A "border zone" approximately 1/4-inch or less of the surface behind the scanned document shall be provided whenever possible.

For some combinations of document sizes and scanning equipment, capturing such a margin may not be possible for all four edges of the page. Therefore, the Library desires a 3-inch margin wherever possible, and requires at least that the entire original sheet or page is captured.

Cropping for Pictorial Materials. The Library wishes to provide researchers with a reproduction of the entire original item. Thus, images shall be framed and cropped to show the entire original item and beyond the item(s) edges. For negatives or other transmitted light items, each digital image shall reproduce that item(s) actual-image area, the border on the film that surrounds the image area, and a portion of the background (light box or scanner top) beyond the edge of the film. A similar approach shall be followed for reflected-light items; the whole print, whole mount, and a portion of the background (beyond the mount) shall be reproduced. In order to limit light flare or other technical anomalies caused by lighting, the contractor may propose to use filters or masks around the edges of negatives or other media that permit excessive light within the scanned scene.

2.4.2 Rotation, de-skewing

In addition to cropping, images may need to be rotated or deskewed. These processes are not generally applied unless the skew angle exceeds 3 degrees. Some OCR packages require more accurate alignment – if a project outcome requires OCR the scanning instructions will specify the acceptable skew and any corrections to be performed.

2.4.3 Sharpening

Image sharpening may be applied if necessary to increase the match between the image and the original. This process should not be used to overcome defects in the scanner quality or in the proper operations of the equipment. Sharpening should not be used to increase the apparent resolution beyond the resolution of the original. Currently, the Library prefers using the "unsharp mask" method using an image ratio of 1:1 to obtain a match between the original and the scan.

2.4.4 Tonal aimpoints

The Library generally expects that operators will use the device control software to adjust their equipment at least once each day using an ISO standard grayscale target such as the Kodak Q-13 or the Golden Thread. The scanner should be set to achieve a black aimpoint of approximately 1.95, a white aimpoint of approximately 0.10. At least 19 steps should be discerable. A midpoint aimpoint may also be set. At the same time, the image should be "neutralized" so that the RGB components of the white or middle gray patch are equal. This neutralization needs to be done on a quality target or on a special, carefully selected paper because documents from the collection may be on paper that has colorcasts or optical brighteners that mislead scanner sensors.

A sample document should also be scanned as a test image. This image should be checked carefully for a match between the blackest element of the document and the black aimpoint and for a match between the lightest element of the document and the white aimpoint. Then the image should be checked to match the detail in the dark and light gray areas to be sure the scanned image retains the detail of the original.

2.4.5 Color Management

Color management must begin with correct scanner operation and the time of capture so that the original scan is as accurate representation as possible. The aimpoint adjustments and white neutralization provide the starting point for good color management. However the Library expects that additional steps must be taken to capture color images that represent the original document well. When possible, the original document should be compared to the scanned image under controlled viewing conditions on a color-controlled monitor. Using graphics processing software such as ***Photoshop,*** the image may be adjusted so that the colors are a close match. During production, the required adjustment may be noted and run as a batch process. When imaging rare or valuable materials the adjustment may be done on each individual image.

Color images should be placed in standard RGB (sRGB) color space. The transformation of color into sRGB space may require that some imaged colors be adjusted to fit within the limits of the color space. This adjustment is done using a specific "rendering intent." The choice of rendering intent will depend on the type of original. This choice should be discussed with the digital conversion specialist and division curator and the decision included in the scanning specifications. Normally, a "relative colorimetric" intent should be chosen for text and graphic arts while a "perceptual" intent may be used for photographic materials.

After this transformation the image should be saved as a 24-bit TIFF file with an attached ICC color profile placed in the TIFF 34675 tag. The ICC color profile is essential for any user hoping to display reasonably accurate color. (It should be noted that the standard TIFF tags for BitPerSample (258), for PhotometricInterpretation (262) and for SamplesPerBit (277) only indicate that the TIFF image is an RGB rather than bitonal or grayscale image. The tags do not indicate the color space and color aware applications will note that the color space is unknown unless the proper data is in the 34675 tag.)

