

RECORDS RETENTION STANDARDS

*Secretary of State,
Records
Management
Division*

Contents

Introduction.....	3
Public Records Commission.....	3
What is a Public Record?.....	4
Records Disposition Authorization (RDA).....	4
Electronic Record Standards	5
File Format Decisions and Electronic Records Management Goals.....	6
Documentation of Existing Electronic Records Systems	6
Essential Characteristics of Electronic Records	6
File Naming	7
E-Mail Management	9
Practical tips for managing e-mail	11
Digital and Electronic Signatures.....	12
Web Content Management.....	14
Tennessee State Library & Archive's Role in Web Site Archiving	16
Electronic Records Destruction	17
Long-Term Preservation	19
Digital Preservation Techniques	19
File Format Options	20
Types of Digital Storage Medi	24
Permanent Electronic Records in the Archives.....	26
Transferring Permanent Electronic Records to the Tennessee State Library & Archives.....	26
Microfilm Basics.....	28
What is Microfilm?	28
Microfilming Historic Value State Records.....	29
Types of Microfilm.....	29
Film Emulsions	29
Criteria for Using Microfilm Copies of Public Records.....	30
Microfiche.....	30
Microfilm/Microform Best Practices.....	31
Quality Control.....	39
Destruction	41
Paper Record Standards	42
Proper Storage of Paper:	42
How to Keep Short Term Paper Records (5-10 years).....	42

Long Term and Permanent Preservation of Paper Records (10+ years)	43
Proper Requirements for Permanent/Long Term Paper Records	44
Storage Methods for Permanent Paper	45
Caring for Archival Records during their Active Life Cycle	45
Preparing Records for Transfer to Tennessee State Library & Archives	46
File Management.....	48
Designing a File Plan.....	48
Filing Practices	49
Alphabetical Filing.....	49
Advantages of alphabetical filing:.....	49
Disadvantages of alphabetical filing:.....	49
Numerical Filing.....	49
Advantages of numerical filing include:	49
Disadvantages of numerical filing are:.....	50
Alphanumeric Filing	50
Advantages of alphanumeric filing:.....	50
Disadvantages of alphanumeric filing:.....	50
Essential Paper Records	50
Destruction	50
Glossary	51

Introduction

This document provides information for the proper maintenance of records in the three primary formats: electronic, microfilm, and paper. Guidance is included for the short term, long term, and permanent retention of records in each format. Information on preparation of records that will be transferred to the State Library & Archives is also included.

Public Records Commission

The Public Records Commission (PRC) was created by statute to determine and order the proper disposition of state records. TCA § 10-7-302, §10-7-303.

Members of the Public Records Commission include:

- Secretary of State
- Comptroller of the Treasury
- State Treasurer
- Director of Legal Services
- Commissioner of General Services
- Attorney General
- President of the Tennessee Historical Society

The PRC is authorized to direct the Department of State to initiate, through the Division of Records Management, any action it may consider necessary to accomplish more efficient control and regulation of record holdings and management in any agency. TCA § 10-7-302.

Records Management Division is implemented in order to:

- Aid and assist government officials in making informed policy and program judgments.
- Enable citizens to judge the conduct of the government by providing administrative, fiscal, legal, and historical accountability.
- Allow information to be open for observation and access, while safeguarding privacy and confidentiality.
- Assure the documentation of government actions.
- Maintain good business practices.

Public officials are legally responsible for creating and maintaining records that document the transactions of government business. These records provide evidence of the operations of government and accountability to its citizens. Public officials must maintain this information according to established Records Disposition Authorizations (RDA).

What is a Public Record?

Tennessee Code Annotated § 10-7-301 defines a public record or state record as:

All documents, papers, letters, maps, books, photographs, microfilms, electronic data processing files and output, films, sound recordings, or other material, regardless of physical form or characteristics made or received pursuant to law or ordinance or in connection with the transaction of official business by any governmental agency.

Records Disposition Authorization (RDA)

Your records management strategy should include records retention schedules for the various formats: electronic, microform, and paper records. A records retention schedule is a plan for the management of records listing types of records, how they should be maintained, and how long they should be kept. The purpose of a records retention schedule is to serve as an on-going authorization for the management and disposition of records.

Because they have similar responsibilities and organizations, Records Management Division has developed general records retention schedules called Statewides for all the records commonly created by agencies. You may also initially choose to develop a specific schedule for your agency. However, you must submit any proposed changes to the Public Records Commission for approval.

Electronic Record Standards

All electronic records systems, whether paper, microform, or electronically based, should be cost effective, easy to use, provide the required information when needed, and retain the records for the required length of time.

Electronic records systems are more vulnerable to undetected alteration, loss, or unauthorized disclosure of information, than are hard copy or microform systems. This vulnerability suggests the need for comprehensive and detailed planning before electronic records keeping systems are implemented, this part should be part of the procurement effort.

In addition, the maintenance of electronic records requires the careful management of procedures and equipment to ensure the continuing accuracy and availability of the records. This maintenance requirement needs to be considered during budgeting and planning.

Use of electronic records keeping system software requires careful application of sound records management principles. Systems' retention capabilities need to meet or exceed RDA requirements. Failure to adequately plan for the required storage will require more expensive changes or additions later.

Required Retention Period			
	0-5 years	5-10 years	10+ years
Non-Essential Electronic Records	<ul style="list-style-type: none"> Any appropriate storage system that meets Strategic Technology Solutions (STS) standards 	<ul style="list-style-type: none"> A Shared Directory on a secured and appropriately maintained file, MOSS, or SharePoint server The State's Enterprise ECM system or a functionally equivalent ECM system. 	<ul style="list-style-type: none"> The State's Enterprise ECM system or a functionally equivalent and appropriately maintained ECM system Tennessee State Library & Archives - permanent archival system
Essential Electronic Records	<ul style="list-style-type: none"> A Shared Directory on a secured and appropriately maintained file system, MOSS, or SharePoint server The State's Enterprise ECM system or a functionally equivalent system 	<ul style="list-style-type: none"> An appropriately maintained MOSS server The State's Enterprise ECM system or a functionally equivalent and appropriately maintained ECM system approved by the Information Technology Assessment and Budget Committee (IT-ABC) 	<ul style="list-style-type: none"> The State's Enterprise ECM system. A functionally equivalent and appropriately maintained ECM system approved by the Information Technology Assessment and Budget Committee (IT-ABC) Tennessee State Library & Archives – permanent archival system

Table 1 Electronic Records Storage System Selection Chart

File Format Decisions and Electronic Records Management Goals

The goals of electronic records management that may be affected by file format decisions include:

- **Accessibility:** The file format must enable staff members and the public to find and view the record. In other words, you cannot convert the record to a format that is highly compressed and easy to store, but inaccessible.
- **Longevity:** Developers should support the file format long-term. If the file format will not be supported long-term, you risk having records that are not durable, because the software to read or modify the file may become obsolete or unavailable.
- **Accuracy:** If you convert your records, the file format you convert to should result in records that have an acceptable level of data, appearance, and relationship loss.
- **Completeness:** If you convert your records, the file format you convert to should meet your operational and legal objectives for acceptable degree of data, appearance, and relationship loss.
- **Flexibility:** The file format needs to meet your objectives for sharing and using records. For example, you may need to frequently share copies of the records with another agency, use the records in your daily work, or convert and/or migrate the records later. If the file format can only be read by specialized hardware and/or software, your ability to share, use, and manipulate the records is limited.

Documentation of Existing Electronic Records Systems

Developing and maintaining up-to-date documentation about all electronic records systems is the role and responsibility of the agency Records Officer and /or Records Coordinators. Documentation is a written record detailing the design, functions, and operating procedures for a computer system.

Adequate documentation will:

- Specify all technical characteristics necessary to read and process the files.
- Identify all defined inputs and outputs of the system.
- Define the contents of the files and records.
- Determine restrictions on access and use.
- Provide an understanding of the purpose(s) and function(s) of the system and its records.
- Describe update cycles or conditions and rules for adding, modifying, or deleting information.
- Ensure the timely, authorized disposition of records.
- Ensure efficient and timely migration of data.
- Backup procedures

Essential Characteristics of Electronic Records

Managing and preserving electronic records can be challenging since they are easily revised, deleted, changed, and manipulated. If appropriate measures are not taken, the essential characteristics of records can be altered or lost in the preservation process. Careful planning and system design are required to guarantee that the essential characteristics of electronic records are both captured and maintained for the lifetime of the record.

The essential characteristics of electronic records are:

- **Content:** Information in the record that documents government business. Content can be composed of numbers, text, symbols, data, images, or sound. The information content of a record should be an accurate reflection of a particular business transaction or activity.
- **Context:** Information that shows how the record is related to the business of the agency and other records. Contextual information is crucial to the evidentiary function of records. If a record lacks key information about its creator, the time of its creation, or its relationship to other records, its value as a record is severely diminished or lost entirely.
- **Structure:** Appearance and arrangement of a record's content and technical characteristics of the record (e.g., file format, data organization, relationship between fields, page layout, style, fonts, page and paragraph breaks, hyperlinks, headers, footnotes). It is easier to preserve a record over time if it has a simple record structure. It is also advisable to base record structure on open standards to avoid dependence on a specific company or organization.

File Naming

Managing electronic files can be overwhelming if there is no organized method for naming and storing files. Efficient electronic filing practices help to ensure that files can be retrieved quickly and with the lowest possible cost.

File naming is an important part of managing any system of records. A file name is the principal identifier for a record. Having a unified naming system can help place records in context with other records as well as associated record series and retention schedules. Records that are named using a consistent, logical system can be more easily located and shared among users. Agencies may want to consider an agency-wide file naming policy as part of their strategy for managing electronic records and match state naming conventions as established by Strategic Technology Solutions (STS).