2.5 Technical Metadata

2.5.1 Descriptive Metadata

Although a detailed analysis of descriptive metadata is beyond the scope of this document, it is useful to note that Library of Congress American Memory digital collections are generally driven through MARC metadata. A MARC record is used to access books available online and specialized MARC records are used to access maps and photographs. A MARC record provides access to other collections and then a standardized non-MARC record provides access to individual items within the collection. The document handle and pathname are placed in the 869 field of the bibliographic record. Recent collections may also be accessible through the Open Archive Initiative – Protocol for Metadata Handling (OAI-PMH).

2.5.2 Structural Metadata

Structural metadata is particularly important in complex digital collections. Even paging through a book is much more complex than it appears to the average library user. The user expects to reach page 17 as printed on the page, by entering 17 into a "turn to" box – but image 17 is almost never page 17. Navigating manuscript collections, scrapbooks, sheet music, or map presentations may be much, much more complex. Document structural metadata has been handled in American Memory projects by filename conventions that are specified in the scanning instructions. The Library's Digital Scanning Center assigns the filename either at the time of scanning or during post processing. Other Library Web applications for digital collections, including Global Gateway, Veterans History Project, and The Library of Congress Presents: Music, Theater and Dance use METS records for structural metadata – METS metadata is developed outside our imaging process and is beyond the scope of this document.

2.5.3 Technical Metadata in TIFF headers

The TIFF format provides a large number of pre-defined, standardized tagged fields that are available for a range of metadata – primarily technical in nature. The TIFF standard also provides procedures for others to create and tag additional metadata designed to specific needs. Most scanner control and image post processing software can be configured to automatically provide much of this metadata. Commercial applications and vendor-developed routines are available to support the input of metadata that cannot be supplied automatically.

<u>Introduction:</u>

This report is intended to be a listing of proposed requirements for TIFF image header tags required by the Digital Conversion Services (DCS) and applicable to all digitization products for still image content regardless of the original format or method of digitization. The ability to store, access, and preserve content depends upon good metadata, and once finalized, the proposed requirements will serve as the core minimum required tags of metadata for these purposes. To insure DCS metadata requirements are met, images delivered by contractors and internal providers will be automatically checked by custom applications. Any files that do not

meet the core minimum requirements will be returned to the producer to be remedied and re-submitted.

This paper will discuss the header requirements for TIFF images included in the American Memory Web site, which are still in effect (and also used by Global Gateways, a program that came along later). It will also list the TIFF tags required National Digital Newspaper Program (NDNP) as detailed in the NDNP TIFF Profile.

The tags are in tables and are listed by tag number and name, along with comments.

American Memory TIFF Profile

In 1996, the Library of Congress issued RFP96-5, Request Proposals For Conversion of Microfilm to Digital Images for the National Digital Library Program American Memory Web Site. This document stated that TIFF images delivered by contractors were required to have "typical" or "expected" header data and defined these as "normally, the data supplied by software default settings." The RFP further explicitly listed TIFF tags then in use by the Library, thus appearing to make them the only explicitly required tags for TIFF images. Software developed specifically for the Library at the time allowed the automatic review and checking of these explicitly listed tags. Two RFP's that followed, Digital Images from Original Documents, Text Conversion and SGML-Encoding (RFP96-18) and Conversion of Pictorial Items to Digital Images (RFP97-9) followed the same TIFF requirements of RFP96-5. To date, these requirements are still in effect for digital images created for display on the American Memory and Global Gateways site.

2.5.4 TIFF Tags In American Memory

The following tags are explicitly checked by software for presence in the TIFF header and pre-determined values. The values of tags are not addressed in this report.

Baseline tags are those tags that are listed as part of the core of TIFF, the essentials that all mainstream TIFF developers should support in their products. Extension tags are those listed as part of TIFF features that may not be supported by all TIFF readers. Private tags are for organizations that wish to store information meaningful only to that organization in a TIFF file. Another set of private tags is Private EXIF tags. If one needs more than 10 private tags or so, the TIFF specification suggests that, rather then using a large amount of private tags, one should instead allocate a single private tag. In that private IFD, one can next use whatever tags one wants.