When developing a file naming policy, consider including as part of the file name some of the following common conventions:

- Version number (e.g., version 1 [v1, vers1])
- Date of creation (e.g., April 14, 2010 [04142010, 04_14_2010])

- Name of the creator (e.g., Edward N. Johnson [ENJohnson, ENJ])
- Description of content (e.g., media kit [medkit, mk])
- Name of intended audience (e.g., general public [pub])
- Name of group associated with the record (e.g., Committee ABC [CommABC])
- Release date (e.g., released on March 24, 2008 at 10:30 a.m. eastern time [03242008_1030ET])
- Publication date (e.g., published on December 31, 2009 [pub12312009])
- Project number (e.g., project number 625 [PN625])
- Department number (e.g., Department 126 [Dept126])
- Records series (e.g., Series2036)/ RDA #)

The following issues should also be considered when developing a file naming policy:

- Access and ease of use: The policy should be simple and straightforward. A simple policy will help staff members logically and easily name records and help ensure that records are accessible to staff members and/or to the public. A simple policy will be more consistently used, resulting in records that are consistently named and thus easier to organize and access.
- Ease of administration: The policy should work with your computer infrastructure, so that you can monitor policy compliance, manage records and records series, gather metadata (metadata in the context of records management is data describing context, content, and structure of records and their management through time), and perform other administrative tasks easily and in compliance with all legal requirements. For example, if all the records in a specific record series are easily identifiable by file name, they will be easier to gather and manage.
- Uniqueness. To avoid file names conflicting when they are moved from one location to another, each record's file name should be unique. Having multiple files with the same name is confusing and there is the danger that a file might automatically overwrite another file with the same name. How you arrive at unique file names will require some thought. Once you have developed a system, it is important to standardize and adhere to it.
- Version control: Determine how and whether to indicate the version of the record.
- Sometimes current and obsolete drafts are put in different electronic file folders without altering the file name. However, when these records are moved from the active electronic file folder to another storage area, identical file names may conflict and cause confusion.
- Scalability: Consider how scalable your file naming policy needs to be. For example, if you want to include the project number, don't limit your project numbers to two digits, or you can only have ninety-nine projects.
- Persistence over time: File names should outlast the records creator who originally named the file. With good staff input, and training, you should be able to develop file names that

make sense to staff members once the file creators are no longer available.

- Reference to the appropriate RDA: The RDA will provide essential information on types of records and how they should be name appropriately.

E-Mail Management

E-mail messages, both sent and received, that provide evidence of a government transaction are considered records. Agency Records Officers must ensure that e-mail is organized for convenient retrieval, maintained, and disposed of in accordance with an approved Records Retention Schedule, and remains accessible as technology is upgraded or changed. The effort to develop and implement an e-mail management policy is the responsibility of each agency and involves a cooperative effort between records management staff, administration, legal counsel, and information technology departments. While Strategic Technology Solutions (STS) is involved in many aspects of records management, such as server maintenance and destruction of backup tapes, it is the responsibility of the Records Officer to part of the creation and dissemination of the agency's e-mail management policy.

Some examples of public record e-mails include policies and directives, correspondence or memos pertaining to the agency's business, work schedules and assignments, documents circulated for approval or comment, and any message that initiates, authorizes, or completes a business transaction, final report, or recommendation. Not all e-mail messages, however, are considered records.

Personal messages or announcements, courtesy or reference copies, routine chat on e-mail listservs, and announcements of social events are all examples of non-record e-mail correspondence. These lists are by no means inclusive.

E-mail messages are subject to the same retention requirements as all other records. This means that there are no set retention periods for e-mails as a format type. Instead, retention periods for e-mail vary according to the information contained within the message as well as the function the message performs. As mentioned above, Tennessee Code Annotated 10-7-301 defines records by their content, not their format. E-mail, like paper, is a format. The life cycle of a record is determined by its Records Disposition Authorization. For records that are not classified as correspondence, review the appropriate retention schedule to determine the applicable retention and disposition period.

Email records are also subject to the same legal requirements regarding access as other government records. In addition, e-mail records are subject to the same accessibility requirements as any other public record, unless they fall within the exemptions provided under the Tennessee Open Records Act. Requests from the public for e-mail records must be honored in the same manner as other public records. E-mail records, like all other public records, must remain accessible during their entire retention period and should be maintained in a manner that permits efficient and timely retrieval. Developing a standardized system of document naming and filing, along with planning for indexing and retrieval points, will assist an agency in maintaining the accessibility of all e-mail messages

throughout the required retention period.

Some state agencies have decided to adopt a proactive and collective approach to e-mail retention by adding a common archive e-mail folder to all of their users' e-mail accounts. This folder contains subfolders, each labeled with a different record type created by that agency. Users can "drag and drop" e-mail messages that are considered public records into these folders on a daily basis. When an agency's e-mail records reach the end of their retention period, they can easily be transferred to the Library & Archives, retained by the agency, or disposed of according to the applicable retention schedules.

More frequently, individuals are personally responsible for the records they create, including e-mails received and sent as well as any attachments. Individuals should be aware of any general or specific retention schedules that apply to their e-mail records and they must file, retain, and dispose of these messages accordingly. Many e-mail programs now include an auto-archiving function, which is not recommended for use, as e-mails are not maintained according to an approved Records Disposition Authorization. When retaining e-mail, any records management system must take into account the importance of metadata. Without this information, much of the original context in which the record was created is lost. Complete e-mail records must include all of the following elements, most of which are included in the Internet mail header:

- Names and e-mail addresses of recipients, including names and addresses of all members of distribution lists
- Name and e-mail address of sender
- Time and date that the e-mail was sent
- Subject line that describes the content of the e-mail
- Text in the body of the e-mail
- Attachments, if applicable

E-mails may be printed and maintained in paper instead of electronic format; however, all of the information above must be included in the paper copy. Often, two users may send a long string of e-mails to one another about a particular topic. In this case, only the last e-mail in a chain must be retained as long as the previous e-mail interactions appear as part of the record. This reduces the number of duplicate records and saves server space.

In addition, it is important for agencies and localities to consider e-mail security and develop procedures to provide security for e-mail so that it cannot be altered or deleted intentionally or unintentionally. E-mail records stored online should be backed up regularly to protect them from system failures, tampering, or deletion. Backup procedures should be coordinated to ensure that no copies of e-mail records are maintained after their retention period expires. Records Officers should work with their Information Services Division to ensure that all copies of a record are destroyed at the end of its retention period.

Practical tips for managing e-mail

1. Clean up your e-mail

Agency personnel are responsible for managing e-mails, including sent and received messages. The following are suggestions for managing your e-mail:

Delete e-mails that do not need to be retained as public records, such as out-of-office responses, meeting announcements, and listserv correspondence. Start by performing a search for the following words or phrases: accepted, declined, tentative, out of office, FYI, or meeting.

It is not always necessary to retain e-mails in which you are not the primary recipient. If an e-mail is internally generated and sent to a primary recipient within the agency, the e-mail should be maintained by the primary recipient. The secondary recipients, that are those in the CC line, may filter out and delete the e-mail. If an e-mail is sent from a source external to the agency and an individual within the agency is copied, that e-mail may be the only copy within the agency and it should therefore be retained.

- Sort messages by sender for easy identification and purge personal correspondence.
- Retain only the final e-mail in a thread, as long as the entire thread is contained in the final e-mail.
- Be sure any attachments are also saved.
- Permanently delete items in your Deleted Items folder on a regular basis. You may also bypass the Deleted Items folder and delete items permanently in Outlook by highlighting the appropriate messages and holding down the Shift and Delete keys simultaneously.
- File your e-mail regularly. Once you have read and responded to an e-mail, place it in one of your e-mail folders, or delete it according to the appropriate retention and disposition schedule. Remember to file or delete sent items as well as received items.

2. Set up an archiving system

Because of mailbox size limitations in most organizations, e-mails should only be stored within electronic mail systems temporarily. In addition, if this method is in use, e-mail accounts must not be deleted until a supervisor certifies that all public records in the e-mail accounts have been transferred to another record-keeping system or that any retention periods have passed and there is no litigation, audit, investigation, or request for records pursuant to the Tennessee Open Records Act. There are three methods of archiving e-mail communications outside of the e-mail system:

Create personal folders that are stored outside of your mailbox but can be viewed using your e-mail client. If you store e-mail on a shared drive, make sure drives are backed up properly on a regular basis. Store, access, and manage e-mail messages and other electronic records using an Enterprise Content Management system (ECM), such as IBM FileNet.

Print e-mails and maintain them in a manual system. Include names and e-mail addresses of

recipients and sender; time and date sent; subject line that describes the content of the e-mail; text; and attachments, if applicable. If an e-mail is sent to a distribution list, include names and addresses of all members of the list.

Regardless of the chosen approach, make sure folders are named and arranged logically, just as they would be in a paper filing system. Organizing archived e-mail in folders according to records series and fiscal or calendar year facilitates the monitoring of records retention and disposition. In addition, never password-protect an e-mail archive, as doing so may result in retrieval issues in the future.

Keep in mind that there is a difference between archiving and AutoArchiving within Microsoft Outlook. Archiving involves a manual transfer by the user and AutoArchiving is an automatic process that, if turned on within Outlook, takes place at regular intervals. Rather than using the AutoArchiving function, users should set aside time to clean up mailboxes and archive appropriate folders manually.

3. Dispose of e-mail appropriately

E-mail, like all other records, may be disposed of in one of three ways: destruction, maintained permanently in agency ECM, or transfer to Library & Archives.

E-mail that does not contain confidential or privacy-protected information may be disposed of by deleting it from the e-mail system. For e-mails containing confidential or privacy-protected information, be sure that you electronically shred the e-mail or wipe clean the media on which it resides. E-mail destruction should be reported on a Certificate of Records Destruction. Work with your STS department to ensure all duplicate copies, which may reside on servers or backup tapes, are also destroyed.

Digital and Electronic Signatures

The manner and format by which digital and electronic signatures will be used in state government will be reviewed and approved by Strategic Technology Solutions (STS).