Table 2. LoC Standard Metadata for TIFF Tags

Tag	Name	Description	Tag Type
256	ImageWidth	The number of pixels per row	Baseline Tag
257	ImageLength	The number of rows of pixels in the image	Baseline Tag
258	BitsPerSample	Number of bits per component	Baseline Tag
259	Compression	Compression scheme used on image data	Baseline Tag
262	PhotometricInterpretation	The color space of the image data	Baseline Tag
273	StripOffsets	For each strip, the byte offset of that strip	Baseline Tag
277	SamplesPerPixel	The number of components per pixel	Baseline Tag
278	RowsPerStrip	The number of rows per strip	Baseline Tag
279	StripByteCount	For each strip, the number of bytes in the strip after compression	Baseline Tag
269	DocumentName	Document Name (path/filename)	Extension Tag
282	Xresolution	Horizontal pixel count per resolution unit (inches, centimeters)	Baseline Tag
283	Yresolution	Vertical pixel count per resolution unit (inches, centimeters)	Baseline Tag
296	ResolutionUnit	Unit of measurement for X and Y Resolution (inches, centimeters	Baseline Tag
306	DateTime	Date and Time image was scanned	Baseline Tag
315	Artist	Person who created image (default LoC)	Baseline Tag

2.5.5 NDNP TIFF Profile

The National Digital Newspaper Program (NDNP) requires the same tags as does American Memory and Global Gateways, as well as some additional tags within the TIFF 6.0 file format. The NDNP TIFF Profile also specifically excludes the 258 field (BitsPerSample), but this is because all images are expected to have 8-bits per pixel.

2.5.6 Additional TIFF Tags in the NDNP TIFF Profile

Table 3. Additional TIFF Tags in the NDNP TIFF Profile

Tag	Name	Description	Tag Type
42016	UniqueImageID	Indicates an identifier assigned uniquely to each image	Private IFD - Exif Tag
274	Orientation	The orientation of the image with respect to the rows and columns	Baseline Tag
41728	FileSource	Indicates the image source, e.g. microfilm, book, etc.	Private IFD-Exif Tag
271	Make	The scanner manufacturer	Baseline Tag
272	Model	The scanner model name or number	Baseline Tag
305	Software	Name and version number of the software package(s) used to create the image.	Baseline Tag

2.5.7 Proposed Minimum Core

The proposed minimum core is all of the tags from the American Memory Profile and tags 271,272, and 305 from the NDNP TIFF profile. The following table contains the proposed core minimum.

The tag numbers, names, descriptions and sample values are taken from:

- The draft NISO Z39.87 / AIIM 20-2002 Standard, http://www.niso.org/standards/resources/Z39_87_trial_use.pdf
- TIFF tag reference at http://www.awaresystems.be/imaging/tiff/tifftags.html.

The Notes field provides Library specific information.

Table 4: Proposed LoC Baseline Tags for TIFF Images:

Tag	Name	Description	Sample Values	Notes
256	ImageWidth	The number of pixels per row		
257	ImageLength	The number of rows of pixels in the image		
258	BitsPerSample	Number of bits per component		
259	Compression	Compression scheme used on image data	1 = Uncompressed 4 = CCITT Group 4	
262	Photometric-Interpretation	The color space of the image data	1 = Black is zero 2 = RGB	RGB is assumed to be sRGB If RGB, an ICC Profile should be present in the 34675 tag
271	Make	The scanner manufacturer		
272	Model	The scanner model name or number		
273	StripOffsets	For each strip, the byte offset of that strip		
277	SamplesPerPixel	The number of components per pixel	8 8 8	
278	RowsPerStrip	The number of rows per strip		
279	StripByteCount	For each strip, the number of bytes in the strip after compression		
269	DocumentName	Document Name	path/filename	
282	Xresolution	Horizontal pixel count per resolution unit (inches, centimeters)		
283	Yresolution	Vertical pixel count per resolution unit (inches, centimeters)		
296	ResolutionUnit	Unit of measurement for X and Y Resolution (inches, centimeters		
305	Software	Name and version number of the software package(s) used to create the image		It is acceptable for this field to include only the capture software. It is preferred that both capture and post-capture processing software (if applicable) are included and separated by ";"
306	DateTime	Date and Time image was scanned		
315	Artist	Used for ImageProducer		Institution name followed (if applicable) by ";" and name of scanning contractor.

2.5.7 - A Library Supported Metadata Standards

A number of new metadata standards have been prepared recently. In addition to the Data Dictionary - Technical Metadata for Digital Still Images (Draft standard for trial use) published

jointly as NISO Z39.87-2002 and AIIM 20-2002 referenced above, the Library has details of MIX (Library Web Site, Nov. 2004.) and PREMIS (Library Web Site, Oct. 2005) on its web site. In the near future the Library expects to review and revise our technical, preservation, and administrative metadata requirements in light of these standards.

2.5.7 - B References

http://www.awaresystems.be/imaging/tiff.html
http://memory.loc.gov/ammem/techdocs/conversion.html
http://www.loc.gov/ndnp/pdf/TIFFSpecs.pdf
http://partners.adobe.com/public/developer/tiff/index.html#spec

2.6 File Management

2.6.1 File Formats

Approved file formats for digital master images include:

TIFF Version 6
Bitonal with Group IV compression
Grayscale and Color with no compression

2.6.2 File Naming

All item IDs and filenames are lowercase and consist of not more than 8 characters.

Filename Pattern Legend:

c	Control page number
p	Print page number
f	Feature identifier
x	Horizontal grid coordinate, alpha (for segmented images)
y	Vertical grid coordinate, numeric (for segmented images)

For TIFF files: The following letters are used as feature codes only for TIFF files.

X	A raw TIFF file, not post-processed
Z	A TIFF file of multiple images that has been joined and post processed

Other feature codes are:

e	East
i	Introduction
m	Map
n	North
p	profile
r	recto (front)

s	South
t	Text
v	verso (back)
w	West
x	Index

For each set of images (uncompressed archival image, compressed reference image(s), and thumbnail image) that reproduces the same source item, the filenames shall end as follows:
a.tif - for exceptionally high quality files, may be compressed if bitonal (up to 10,000 pixels in the long dimension for most pictorial works, 400 ppi for architectural drawings)
u.tif - for uncompressed archival files (usually between 3,000 and 5,000 pixels in the long dimension)
v.jpg = Very high resolution compressed display image (1024 or 1280 pixels in the long dimension)
r.jpg - for JPEG compressed reference image files (640 pixels in the long dimension)
t.tif - for thumbnail image files, (150 pixels in the long dimension)
t.gif - GIF format thumbnail files derived from the "t.tif" file
v.jpg = Very high resolution compressed display image (types 5DI, 4DI, and 3DI; see C.4.3.4)

DIGITAL ID

The field begins with a word or phrase that explains the source used to create the digital image: for example, the "original" work or a "b&w copy film neg." The Library's digital images are often created by scanning one or more of the copy negatives, slides, or transparencies listed in the Reproduction Number field. The Library uses a brief file identifier for its locally programmed image displays. The URL (http) and URN handle identifiers are provided to aid display of images in other environments.

Example from Adams's Manzanar photographs:
(original print)
ppprs 00376
urn:hdl:loc.pnp/ppprs.00376
http://hdl.loc.gov/loc.pnp/ppprs.00376

2.7 Quality Assurance

The Library's quality assurance plan follows a-two stage model. The Office of Strategic Initiatives, Digital Conversion Group maintains a Central Receipt operation. Image files are delivered on CD, DVD, USB hard disk, or over the Library network. At the first stage an automated software system counts and checks all files for format validity, metadata requirements, and file naming conventions. At the second stage, thumbnails of all images are reviewed and selected images are viewed at 1:1 to insure that files meet project quality specifications. The accuracy rate requirements for image batches breaks down into two categories: 99.5% accurate and 100% accurate.

2.7.1 Image receipt and validation

Upon receipt, an automated software review of all files is run. Items required to be 100% accurate include:

File format
Content of file headers and tags
Compression algorithm
Resolution Pixel Depth

The items required to be 99.5% accurate include:

File naming convention
Missing images
Duplicate images,
Images our of order

If the errors exceed the standard, the batch is held and a software-generated list of problems is provided to the scan operator.

2.7.2 Visual inspection

2.7.2 - A Initial inspection

Following the automated review, thumbnails are generated for all images – When possible 100% of the images are reviewed as thumbnails.

The items required to be 99.5% accurate include:

Blurred or indistinct image
loss to distinct features or lines
incomplete capture of page content
skewing
failure to apply treatment to printed halftones
failure to capture illustration captions

2.7.2 - B Detailed visual inspection

From the thumbnail view, specific images are selected for detailed visual inspection. The number of Images selected at random is governed by the project specifications; additional images may be reviewed if possible defects are apparent on the image thumbnail.

2.7.2 - C Image Tonal Range

The tonal range of the delivered digital images shall be representative of the original artifact or, in the case of images whose source is a photographic negative, of the expected representation of the original scene when the negative is reproduced as a positive print.