Digital signature is a specific type of electronic signature that relies on the technology of cryptography to authenticate the signer's identity and ensure the integrity of the signed document. A digital signature is bound to the document being signed using a mathematical algorithm such that any modification of the document after it is signed can be detected.

Electronic signature is defined as an electronic sound, symbol, or process, attached to or logically associated with a record and executed or adopted by a person with the intent to sign the record. An electronic signature must be attributable (or traceable) to a person who has the intent to sign the record with the use of adequate security and authentication measures that are contained in the method of capturing the electronic transaction (e.g., use of personal identification number or personal log-in identification username and password), and the recipient of the transaction must be

able to permanently retain an electronic record of the transaction at the time of receipt.

Objectives:

1. Ensure that digital signatures are implemented using a standard information technology architecture for interoperability of documents across government.
2. Ensure that documents and/or transactions signed using a digital signature can be reproduced over time to meet statutory requirements.
3. Facilitate online business processes that require a high degree of “trust” (identity authentication) between the parties and the “integrity” of the transaction.
4. Promote the cost effective use of electronic and digital signature technologies to provide business solutions commensurate with the value and risk to the business process.
5. Define the responsibilities of information systems management and users in the use of electronic and digital signature technologies.

This applies to the use of all electronic and digital signatures regardless of computing platform, type of software utilized (custom developed or commercial off the shelf product), procured, acquired, or hosted by a third party.

Implementation:

1. Develop statewide standards, procedures, and guidelines necessary for the implementation of electronic and digital signatures in state government.
2. Provide management and technical consulting to state agencies in planning for and utilizing electronic and digital signature technologies.
3. Provide for the ongoing technical review of electronic and digital signature technologies and legislation in order to forecast changes needed in state policy.
4. Provide for administrative review of the policies, standards, procedures, and guidelines in light of technical, procedural, or statutory changes that may occur in the use of electronic and digital signatures.
5. Define the responsibilities of information systems management and users in the use of electronic and digital signature technologies.

Agency shall:

1. Establish agency policies, standards, procedures, and guidelines pertaining to the implementation of electronic and digital signatures consistent with statewide policies and standards.
2. Educate users on the policies, standards, procedures, and guidelines related to the use of electronic and digital signatures.
3. Provide for agency administrative review of the policies, standards, procedures, and guidelines in light of technical, procedural, or statutory changes that may occur in the use of electronic and digital signatures.

Individual Users/Clients shall:

1. Adhere to statewide and agency policies, standards, procedures, and guidelines pertaining to the implementation of electronic and digital signatures in state government.
2. Refrain from behaviors that would expose the confidential nature of authentication and/or integrity components of electronic and digital signature technology to unnecessary or unauthorized risks.

Web Content Management

Government websites contain records that document public transactions just like paper records and, as a result, a website must be retained like any other record. However, due to the volatile nature of websites, web record retention has remained a challenge for archivists and records managers across the country. Static sites are common, especially in government, where policies, procedures, and public notifications posted on Web pages change frequently but not dynamically.

In addition to traditional websites, social networking applications such as Facebook, YouTube, and Twitter, and other social media technologies, including but not limited to; websites, Really Simple Syndication (RSS), Blogs, and Wikis, are used increasingly for government business. New uses imply different types of content, possibly with different records management considerations. Regardless of the differences in the timeliness, presentation, context, or completeness of information yielded by the various web applications, web content may be a record and should be managed as such. The Tennessee State Library & Archives strongly suggests agencies consider the recordkeeping implications of these tools before implementing them so that they have a plan to manage the content according to a Records Disposition Authorization.

Tennessee State Library & Archive's approach to the preservation of web content, context, and structure combines the need for record retention and disposition policies with the desire to preserve a website's format (look and feel) for historical and reference purposes.

An agency's web records are composed of all publicly available information on the agency's External website (Internet) and records on their Internal websites (Intranet), as well as information they may have created on any additional websites. Each of these sites contains records that need to be managed.

- **External Website:** An intranet is an internal website which is only accessible to persons within an organization. These may have additional roles and responsibilities which grant or deny access to users.

In order to document a website properly, several factors must be taken into consideration and the

following elements retained:

- **Content:** The actual HTML-encoded pages themselves and additional content files referenced therein or content created by end users interacting with the website. Analyze the pages of the website to determine which elements constitute public records.
- **Context:** Administrative and technical records necessary for or produced during the management of a website. Maintenance of these records provides a context for web operations, which attests to the reliability, authenticity, and integrity of an agency's website.
- **Structure:** For those websites that have been appraised as records, a site map indicating the arrangement of a website's content pages and software configuration files of content management systems. Structure also includes technical characteristics of the record (e.g., file format, data organization, page layout, hyperlinks, headers, footnotes).

Consider creating a file-naming protocol for web pages to help ease management of the site. Having a common taxonomy is important because it maintains consistency between web, database, and ECM systems. In addition, because websites are updated frequently by various people and groups, develop a method for designating and controlling versions. This practice will help ensure that website content remains trustworthy.

Traditional records management techniques easily apply to relatively stable contextual and structural website records. Managing web page content is much more complex. Web pages are fluid in nature, and when updates or redesign of website maps change the organization of web content, it may be deemed necessary to set aside a new record-keeping copy of website content.

Like e-mail messages, websites should be maintained according to a Records Disposition Authorization based on the content they contain rather than their format. A website may contain any number of record types, including but not limited to meeting minutes, annual reports, photographs, press releases, maps, organizational charts, policies and procedures, and mission statements, for example. Different formats exist even within web pages, such as text, image, audio, or video files.

Just as individuals are responsible for maintaining other electronic records according to Record Retention Schedules, so are they responsible for ensuring that the information they place on their websites is available elsewhere in another format. If a record is only available on a website, the website is considered the record copy, which must be retained according to the appropriate retention schedules based on the content it contains. Web pages, therefore, are not considered record copies as long as the information contained within them is retained elsewhere. However, websites with original content generated using social media technologies, such as public blog comments, Facebook posts, or YouTube video responses, may need to be managed as records if they fit the definition of a public record as defined in the Tennessee Code Annotated.

Tennessee State Library & Archive's Role in Web Site Archiving

Tennessee State Library & Archives collects, preserves, and provides access to all websites of Tennessee's state government agencies in the executive, legislative, and judicial branches of government as described in this guideline. State government websites are selected for inclusion based on intellectual content, research and educational use, and long-term benefit to the citizens of the state.

A state government website is defined as the collection of all files identified by a state government domain for the purpose of providing publicly available information, affording access to government services, and/or conducting the state's business. Large, complex Web sites may span multiple servers and domains but are unified by Tennessee government-related content.

All websites selected will be collected and preserved in the formats in which they were primarily distributed to the public. They will be made accessible from the Library & Archive's catalog and/or website, as well as from the Archive-It website, a subscription service of the Internet Archive, a non-profit organization founded to build an Internet library offering permanent access for researchers, historians, and scholars to historical collections that exist in digital format.

Library & Archives will collect the following websites:

- All executive, legislative, and judicial branch state agencies, commissions, and boards as listed in The Report of the Secretary of State (i.e., the Blue Book)
- All independent state agencies
- All statewide constitutional officers (e.g., Office of the Governor, Office of the Lt. Governor, and Office of the Attorney General), the Governor's Cabinet Secretaries, and the First Lady
- Gubernatorial initiatives and special projects

Websites are collected on an established schedule, which is currently monthly for statewide constitutional officers, the Governor's Cabinet, gubernatorial initiatives, and the First Lady. All other Web sites will be crawled quarterly. In the occurrence of significant public safety and health incidents or other noteworthy events, Library & Archive may, at its discretion, alter the crawling frequency of state agency Web sites.

The Library will not collect:

- Public or private college and university websites. Due to the size and the access restrictions of these web resources and because of existing Tennessee State Library & Archives practices, these sites will not be archived.
- Non-state agency websites. In general, captured Web sites will contain only state government information. Non-state government websites may be considered for capture if they contain significant state government information and assist in the formation of government policy.

Tennessee State Library & Archives has partnered with the Internet Archive to collect, preserve, and provide access to the Library's web archive collections to the best of its abilities via the Archive-It service. Web content is harvested using the Heritrix Web crawler and archived content is indexed and searchable via the Internet Archive's Wayback Machine.

As a general rule, simple, static web pages are the easiest to archive. Limitations to capturing and playing back archival web content are as follows:

- When a dynamic page contains forms, JavaScript, images, streaming media, or other elements that require interaction with the originating host, the archived pages might not contain the original site's functionality.
- Database-driven websites can be very difficult to harvest. For example, if you need to fill in a form to get access to the content, such as with a search box, the harvester typically cannot retrieve the content.
- Password-protected sites cannot be accessed by the crawler and therefore will not be archived. The Archive-It Web crawler does not apply to locality websites.
- JavaScript elements often are hard to archive and even harder to display in the Wayback Machine, especially if they generate relative links (links that do not contain the full address of the linked page).
- Website owners can specify files or directories to be excluded from a crawl and can even create specific rules for different automated crawlers. All of this information is contained in a file called robots.txt. The Archive-It tool respects robots.txt. exclusion headers. However, the Library is mandated to collect all state documents, some of which are now available in electronic form only. It is suggested that website owners using robots.txt enable the Library's Archive-It service to crawl their sites while preventing other entities from doing so by allowing crawls by archive.org_bot only. In the example below, the Archive-It crawler is allowed into the site, but all other crawlers are not.

```
User-agent: archive.org_bot
```

```
Disallow:
```

```
User-agent: *
```

```
Disallow: /
```

If a problem should occur during regular crawls, the Library will make every effort to contact site owners to be sure that they allow the Archive-It crawler to have appropriate access to their site.

Electronic Records Destruction

Electronic records may be destroyed only in accordance with an approved Records Disposition Authorization. In addition, custodians of records must ensure that information in confidential or

privacy-protected records is protected from unauthorized disclosure. "Deletion" of confidential or privacy-protected information in computer files or other electronic storage media is not acceptable. When a record is "deleted," only the index to the record is actually destroyed instead of the document itself. To be effectively disposed of, electronic records must be overwritten with meaningless data, also known as "electronic shredding," or the storage media on which the records are housed must be physically destroyed. All copies of a record (electronic or otherwise) that have reached the end of their retention periods must also be destroyed, including copies on backup tapes and in off-site storage. As with all aspects of electronic records, electronic records destruction necessitates good communication between records managers and information technology personnel.

Methods of Destruction

1. Digital Shredding

Digital shredding is a viable, in-house electronic records destruction method that uses software erasure programs to overwrite files with meaningless data. Limitations of this method include the following:

- Defective hard drives cannot be erased.
- There is no way to ensure visibly that erasure has been successful.
- It is a time-consuming process and subject to human error.
- Erasure tools require upgrades.

2. Degaussing

This method of destruction involves equipment that applies a strong magnetic field to magnetic media that erases all recorded data. As storage devices are typically degaussed one at a time at the rate of one minute per device, degaussing is a much more time-effective destruction method than digital shredding. Limitations of this method include the following:

- There is no way to ensure visibly that degaussing has been successful.
- Equipment creates large magnetic fields that may damage other surrounding devices.
- Different types of media require magnetic fields of varying strengths.
- Degaussing only works on magnetic media, not optical media.

3. Physical destruction of storage media

Often the most popular method of destroying electronic records is to erase or delete the data from the tape, disk, or other storage medium so that it can be reused. Software exists, however, that can extract deleted data even after it has been overwritten. For confidential or proprietary records, the safest method of destruction is to destroy the physical media itself. Depending on the volume of

storage media to be destroyed, agencies may want to use outside vendors.

Limitations of this method include the following:

- Shipping records to outside and off-site vendors creates possible security problems.
- Shredded equipment may be difficult to dispose of as it may be considered environmentally controlled waste.

The best option for an agency might also be a combination of two destruction methods.

Long-Term Preservation

Government entities generate large amounts of electronic records in various formats. Many of these records are useful only for a short period of time, but others are considered archival and thus need to be kept permanently. To ensure the reliability of these records with continuing value over time, establish and implement a preservation plan. Since electronic records create access challenges, preservation plans for electronic records must consider the limitations of storage media, the probability of hardware and software obsolescence, data degradation, and the ways in which information may potentially be used.

When developing a preservation plan, first conduct a needs-analysis to help guide decision-making. How records are used will aid in determining appropriate preservation options as well as the types of metadata that will be most useful to create with the records.

Decide whether a record must be kept in electronic format or whether there is another cost-effective option for long-term storage. For example, a word processing document could be printed on paper, which might take up more physical space but would not require further migration or conversion. Printing a copy of a Web site, however, would result in the loss of majority of its functionality. If an agency chooses to retain custody of permanent electronic records, the agency assumes responsibility for maintaining their reliability, authenticity, integrity, and usability.

It is also important to ascertain if access to certain data in the records is restricted by statute, such as the Tennessee Open Records Act and other state and federal laws. Long-term storage and access policies must address these obligations.

Digital Preservation Techniques

Preservation plans for electronic records must consider the probability of hardware and software obsolescence and guarantee long-term access to records. Proprietary software will eventually become obsolete as companies upgrade or stop producing the product altogether. There are several approaches, some more practical than others, to ensure that electronic records remain useful over time.

One approach is **emulation**. Emulator programs simulate the behavior, look, and feel of other programs, thus preserving the functionality of the records in their original format without the necessity of saving the original equipment and software. Emulation, however, has so far proved more attractive in theory than in practice. There are few examples of success using this approach, and costs have been shown to be high. It has a further limitation in that, at best, emulation simply

reproduces earlier, less- sophisticated versions of an application.

Another approach to preservation is **encapsulation**. It involves combining the object to be preserved with all of the necessary details on how to interpret it within a wrapper or package, all possibly formatted in XML. While appealing in its comprehensiveness, encapsulation has several drawbacks: file sizes are large because of all of the included information; format specifications must be determined; the encapsulated records must somehow be generated, usually separate from the act of record creation; and the encapsulated records must still be migrated over time.

The most common approach to preserving electronic records involves a combination of two other techniques: migration and conversion. **Migration** is the process of moving files to new media (also known as "media refreshing") or computer platforms in order to maintain their value. **Conversion** entails changing files from one format to another and may involve moving from a proprietary format, such as Microsoft Word, to a nonproprietary one such as a plain text file or XML. To avoid losing data in the process, testing and analysis should determine exactly what changes will occur and whether they are acceptable. With both migration and conversion, special attention must be paid to maintaining the accessibility of associated metadata. When properly planned and executed, the migration and conversion approaches represent the easiest and most cost-effective preservation methods available today. A discussion of file format and media options to consider when migrating or converting records follows this section.

One challenge of converting files is that data may be lost. Data compression is the process of encoding information using fewer bits. Compression saves storage space and enables data to be transmitted quickly and easily, but data may be lost as a result. Compression also introduces an additional layer of software dependency. Compression options vary in their degree of data loss. Some are intentionally "lossy," such as the JPEG format, which relies on the human eye to fill in the missing detail. Others are designed to be "lossless."

There are three basic types of loss that may occur during conversion or migration:

- *Data*. If data is lost, the content of the record is lost to a varying degree.
- *Appearance*. Converting records may alter the formatting of the file. For example, converting all word processing documents to RTF may cause some loss of page layout. Determine whether this loss affects the completeness of the record. If the structure is essential to understanding the record, this loss may be unacceptable.
- *Relationships*. Relationships within the data in a file, such as spreadsheet cell formulas and database file fields, may be lost.

File Format Options

File formats quickly become obsolete as technology continually advances, making long-term preservation strategies, such as reformatting, vital. Proper advanced planning can mitigate risk and ensure that legal standards are upheld, and operational requirements are met.

A file format is often described as either proprietary or nonproprietary:

- *Proprietary formats.* Proprietary file formats are controlled and supported by just one software developer. Proprietary formats, such as Microsoft Word files and WordPerfect files, carry the extension of the software in which they were created.
- *Nonproprietary formats.* These formats are supported by more than one developer and can be accessed with different software systems. For example, eXtensible Markup Language (XML) is a popular nonproprietary format.

The software in which a file is created usually has a default format, often indicated by a file name suffix, such as PDF for portable document format. Most software programs allow creators to select from a variety of formats in which to save a file, including document (DOC), Rich Text Format (RTF), and text (TXT). Some software, such as Adobe Acrobat, is designed to convert files from one format to another.

Basic file format types include the following:

1. *Text files* are most often created using word processing software. Common file formats for text files include Rich Text Format (RTF) files and Portable Document Format (PDF) files.
2. *Graphics files* store images, such as photographs and drawings, and are divided into two basic types:
 - A. Vector-based files store images as geometric shapes in mathematical formulas, which allow images to be scaled without distortion.
 - B. Raster-based files, also referred to as bitmapped images, store images as a collection of pixels and cannot be scaled without distortion.
3. *Data files* are created in database software programs. Data files are divided into fields and tables that contain discrete elements of information. For example, a customer service database may contain customer names, addresses, and billing history fields. These fields may be organized into separate tables. Data files can be converted to a text format, but relationships among the fields and tables may be lost. Converting data files to the Comma Separated Value (CSV) file format allows aspects of the formatting and field names to be preserved.
4. *Spreadsheet files* store the value of the numbers in their cells, as well as the relationships of those numbers. For example, one cell may contain the formula that totals two other cells. Like data files, spreadsheet files are most often saved in the proprietary format of the software program in which they were created. Spreadsheet files can be exported as text files, but the value and relationship of the numbers are lost. Converting data files to the Comma Separated Value (CSV) file format allows aspects of the formatting and field names to be preserved.
5. *Video files* contain moving images, such as digitized video and animation. These files are most often created and viewed in proprietary software programs and stored in proprietary formats. Currently, best practices in the preservation of video leans towards storage on analog or digital videotape and a consistent migration plan to refresh the media.
6. *Audio files* contain sound data. These files are frequently used in customer service environments to capture audio telephone recordings as well as to track key strokes of

customer service representatives, allowing these conversations to be re-created at a later time. Audio files in mp3 or other compressed formats should be converted to a preservation format. Broadcast wave format (.WAV) is considered a type of preservation format for audio files.

7. *Markup languages*, also called markup formats, contain embedded instructions for displaying or understanding the content of a file. The World Wide Web Consortium (W3C) supports these standards. Currently, eXtensible Markup Language (XML) is the most favorable format choice for long-term preservation and use of electronic records. XML, an international standard since 1998, is a human-readable, self-describing markup language that is independent of hardware and operating systems. Because of its infrastructure-independent quality, XML is a great solution for refreshing and sharing record content. In order to use and benefit from XML, agencies must plan for certain up-front costs and time expenditures. Its structured nature, however, makes XML suitable for eventual automation and will enable the use of future open formats.

File Format type	Common Formats	Sample Files	Description
Text	PDF, RTF, TXT, proprietary formats based on software (e.g., Microsoft Word)	Letters, reports, memos, e-mail messages saved as text	Created or saved as text (may include graphics)
Vector Graphics	DXF, EPX, CGM	Architectural plans, complex illustrations	Stores the image as geometric shapes in a mathematical formula for undistorted scaling
Raster Graphics	TIFF, BMP, GIF, JPEG	Web page graphics, simple illustrations, photographs	Stores the image as a collection of pixels that cannot be scaled without distortion
Data File	Proprietary to Software Program	Human resources files, mailing lists	Created in database software programs
Spreadsheet File	Proprietary to Software Program DIF	Financial analysis statistical calculations	Stores numerical values and calculations
Video and Audio Files	QuickTime, MPEG	Short video to be shown on a Web site, recorded interview to be shared on CD-ROM	Short video to be shown on a Web site, recorded interview to be shared on CD-ROM
Markup Languages	SGML, XML, HTML, XHTML	Text and graphics to be displayed on a Web site	Text and graphics to be displayed on a Web site

Table 2 Standard File Formats. Please reference Appendix A for additional File Format Guidelines

File format decisions may affect electronic records management in the following ways:

- *Accessibility*: The file format must enable users to find and view the record. Records cannot be in a format that is highly compressed and easy to store if that format makes the record inaccessible.
- *Longevity*: The file format should be supported for the long-term. Proprietary software developers may not be able to ensure long-term support, thus increasing the risk of records' becoming inaccessible.
- *Accuracy*: Converted records should retain all the significant detail of the originals. The converted file should minimize data, appearance, and relationship loss.
- *Completeness*: Converted file formats should meet operational and legal objectives of existing standards for an acceptable degree of data, appearance, and relationship loss.
- *Flexibility*: The file format must meet objectives for sharing and using records. If the file format can only be read by specialized hardware and/or software, the ability to share, use, and manipulate records is limited.