Utilization of general imaging industry standards for library materials and those as agreed to and established during each project startup and testing phase shall be followed. Consultation with Library staff may be required and is encouraged in order to ensure that appropriate operator judgments are made throughout the run of a particular project or batch.

For black-and-white or color prints or positive film (slides or transparencies), the objective is to reproduce the tonal range of the items as they are viewed under typical lighting conditions.

For black-and-white or color negatives, the objective is to create a positive image in a manner that may be compared to creating a print in a darkroom. Providing images with acceptable tonal qualities shall require that the scanning operator exercise judgment when producing the images. The Library will offer guidelines regarding expectations for the viewing and use of the images that will inform and improve operator judgment. For example, when scanning film negative photographs that are intended to provide visual documentation about a particular subject in the image, such as building details, the operator would be encouraged to ensure accurate tonal rendition of that area of interest.

The Library also requires that the broadest range of tonal information available from the object be captured in the tonal values of the delivered image files. Areas of extreme highlight and shadow information shall not be clipped from the resultant image file. As a guideline, the Library desires that all of the content information from the source object be represented within a range of pixel values that does not approach absolute black or absolute white. Therefore, in a typical 8 bits-per-pixel grayscale image, for example, most of the darkest black values in the content areas should begin around pixel value 5 and the lightest white values should not exceed pixel value 251.

2.7.2 - D Noise

The Library inspects all broad tonal areas – particularly in the darker tone and in the sky – for visible noise. While it is recognize that some visible noise will be present the Library does not accept images where the noise level

- obscures detail,
- exhibits artifacts and color fringing, or
- shows significant patterns within smooth tonal areas.

2.7.2 - E Resolution

The image may be compared to the original to determine if the sharpness of the image matches the sharpness of the original. A check will be made to determine that details visible in the dark and light areas of the original visible in the image.

If OCR is to be used, the OCR results will be considered as an indication of image resolution. The Library has determined that an optical resolution of 400 ppi provides improved OCR accuracy and poor OCR results may be an indication of inadequate resolution.

2.7.2 - F Color

Color specifications and requirements vary greatly with the expected outcome of the project. In many cases, color is merely an aid to content presentation or an indicator of artifactual values. In other cases, the color accuracy of an image is considered essential to the presentation. In the first case, the overall color of the image may merely be reviewed from visual memory; in the second case the color of the original object will be compared with the colors of the image on a color managed workstation under controlled viewed conditions. Consultation with Library staff may be required and is encouraged in order to ensure that appropriate operator judgments are made throughout the run of a particular project or batch.

2.7.3 Documentation

All visual image evaluations will be recorded using a standardize list of defects and a report generated for the scan operator. ***However, if the number of defective images exceeds the established standard the entire batch may be returned to the scan operator. It is not the job of the Library to list every defect in every image when an entire batch fails visual inspection – the scan operators are expected to perform their own QC prior to delivery and the Library will not accept responsibility if the operator fails to inspect their images properly.***

3 Complete Document (pdf)

4 Change History

Date	Rev.	Section	Type	Change
03/07/2007	.01	2.5.7 Table 4	Substantive, *Clarification*	*Deleted text in 305 notes field:* Capture software followed (if applicable) by ";" and post-capture processing software *Added text in 305 notes field:* It is acceptable for this field to include only the capture software. It is preferred that both capture and post-capture processing software (if applicable) are included and separated by ";".
03/07/2007	0.2	2.5.7	Editorial *Modification*	*Edited Title of Section 2.5.7 from*: "Proposed LoC Baseline Tags for TIFF Images "to "LoC Baseline Tags for TIFF Images."
03/07/2007	0.3	2.5.7	Editorial *Modification*	*Edited Title of Table 4 from*: "Proposed LoC Baseline Tags for TIFF Images "to "LoC Baseline Tags for TIFF Images."

Appendix VI:

NPS Report
Buffered and Unbuffered
Storage Materials

NATIONAL PARK SERVICE
DEPARTMENT OF THE INTERIOR

Conserve O Gram

July 1995 Number 4/9

Buffered And Unbuffered Storage Materials

Storing museum objects in archival-quality materials is essential for their long-term preservation. The housing enclosures used to store objects are usually in prolonged and direct contact with the object and form its immediate environment. It is essential that enclosures be made of archival-quality materials that are chemically stable. These enclosures also help to organize the collections; protect objects from light, dust, dirt, air pollutants, and handling; and provide some protection against sudden changes in temperature and relative humidity.

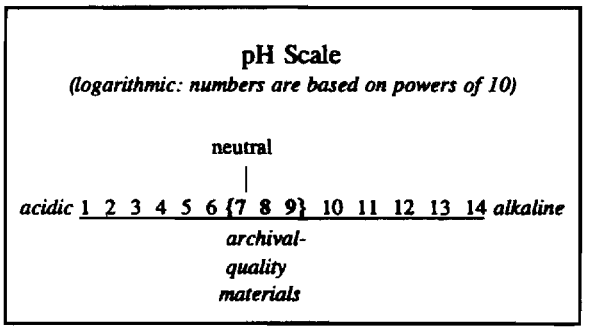
Paper products used for housing museum collections are available in a wide variety of types and sizes. Folders, envelopes, tissue paper, board, album pages, trays, and boxes are some of the many commercial paper products that are used in parks to house, store, display, and pack museum collections.

Paper was initially made by hand from rag (cotton or linen) which produced a strong, long-fibered paper. Since the 19th century, paper-making processes have produced inexpensive paper made from wood fiber. Most paper made from wood fibers contains lignin, which holds cellulose fibers together in the tree. Over time lignin deteriorates and produces acid that breaks down and weakens the paper. In addition, some paper is treated with alum-rosin sizing to control water absorption. This sizing produces sulfuric acid that can accelerate the deterioration process. Not only will poor-quality paper deteriorate but the acid produced during the deterioration process can migrate and contaminate the materials in contact with it.

Paper made from wood pulp can be chemically purified to remove acid-producing properties, resulting in a more stable paper. Over time, however, the residual chemicals used to purify paper, those used to improve the appearance of paper (for example, bleaching agents), and air pollutants can cause acids to form which may migrate to the object inside.

The term *acid-free* is generally used to describe the paper products recommended for object, archival, and manuscript storage. *Paper that is pH 7 or higher is considered acid-free.* Longer-lived acid-free papers are made with alpha cellulose stock and have little or no lignin.

The pH scale (below) measures the most acidic (pH 1) to the most alkaline (pH 14) with pH 7 being neutral.



Buffered Paper

Buffered paper products have an alkaline reserve, or buffering agent, added during production to alter the pH. Buffering protects the museum object against migrating acids. Calcium carbonate and magnesium carbonate are

the common buffering agents. Because this alkaline reserve depletes over time, storage containers that were once acid-free can become acidic. *Buffered paper is alkaline at about 7.5 to 8.5 pH.*

Unbuffered and Neutral Paper

Unbuffered acid-free paper products are neutral or slightly alkaline but do not contain an alkaline reserve. *Neutral paper has a pH of 7-7.5*, and does not contain acid. It has a limited capacity to absorb acids from the environment or from objects housed inside, whereas alkaline buffered materials can help neutralize acids as they form. (See *Conserve O Gram* 14/2, Storage Enclosures for Photographic Prints and Negatives.) Unbuffered acid-free paper is pH neutral at the time of manufacture; however, the pH value will drop when exposed to normal atmospheric conditions.

NOTE: Most objects can be safely housed in unbuffered neutral pH material (exceptions are listed in the table). ***When in doubt about the type of enclosure or container to use, an unbuffered neutral pH enclosure is recommended.***

The following table serves as a quick reference for the use of buffered or unbuffered products for the storage of objects. Refer to NPS *Museum Handbook*, Part I (Rev 9/90) for the specific types of storage enclosures and containers recommended for each object type and condition. Often, depending upon condition and stage of deterioration, similar objects should be placed in very different types of storage containers. Consult a conservator for advice if questions remain concerning proper housing.

Sources

NPS curatorial staff should refer to the current NPS *Tools of the Trade* for information on the various types of housing enclosures available.

Unbuffered neutral pH and buffered storage enclosures and containers can be purchased from archival-quality material suppliers, such as the following:

Conservation Resources International, 8000-H Forbes Place, Springfield, VA 22151; (800) 634-6932 or (703) 321-7730; Fax (703) 321-0629.

Gaylord Bros., Box 4901, Syracuse, NY 13221-4901; (800) 448-6160 or (315) 457-5070; Fax (800) 272-3412.