State Agencies must ensure access to electronic records for the entire length of their retention period. This means that users must be able to find, open, and read all records throughout their lifetime.

Consider digital storage options that enable accessibility through migration and/or conversion of records throughout their required retention period. The longer the retention period the higher cost associated with the maintenance. This will also require regular documented quality checks.

In order to determine the best long-term storage medium for records, examine the current volume of stored records, along with the size of the record files and any metadata associated with them. Next, estimates projected record volume, and take into account any data access and security requirements.

There are three basic records storage options:

- *Online storage*: Records are available for immediate access and retrieval. Online storage devices include mainframe storage and network-attached storage. Online storage provides the fastest access and regular integrity checks.
- *Nearline storage*: Records are stored on media such as network-attached storage, optical disks in jukeboxes, or tapes in automated libraries. Nearline storage provides faster data access than off-line storage at a lower cost than online storage.
- *Off-line storage*: Records are stored on removable media such as magnetic tape or optical disk. Because human intervention is necessary, this option provides the slowest access.

Essential, long-term, or archival electronic records should be stored utilizing online or nearline storage options. The advantages of online and nearline storage include large storage capacities and the opportunity for data replication. Off-line storage devices are not recommended for record copies of essential, long-term, or archival records, as they are less likely to be routinely accessed and are often overlooked when systems are upgraded, and electronic records are migrated to new formats. Off-line

storage is recommended for backups or security copies, however, as the records can be stored off-site.

Types of Digital Storage Media

All storage media have finite life spans that are dependent on a number of factors, including manufacturing quality, age and condition before recording, handling and maintenance, frequency of access, and storage conditions. Under optimal conditions, the life expectancy of magnetic media ranges from 10 to 20 years, while optical media may last as long as 30 years. In less than ideal conditions, however, media life expectancies are significantly less.

The storage capacity of digital media is measured in bytes, the basic unit of measurement:

1,024 bytes	=	1 kilobyte (KB)
1,024 KBs	=	1 megabyte (MB)
1,024 MBs	=	1 gigabyte (GB)
1,024 GBs	=	1 terabyte (TB)
1,024 TBs	=	1 petabyte (PB)
1,024 PBs	=	1 exabyte (EB)

Access to digital information on digital media is divided into two types:

- *Sequential*: Sequentially ordered digital media requires the user to access preceding information in order to arrive at a specific point. For example, to view a specific portion of a videotape, a user must first fast-forward through the preceding portion of the videotape.
- *Random*: Some digital media allow users to access the stored information from any physical place on the media. For example, users can access any single file stored on a computer disk without having first to access all the files that precede it.

Digital media are divided into three types:

1. *Magnetic*: Electronic information is stored on computer drives, disks, or tapes by magnetizing particles imbedded in the material. Magnetic media include:
 - A. *Magnetic disks*, such as computer hard drives that store programs and files, are randomly accessed. Fixed disks reside permanently in a drive while removable disks are encased in plug-in cartridges, allowing for storage and transfer of data.
 - B. *Magnetic tape* is a sequential storage medium used for data collection, backup, and archiving. Common magnetic tape formats include Digital Audio Tape (DAT), Digital Linear Tape (DLT), and Linear-Tape Open (LTO).
2. *Optical*: Digital data is encoded by creating microscopic holes in the surface of the medium. Optical media can be utilized but not highly recommended due to the dangers of data loss, susceptible to physical damage, and lack of security.

Optical media options include:

- A. *Compact Discs (CD)* can be read-only (CD-ROM), write once read many (CD-R), and rewritable (CD-RW). CDs can hold roughly 700 MB of data.
- B. *Digital Versatile Discs (DVD)* are also called digital video discs. The data they store do not have to be in video form, however. DVDs can hold between 4.7 GB and 17.0 GB of data. Common types of DVDs include:
 - *DVD Random Access Memory (DVD-RAM)* is a rewritable disc that provides 4.7 GB per side storage capacity.
 - *DVD-R* has the same storage capacity as DVD-RAM, but can only be written to one time.
 - *DVD+R* is a writable disc with 4.7 GB of storage capacity on either side.
 - *DVD-RW* offer 4.7 GB per side, but can be overwritten 1,000 times. The DVD- RW technology is mainly used for video.
 - *DVD+RW* is an alternative rewritable format that has a capacity of 4.7 GB per side and is used for both data and video content.
3. *Solid state:* With no moving parts, a solid state device uses electronics instead of mechanics. These devices are much faster and more reliable than magnetic and optical media. However, long term storage capabilities have not been fully determined and some of the options carry security risks. Solid state devices include:
 - A. A computer's BIOS (Basic Input/Output System) chip
 - B. PCMCIA Type I and Type II memory cards, which are used as solid-state disks in laptops
 - C. Flash and Dynamic Random Access Memory (DRAM-based) solid state drives
 - D. CompactFlash, SmartMedia, or Memory Stick, which are most often found in digital cameras

When choosing digital storage media, each option's performance characteristics must be evaluated in relation to the users' records management needs. Consider:

- How quickly users need to access the records. Some types of records require quick retrieval, while others do not.
- The volume of records that can be stored on the medium. Examine the current volume of the records and try to determine future needs.
- How long the industry will support various media options and compare those figures with the time period that records must be kept according to the approved records retention schedule. A medium that meets many needs but is not widely used or has a high risk of becoming obsolete has limited long-term value.
- How easily a given medium can be damaged or will deteriorate. A medium that deteriorates after three years might be a suitable option for records that need to be retained for only one year.
- The types of file formats a medium can store. For example, a CD or a DVD can store graphics, text, audio files, and video files.

- The backward and forward compatibility of the digital media. A backward compatible component retains the functionality of an older component. Forward compatibility refers to the ability of the media to read information created for later versions. DVD-ROM drives are backward-compatible to CD-ROMs, but a CD-ROM drive is not forward-compatible to DVD-ROMs. This assessment will help determine how often to upgrade supporting systems, migrate and/or convert records.
- Costs and benefits of each medium, including the cost of converting and/or migrating records.
- Security risks and limitations.

Permanent Electronic Records in the Archives

Tennessee State Library & Archives will accept the transfer of permanent electronic records from state agencies on a case-by-case basis. Agencies are responsible for all permanent public records created and maintained during the course of business, regardless of the record's format. With assistance from the Records Management Division, each organization will establish appropriate methods to maintain the authenticity, integrity, and accessibility of these records until their official transfer to the permanent Library & Archives collection. Library & Archives staff highly recommends that organizations create and implement a records policy, as well as train staff on the proper methods for maintaining public records.

The transfer of electronic records for permanent archival storage requires extensive planning and scheduling. Library & Archives must take into account the volume, hardware requirements, software accessibility, file type, potential file degradation, reference rate, and data migration in determining resources necessary for each permanent record series. This will require agencies to plan out the process of transferring electronic records to Library & Archives. Once a record series is scheduled to be transferred to Library & Archives a detailed plan should be created between the two agencies. Until the records are transferred to Library & Archives it is the agency's responsibility to maintain and safeguard the electronic records.

If an agency chooses to retain custody of any permanent records eligible for transfer to Library & Archives, it will assume the responsibility for maintaining that record. The agency must maintain these records in a manner that preserves its authenticity and integrity, as well as ensures its continued accessibility. Records stored electronically require a migration plan to ensure that access is not interrupted by degradation or by hardware, software, or media obsolescence.

Transferring Permanent Electronic Records to the Tennessee State Library & Archives

If records have been designated as archival by the Library & Archives staff and will be added into the permanent collection, an agency must follow these procedures for transfer. These procedures do not include electronic back-up tapes or essential information created and maintained for internal use only.

- 1) Review appropriate Records Disposition Authorization and locate the series for the records. The schedule will indicate which records series have a permanent retention and may be or are required to be transferred to Library & Archives.
- 2) Upon receiving transfer approval, send a completed Sample List to Library & Archives. (Although

most electronic transfers will be on physical media tape and/or optical disc, under certain circumstances other transfer options may be available.)

Physical media can be transferred to Library & Archives similarly to traditionally formatted records. Arrangements for delivery or pickup will be made by Library & Archives. Be sure to remove all password protection applied to any files prior to copying to the transfer media.

Records custodians will remain responsible for the security of the media and the information contained on them until an official transfer to the Library & Archives is complete.

- 3) Following the initial transfer of records to Library & Archives all electronic files will be quarantined and inspected. Do not delete or destroy any electronic files identified as permanent prior to official notification from the Library & Archives indicating that the inspection process has been concluded and a re-transfer of the files is not required.

Please refer **Appendix B** for “File Formats for Transfer of Electronic Records to Tennessee State Library & Archives.”

Microfilm Basics

What is Microfilm?

A micro image is an image that is too small to be seen by the naked eye. Microfilm is used to preserve and protect information that has long term or permanent value. Microfilm is a storage option that reduces physical storage space, a method of high volume distribution media, and is used to reduce the dependency on voluminous computer reports.

Microfilm systems are less voluminous than paper and satisfy the requirements of long-term storage. They provide a mechanism for disaster recovery, and have established standards for creation, use, and storage.

Pros

- Less voluminous than paper (high density)
- Satisfies requirement of long-term storage media
- Human readable
- Low maintenance (periodic inspection required)
- Easily duplicated
- Mechanism for disaster recovery
- Established standards for creation and use

Cons

- Requires specific equipment to view/print
- Requires specific storage environment for the master
- Conversion cost
- Not an easily updateable media (interfile and expunge)

Records that may be well-suited for conversion to microfilm (either in addition to, or in replacement of, the paper) are often have long retention periods, need to be accessed from a central location, require a mechanism of disaster recovery, or have historical value.

Examples include:

- Deeds, easements, encroachments, right-of-way
- Vital records (birth, death, marriage, divorce certificates)
- Criminal records
- Licensing files
- Court records
- Board and commission minutes and agenda materials
- Drawings and maps
- Annual financial ledgers
- Records that are subject to statutory or require secure off-site storage

Microfilming Historic Value State Records

Records with historic value are those deemed to be State archives and are identified as such in an approved RDA. Historic records that must be retained permanently should be transferred to Tennessee State Library & Archives at the end of their active life.

The microfilming of historic records normally occurs to ensure the ongoing preservation of the original, where the original will continue to exist after filming to ensure legibility and readability. Minimizing the need to repeat microfilming over time is crucial.

Types of Microfilm

Microfilm – A roll of photographic images, similar to a roll of movie film. The standard sizes are 16mm and 35mm. 35mm is generally used for engineering drawings and 16mm for letter sized documents. The storage capacity for a roll of film is 2,400 letter sized pages or 600 drawings.

Aperture Cards – (also known as Hollerith cards) this is a 35mm chip of microfilm embedded in a punch card. The punch card is coded with the indexing information for the image. Using a punch card allows for mechanical sorting of drawings. The capacity is one drawing per card.

Microfiche – All microfiche are a series of micro images on a flat sheet of 105mm film arranged in a grid pattern. The most common size of microfiche now being produced measures 4 x 6 inches (105mm x 148mm).

Film Emulsions

Although there are many types of film, three are most commonly offered to libraries by micropublishers and suppliers. Microforms come in a number of formats. The most familiar of these are 16mm or 35mm roll microfilm and microfiche, the latter resembling a plastic file card. Roll microfilm, in either 16mm or 35mm formats, can be cut into short strips and housed in clear "jackets" to produce a microfiche. Three types of film are common in microform collections: silver-gelatin, diazo, and vesicular.

- *Silver Halide*- A specific type of silver gelatin film composed of very finely divided grains of silver. Silver halide is the most light-sensitive of all the films used in microforms hence it can record the greatest amount of detail and provides the richest tonal variance. It provides the most faithful reproduction of the source document. If properly prepared and properly stored, silver halide polyester microforms have a 500 year life expectancy (LE-500). Silver halide is suggested for permanent records.
- *Diazo* -The generic name for films composed of light-sensitive diazonium. Ammonia fumes are used in the chemical processing of the exposed diazonium salts to produce azo dyes. The azo dyes of some diazo films may be subject to fading and loss of image. These films are frequently blue-black, purple-black, or brown-black in color, compared with the gray tones of silver halide.

Diazo films are very unstable in the presence of light and will fade easily, even when film is heavily used on microfilm readers. Diazo films are not considered archival quality and are primarily used for frequently used records. Diazo films on polyester base and stored properly have a 100 year life expectancy (LE-100) and are less costly than silver halide.

- *Vesicular*- is a generic term for films having images consisting of small bubbles or vesicles. Vesicular film uses diazonium salts. Vesicular films are not chemically processed; rather heat is used to develop the vesicles that harden into images as the film is processed. All vesicular film is polyester-based. Vesicular film typically has light-blue tone and is considered fairly scratch-resistant; however, with heavy use or in the presence of high heat from readers, the bubbles can collapse or deform, distorting the images.

Criteria for Using Microfilm Copies of Public Records

The following criteria are required in using microfilm copies of public records:

- The original camera film (master) of records created for permanent retention should never be used for reference purposes. An intermediate silver master should be created and used to produce additional user's copies. The user's copies may be either silver or diazo depending upon the quality of the original documents and camera negative film.
- Adequate measures shall be taken to keep microfilm clean and minimize the amount of scratches during any inspection and duplication process. Care shall be used when handling any silver copies of any microfilm.

Microfiche

Most microfiche produced today for archival purposes is created from computer-generated tapes. This is called COM (computer-output microfilm). Roll film can also be produced from COM. Microfiche format is generally not used for the permanent storage of archival material, but there are exceptions.

The original silver camera negative should be duplicated, and the duplicate used to make the user microfiche jacket. The camera negative should then be sent to the State Records Center as the archival film.

- *Resolution:*
90 lines and 4.0 patterns
- *Density:*
.8 to 1.2 for all film except computer-output-generated film, which can go as high as 1.8

The fiche you submit for storage should be free from fingerprints or any other foreign substances, free from scratches in the emulsified areas, and free from microbiological growth and chemical reactions (redox). It should contain all necessary information as requested below and the records filmed should be unobscured. In meeting these requirements, you or your vendor should conduct a visual check of your fiche using a light box and an eye loupe. The **camera negative fiche** should **not** be placed in a reader to make the necessary inspection. As an alternative, if light-boxing is not possible, you can produce a working copy from the camera negative that can then be used on a reader to verify that the

camera negative meets the requirements.

Microfilm/Microform Best Practices

As part of a good record-keeping routine, permanent microfilmed records should receive proper care and attention. Permanent microform should be clearly labeled and kept in an orderly manner in clean and safe storage areas with appropriate environmental conditions. Microfiche should be inserted in individual sleeves. In keeping with preservation maintenance practices, these microforms should be kept in acid-/lignin-free microfilm boxes and microfiche envelopes.

Standard Operating Procedures

- Equipment testing requirements and frequency
- Document preparation functions common to all record collections
- Index data and film backup
- Access and security
- Administration and maintenance
- Audit trails
- Disaster recovery
- Employee safety

Microfilm Production

Record keepers can decide to produce their microfilm in-house, to hire a vendor to produce microfilm for them, or they can use a combination of both methods. There are a variety of microfilm formats, including Computer Output Microfilm (COM), microfilm jackets, aperture cards and microfiche. Multiple factors should be considered when selecting a microfilm format, including physical characteristics of the paper, viewing equipment, indexing, and organization of the content. Format evaluation should be incorporated into the feasibility and needs assessment process.

- *Resolution:*
90 lines and 4.0 patterns for 16mm film
90 lines and 6.3 patterns for 35mm film
120 lines and 5.0 patterns for 16mm film
120 lines and 3.2 patterns for 16mm film generated from digital scanning
- *Density:*
.8 to 1.2 for all film except computer-output-generated film, which can go as high as 1.8
- *Media:*
Multiple types of film media can be used when creating microfilm. It is often desirable to create both an original (master) film for preservation purposes, and a duplicate film for daily use. The original (master) film can be used to create new duplicate film if the initial duplicate film is lost or damaged.

- *Original (Master) Film:*
Selecting the correct microfilm stock is vital when the record has long-term retention requirements. Other (older) film stocks may be deficient in their chemical composition, and therefore may be unable to meet long-term retention requirements. Film with a life expectancy of 500 years is known as LE-500 film. Only polyester based silver gelatin film LE-500 should be used to create original (master) film.
- *Duplicate Film:*
A significant advantage of the various microforms is the relative ease and low cost of duplication. It is important to note that use of film on a routine daily basis should be performed from duplicate rolls created from the camera original. Evaluation of the need for duplicates should be incorporated into the feasibility and needs assessment process. Duplicate films may be silver- gelatin film, diazo film, or vesicular film. Diazo film is the recommended and preferred type for usage film. Duplicate copies for daily use should be made if the film will be handled more than 10 times during its lifetime.

Guidelines for Handling and Inspecting Microfilm

The total microfilming system should be evaluated to ensure that the micro-images produced conform to the standards. The final reproduction, whether film or photoprint from the film, must be retrievable, readable, and reproducible. The following criteria are required in handling and inspecting the microfilm:

- Clean, lint-free, white cotton or nylon gloves should be worn when handling the film. The microfilm should also be handled by the edges.
- Food, smoking and other contaminants should not be allowed in the microfilm production and quality control areas.
- The camera microfilm should be handled only during the inspection procedure, editing stage, and when generating an intermediate master. In systems generating two rolls of camera negative simultaneously, one should be designated as the archival camera microfilm. As designated "archival" film, it should not be used for duplication, loaded into a cartridge, or inserted in a reader or reader/printer.
- In systems generating a single camera microfilm, the roll of film should be used only for the production of an intermediate master.
- Splicing is not permitted with certain exceptions. The images are to be spliced at the beginning of the reel before all beginning targets but after the clear leader. For procedural recording or other coding methods, splicing can be done in place on the intermediate master up to a total of five splices. An unexposed area of film must be used between the splice and the beginning title targets. Ultrasonic splicing is recommended for polyester film. The splicing should be done so that it does not impair the integrity of images nor interfere with blip or other code methods. There should be 24" leader of clear film for each roll of film
- Due to the required filming procedures, more than five splices within a single 16mm reel are permitted for procedural microfilming. However, each days filming sequence should be discarded and re-filmed when defects obliterating or obscuring information or missing pages are noted within that sequence.

The following equipment and supplies should be purchased to maintain a quality control program:

Densitometer - an instrument for measuring the photographic density of an image on a film or photographic print.

Microscope (minimum resolving power 100x) - an optical instrument used for viewing very small objects- 1,200

Eye loupe - a simple, small magnification device used to see small details more closely
Light box with rewinds - device used to make a copy of a single fiche or aperture card
Inspection gloves - white cotton gloves used for protection of film when handling

Resolution targets - used to measure the accuracy or performance of an imaging system for using applications such as microscopy or imaging.