Light Impressions Corporation, 439 Monroe Avenue, P.O. Box 940, Rochester, NY 14603-0940; (800) 828-6216 or (716) 271-8960; Fax (716) 442-7318.

University Products, 517 Main Street, P.O. Box 101, Holyoke, MA 01041-0101; (800) 628-1912 or (413) 532-9431; Fax (800) 532-9281.

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Object Type	*Buffered Materials*	*Unbuffered Materials*	*Remarks*
Archeological Materials		Depending on the objects, many are housed in plastic such as polyethylene and polypropylene; use unbuffered tissue if padding is needed.	Buffered is not recommended because of the possibility of influencing research chemical analysis by placing object in an alkaline environment. See NPS, *Museum Handbook*, Part I (Rev 9/90), Appendix I, for storage guidelines.
Archival & Library	Books, damaged or rare, (house in archival rare book boxes) Flat documents Manuscripts Maps Most papers (with exceptions listed under unbuffered); Posters	Albums and collages with wool or silk components Blueprints Diazo reproductions Handtinted materials (maps, etc.) Friable media (especially pastel and charcoal) should be stored in shallow boxes.	Buffered materials are preferable for storage of archival items with exceptions listed at left under *Unbuffered*. Buffered materials can alter the pigment color, so when storing handtinted or other color friable media mounted on acidic board, place in unbuffered pH neutral enclosure with a slip sheet of buffered next to the acidic board.
Archival & Library: Photographic Materials	Cellulose-nitrate and acetate and early safety film negatives *NOTE*: Cellulose-nitrate is a fire hazard. The NPS policy for preserving it is by duplicating it onto safety film and storing the original in an appropriate storage facility. See NPS *Museum Handbook*, Part I (Rev 9/90), Appendix M, Curatorial Care of Cellulose Nitrate Negatives.	Monochrome processes, including: Albumen prints Ambrotypes Collodion prints Cyanotypes Daguerreotypes Gelatin prints Glass negatives Lantern slides Palladian prints Platinum prints Salted paper Sunprints Color images and negatives, including: Chromogenic photographs Dye transfer prints Polaroid prints	Current research indicates that buffered enclosures housing salted paper, albumen, gelatin, platinum and collodion-processed prints are *not* detrimental ***provided RH levels are maintained***. It is *not* necessary to *replace present* buffered enclosures with unbuffered materials for these media. Any materials used to store photographs should have passed the Photographic Activity Test (PAT). See *Conserve O Gram* 14/2, Storage Enclosures for Photographic Prints and Negatives.
Works of Art on Paper	Prints Drawings	Watercolors Handtinted prints, drawings and other art	
Ethnographic Materials	Cellulosic (plant-derived) materials: Bark Cotton Linen Paper Wood	Proteinaceous (animal-derived) materials: Antler, Quill Bone, Silk Horn, Skin Ivory, Wool Leather	Ethnographic objects are often complex and could contain materials sensitive to buffered environment. If in doubt, use unbuffered neutral pH materials. See also *Remarks* under ***Textiles*** below.

Object Type	*Buffered Materials*	*Unbuffered Materials*	*Remarks*
Film	Black/white motion picture film	Color motion picture film	*NOTE:* Cellulose nitrate film is a fire hazard. The NPS policy for its preservation is by duplicating it onto safety film and storing the original in an appropriate storage facility. See NPS Special Directive 93-2 "Preserving NPS Cellulose Nitrate Film Collections," and NPS *Museum Handbook*, Part I (Rev 9/90), Appendix M, Curatorial Care of Cellulose Nitrate Negatives.
Metal		Silver (Use acid- and sulphur-free tissue for wrapping to prevent tarnish.) Iron, lead, and other metals	Heavy, stiff tissue may scratch some soft metal; use a soft, neutral pH tissue.
Natural History Specimens	Herbarium collections	Insects (pinning trays) Skeletal material Birds and mammals	Does not apply to wet specimens except for label (unbuffered).
Textiles		All Textiles	Many references recommend buffered for plant derived material (cotton, linen) and unbuffered for animal derived material (wool, silk). The NPS Harpers Ferry Center Division of Conservation recommends that all textiles be wrapped in soft, unbuffered, neutral pH tissue. This recommendation is not based on chemistry, but is offered as a means to eliminate confusion because there are many buffered tissues. Many have hard, sharp corners when folded or crumpled and are too heavy or stiff for some fabrics.

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.

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