The camera microfilm shall be handled only during the inspection procedure and when generating an intermediate master. In systems generating two camera microfilms, one shall be designated as the archival camera microfilm and shall not be used for duplication, loaded into a cartridge, or inserted in a viewer. The second camera negative shall be designated as the working master. In systems generating a single camera negative, the camera negative shall be used only for the production of an intermediate master from which copies will be generated.

Preparing to Transfer Microforms

Tennessee public records with enduring administrative, fiscal, historical, or legal value are considered archival, and many are scheduled for transfer to Tennessee State Library & Archives for permanent retention. The transfer process is one part of an effective records management program and plays an integral role in supporting Library & Archives in meeting its goals of preservation and access. It is important to review the Records Disposition Authorizations in order to identify which records are permanent and may ultimately be transferred to Library & Archives. As part of a good record-keeping routine, these records should receive proper care and attention prior to their eventual transfer.

The transfer of microforms for permanent archival storage requires extensive planning and scheduling. Due to the nature of managing archival collections, it is often advantageous for Library & Archives to create the microform from the original records (paper or electronic) rather than utilize microform created by the agency. This will require agencies to plan out the process of transferring the original records to Library & Archives. Once a record series is scheduled to be transferred to Library & Archives a detailed plan should be created between the two agencies. Until the records are transferred to Library & Archives it is the agency's responsibility to maintain and safeguard the records.

Ideally, the submitting state government agency should batch its jobs to match the number of images that will fit on a reel of microfilm. Refer to the following requirements for batching records for transfer. Only one record series or one item number from a records retention schedule should be placed in a batch. It is crucial that the exterior of all boxes be properly labeled to ensure that they are easily accessible. No files or documents should be split between batches. The submitting agency must retain a copy of all files submitted to Library & Archives until the agency has been notified that the transfer to microfilm has been successfully completed. Size of batch will vary based on reduction ratio for the reel and machine used for conversion. Contact vendor to verify number of images that will fit on each roll of film.

1. Review Records Disposition Authorizations

Find the appropriate Records Disposition Authorizations and locate the disposition for the records on microform. The schedule will indicate which records series have been listed for permanent retention and are eligible or required to be transferred to Imaging Services.

2. Order boxes and microfiche envelopes

All microfilm sent to Library & Archives for storage should be placed in acid-/lignin-free boxes. This helps to ensure stable, long-term storage of the film. For microfiche, use acid-/lignin-free envelopes and fiche boxes.

3. Pack boxes

Arrange and pack reels into boxes by records series, volume/file number, and reel number. Insert the microfiche into an individual acid-/lignin-free envelope by records series, volume/file number, and fiche number.

4. Label microfilm boxes

It is crucial that the exterior of all boxes be properly labeled to ensure that they are easily accessible.

Quality

The film you submit for storage should be free from fingerprints or any other foreign substances, free from scratches in the emulsified areas, and free from microbiological growth and chemical reactions (redox). It should contain all necessary targets or information as requested below and the records filmed should be unobscured. In meeting these requirements, you or your vendor should conduct a visual check of your film using a light box, rewinds, and an eye loupe. The **camera negative film** should **not** be placed in a reader to make the necessary inspection. As an alternative, if light-boxing is not possible, you can produce a working copy from the camera negative that can then be used on a reader to verify that the camera negative meets the requirements.

Reduction Ratio

The reduction ratio is the relationship between the dimensions of an original and the dimensions of the corresponding microcopy. For example, reduction ratio is expressed as 24:1. The degree of reduction should be chosen after considering all of the system requirements.

Due to the variety of sizes and types of documents that can be microfilmed, it is not practical to specify which reduction ratio should be used. Any reduction ratio selected should result in producing the legibility and quality requirements identified in the sample test for quality. If the reduction ratio is changed within a roll, the camera operator should indicate the change on a film target.

- Size, line width, quality, and contrast of the characters
- Size and shape of the original documents.
- Number of generations of film to be produced

- Resolution capabilities of the camera
- Size of film being used
- Magnification and image rotation capabilities of available viewing equipment
- Size and shape of screen on viewer
- Resolution and contrast characteristics of film being used for duplicates

A lower reduction ratio will typically provide higher image quality. Tradeoffs exist between image quality, storage density, and film usage. If image quality alone is considered, larger images are usually better. A larger image is generally more tolerant of poor quality original documents and other microfilm variables such as density fluctuations, camera vibrations, and resolution loss.

Document Preparation

Preparation of records prior to microfilming is critical to the success of the microfilm solution. Care should be taken in the preparation, content, and arrangement of original records for microfilming to ensure that a true, accurate and complete reproduction is created. The functional steps in the preparation may include but may not be limited to:

- Remove all staples, paper clips or other fastening devices
- Repair all torn or damaged documents
- Remove creases or folds for the pages so that no information is covered or lost
- Identify any significant categories or subcategories of the collection prior to filming
- Identify and locate missing or misfiled documents
- Arrange the documents in the order in which they are to be microfilmed
- Ensure that only pages of a single records series will be contained on any single roll of film.

Microfilm/Microfiche Storage

It is recommended that original microfilm of public records be stored in a fire resistant vault, room, or storage facility. This storage must not be used as an office or working area. No flammable material or chemicals shall be stored in this area. For full protection against fire and its associated hazards, fire-resistant safes or insulated containers should be placed within fire-resistant vaults or rooms constructed in accordance with recommendation of the National Fire Protection Association.

The storage protection required in each case will differ in degree according to the cost of providing storage facilities, the desired record life, and the frequency of record use. Storage conditions shall be chosen within specified limits in order to obtain a satisfactory compromise between the degree of protection required and the practical consideration of immediate availability.

Film Storage

- (1) Residual thiosulfate levels that are sufficiently low (1.4mg/cm³), and
- (2) Film is stored in an environmentally controlled storage facility. An environmentally controlled facility should meet the following minimum requirements:

- Original (or security) film should be kept in a separate building from the duplicate or working copy.
- The storage room must be separate from other types of storage, offices or work areas.

- The storage room must be equipped with a fire alarm system.
- Film should be maintained in a constant cool environment, with temperatures not exceeding 70 degrees.
- Humidity of the storage facility must be maintained at 35% +/- 5%.
- Dissimilar films (silver, diazo, vesicular) should not be housed in the same storage container or cabinet.
- Film should be contained in acid free cardboard boxes or inert plastic containers.

Routine film inspection should reveal harmful reactions. At a minimum, each year a random sample of not less than 2% of the total number of rolls should be examined to determine if deterioration is taking place. Each successive year the sampling population should include new rolls and the balance of the rolls not examined during the previous year. Older films should be inspected more frequently.

Storage Containers

Rolls of photographic film should be stored in acid/lignin free film boxes to provide protection against dirt and physical damage. The acid/lignin free box shall contain buffer with less than 3% calcium carbonate.

Proper temperature and humidity should be maintained with good ventilation and clean air in the storage area. Films of different generic type (for example, diazo and silver gelatin) should not be stored together because of possible chemical reactions. Film of different generic types should not be wound on the same roll or stored in the same area.

The size and placement of the film box label and printed information should be consistent with the container. The surface of the label should readily accept writing with an ink pen, a common graphic pencil, or the addition of a sticker. The label should include the following minimum information: name of agency/locality, record series, and dates of the records series, volume numbers, file numbers, reel number and producer.

Contamination

Testing for residual thiosulfates that are a common component of the fixer should be a part of the standard operating procedures for processing microfilm. If residual thiosulfate levels are sufficiently low and film is stored in an atmospherically correct environment, film can be expected to meet the long term storage definition. However, improper storage conditions or inadequate rinsing of film will accelerate the REDOX process. Film life expectancy can be negatively influenced by two chemical processes, REDOX and the "vinegar syndrome."

REDOX is rust on the film surface that impacts the stability of the silver used to create the image. Silver degeneration on the film surface can be caused by failure to wash fixer from the film during original processing.

Overtime, the microfilm may become unreadable. For many years acetate compounds were the base material of microfilm. Acetate was a substantial improvement over earlier bases. Yet microfilm with an acetate base may degenerate by chemically separating the emulsion from the base. Unfortunately, this is a normal reaction of the acetate reducing to acetic acid (which has the smell of vinegar), causing the separation of base from the emulsion. This is called the vinegar syndrome. Fortunately, most film

manufacturers stopped using acetate as a base material in the late 1980's. Acetate film created prior to 1990 should be examined to detect this syndrome.

Contaminated microfilm should be replaced with either duplicate microfilm or with scanned digital images. Scanning will cost more than duplication and should only be considered if retrieval is high.

Environmental Conditions

The relative humidity of the storage area must not exceed 40 percent. Temperatures must not exceed 70 F (21 C). Rapid and wide range cycling of humidity or temperature should be avoided and should not exceed 5 percent relative humidity or 5 F in a 24-hour period. If the inactivity of the film permits protection may be increased by conditioning and sealing the film at a lower humidity. Storing the film at a lower temperature may also be done. Film stored at a relative humidity below 30 percent or a temperature lower than 60 F (16 C) should be sufficiently warmed and conditioned before use to avoid any possible damage. If possible, approximately 0.05 inches of pressure above atmospheric pressure should be maintained in the room or vault and in the film inspection area by means of an independent air- conditioning system.

Control of Air Conditioning

Air conditioning should be kept under sufficient control to meet the standards for temperature and humidity. Dehumidifiers using desiccants may be used if they are equipped with filters capable of removing dust particles and maintaining relative humidity. Humidification before storage is not necessary unless the relative humidity in storage areas is less than 15 percent for long periods of time.

Protection against Air Entrained Impurities

Solid particles that abrade film or react on the image should be cleaned from the air supplied to microfilm storage and associated rooms by the use of dry media mechanical filters or electrostatic precipitators. These filters should have an arrestance or cleaning efficiency of at least 80 percent when tested with atmospheric air.

Gaseous Impurities

Such gaseous impurities as sulfur dioxide, nitrous oxide, peroxide, and hydrogen sulfide that may cause deterioration of microfilm should be removed from the air. Silver-gelatin microfilm should not be stored with other types of film, either in the same room or in rooms connected by ventilating ducts, because gases given off by the non-silver - gelatin microfilm may damage or destroy the safety bases film.

Deteriorating Film

An agency having microfilm of public records should prepare a silver duplicate to replace the original when it finds that the original copies are deteriorating.

Reel and Cores

Microfilm stored in roll form shall be wound on cores or on reels. The materials used for the cores and reels should be plastic compounds that do not give off reactive fumes or emissions during storage. Paper strips or rubber bands must not be used to fasten film onto reels or cores. The materials used should not ignite, decompose, or develop reactive fumes or vapors.

Methylene Blue Test

This test is required periodically (minimum monthly) to determine whether the film has been processed properly for archival retention. Silver-gelatin film used to make micro photographic copies of long-term, permanent, or archival records must be processed so the residual thiosulfate ion concentration is within archival limits. Thiosulfate is a chemical used in developing microfilm. When not adequately removed by washing during processing, such residue can consume the emulsion of the film and result in permanent damage.

All microfilm using agencies must perform methylene blue testing to measure the residual thiosulfate on microfilm developed on each processor. The methylene blue testing method measures the concentration of a blue dye that is formed during the testing procedure. The amount of dye indicates amount of residual thiosulfate remaining on the film.

All methylene blue testing must conform to the specifications of ISO 18917:1999. Residual thiosulfate ion concentration must be greater than zero but must not exceed 1.4 micrograms per square centimeter in a clear area

File Naming

File-naming requirements are critical to the production of quality and useful microfilm. The retrieval of the images on microfilm will be difficult if they are not sorted as anticipated. Not all computers sort lists the same way.

- File names should be no longer than 25 characters and must be alphanumeric with no special characters. Allowable characters in file and folder names include letters, numbers, and underscores.
- Do not leave blank spaces in the file name.
- When using numbers, make sure that the number of characters is consistent to ensure that these are accurately sorted by the computer. For example:

Indexing

When filming original documents, all indexes, registers, or other finding aids, if created, the standards require them to be microfilmed in the first frames of the first roll of a series, the last frames of the last roll of a series or in the last frames of the last microfiche of a series. Indexing may also refer to the placement of flash cards or dividers that are microfilmed in order to facilitate rapidly locating specific information on a roll of film. Indexing may also take the form of a database or spreadsheet that helps identify the specific location of an image, or series of images, on a roll. Each reel of film should be indexed, either by means of a self-index or an externally created index.

Page numbering, chronological order, alphabetical order, or any other readily apparent organizational system inherent in the submitted images will self-index a reel of microfilm. Lacking that, an agency may submit an external index for inclusion on the microfilm.

Agencies may create a database to serve as an external index for submitted information when, for example, the files do not follow chronological or numerical order (e.g. case files that are not completed in numerical sequence).

The use of an external electronic index without submitting a copy to be converted to microfilm is not recommended because it counteracts one of the primary benefits of creating microfilm from digital content—protection from technological obsolescence.

Targeting

Targets are used to identify the records being filmed, to serve as finding aids to those records, to conduct quality assurance tests on the film, and to provide the certification needed to ensure that the filmed records will be accepted in court in lieu of the original records. In order for each reel to be appropriately targeted:

- State agency submissions must include the full name of the submitting agency, with all of the organizational layers named; the record's item number from an active records schedule; title of the records: the date, page, or other range of content information for each reel; and a digital image of any external indexes.
- Local agency submissions must include the name of the submitting county or municipality; the name of the board, council, department, or agency; the title of the records; the date, page, or other range of content information for each reel; and a digital image of any indexes.

Splicing and Retakes

The standards require a single roll of film to contain no more than one splice and no more than three retakes. Splices can be made using heat, ultrasonic or splice tape manufactured specifically for that purpose. Splices are to be butt splices not overlap splices. If tape splices are used, no rubber-based adhesives shall be contained in the tape material.

If during the normal inspection process, it is determined that errors in the filming process have taken place, it is permissible to corrected images on a separate roll of film and then add the corrections to the end of the original roll. Any such corrections must be clearly identified both on the roll itself and on the label of the roll. The corrective film should contain a list of the retaken images in front of the images being added. The splice should be made no less than 6 inches from the End of Roll Target. A single re- take may contain a single image or multiple consecutive images (as displayed on the original film); however, the splice should not contain more than 2 feet of images in total. A splice in the film should not be made at any point between the start target and the end target. Splicing should be used only for corrective purposes.

Quality Control

Records **MUST** be scanned and verified in a systematic and consistent fashion that ensures a complete and accurate copy of the source record. Records that are not completely and accurately captured must not be destroyed. Agencies should develop written quality control procedures and work instructions to ensure a consistent capture of complete and accurate copies of original records. Train all staff with scanning responsibilities to ensure that they adhere to these requirements and procedures.

Examples of specific quality control procedures are:

- Enhancements or other manipulations of the scanned images (such as de-skew, de-speckle,

- etc.) in order to improve the quality of the resulting image.
- Routine use of scanning targets to verify configuration settings.
- Visual comparisons and inspections of each imaged record and source document, or of selected images and source documents.
- Regular calibration and testing of systems and scanners.
- Periodic checks that the indexing/metadata is accurate and appropriate.
- In instances where a complete and accurate image cannot be obtained and verified, the source document must be retained for the entire minimum retention period (and the image should be labeled or tagged as “best scan possible”).
- In instances where the content of the source document is not completely legible (faded receipt, coffee stain covering information, etc.), the source document must be retained for the entire minimum retention period. (If the image is *more* legible than the source document, retention of the source document is not necessary.)

Imaged records must be protected against alteration and/or deletion, damage, or loss throughout the entire retention period. Specific protective measures may include, but are not limited to:

- Establishment of security protocols, and approved administrators and users.
- Employment of system checks and error-checking utilities.
- Implementation of back-ups and disaster preparedness measures.
- Storage of a regular backup at least 50 miles off-site to enable recovery and access to the imaged records in the event of a wide-spread disaster or emergency

Imaged records are to be destroyed only after the minimum required retention period as specified by the approved records retention schedule currently in effect.

Reminder: If images are not verified for completeness and accuracy, the source documents must not be destroyed. Instead, the source documents must be retained for their entire minimum retention period.

Records must not be destroyed when required for:

- Existing public records requests
- Ongoing or reasonably anticipated litigation
- Other legal requirements, federal statutes, grant agreements, etc.
- Archival transfer

If changes to the records retention schedules have occurred between the digitizing of the record and their planned destruction, and those changes have altered the minimum retention period (or the archival designation) of the imaged records, agencies must follow the current approved records retention schedule.

Agencies should refer to RDAs for the timeline of destruction of imaged records. This includes following a regular and systematic schedule for destruction processes. These practices should be consistent with the agency’s procedures for the lawful destruction of public records in other formats.

Destruction

It should be noted that original records of both temporary and permanent value cannot be destroyed after microfilming prior to their stated retention period. Punching a hole in the image, blotting out the image with any type of ink or marker or by chemically removing the image should not be conducted because it may damage surrounding images. Any duplicates in existence should be recalled, destroyed, re-duplicated from the corrected original and re-issued. It is required that a destruction certificate be maintained that details the reason for destruction, the date of original filming, and the date of destruction. The destruction certification should also indicate that the original and all copies have been destroyed.

Destruction of Microfilm

Once records have reached the end of their retention period they should be destroyed. When a vendor is used to destroy microfilm containing confidential information a staff member of the agency should witness the destruction. Recommended destruction methods include incineration, shredding, and dump site burial. However, best practice for the destruction of microfilm is shredding. According to federal standards, records must be shredded to 3/16 of an inch or less, to guarantee they cannot be reassembled.

Agencies should document the destruction of both paper and scanned records. Documenting the destruction of public records, including scanned images, provides agencies with evidence to prove that they retained their records for at least the minimum retention periods.

Agencies will want to document that the paper was converted and destroyed lawfully under the appropriate disposition authority, and that the images are also destroyed lawfully once the retention requirements have been met.

Paper Record Standards

Proper Storage of Paper:

- Good storage significantly prolongs the preservation of paper materials and includes:
- Maintaining a stable environment is important since fluctuations in temperature and humidity pose more of a threat to records than steady, but less-than-ideal temperatures. Stable temperatures around 68° F and a relative humidity of 35 to 50 percent are acceptable for storage areas that must house records in both paper (avoid attics, basements, and other locations with high risk of leaks and environmental extremes)
- Smoke detectors, fire alarms connected to a 24-hour monitoring station, and appropriate fire-suppression systems provide a good line of defense against records destruction by fire
- A well-trained staff and close communication with fire department personnel enhance fire safety
- Minimal exposure to all kinds of light; no exposure to direct or intense light
- Distance from radiators and vents
- Supportive protective enclosures
 - Supportive protective enclosures include: acid- and lignin-free folders, mats, and document boxes (all available alkaline buffered or neutral pH); and polyester film sleeves that are stiff enough to adequately support the paper(s) within. Alkaline buffered storage materials provide a desirable neutralizing effect on acids that are inherent in works on paper, especially as paper ages, but be aware that some media found on paper objects may be sensitive to alkaline pH. Polyester film has the benefit of being clear, but does not contain an alkaline buffer and with little friction readily produces an electrostatic charge that can lift powdery media such as pastel, charcoal, pencil, and flaking paint.
- Unfolded and flat or rolled storage for oversized papers
- Individual/isolated storage of acidic papers to prevent acids from migrating into the other paper documents

Take proper care when handling paper by:

- Having clean hands and a clean work area
- Keeping food and drink away
- Using pencil, not ink, to make any necessary marks or inscriptions; in addition, only make inscriptions when the paper is on a clean, hard surface, to avoid embossing the inscription into the paper, which will be visible from the other side
- Not using paper clips, other fasteners, "dog ear" folding to mark or organize leaves folds and creases which can weaken that paper
- Not using rubber bands, self-adhesive tape, and/or glue on paper

How to Keep Short Term Paper Records (5-10 years)

According to Tennessee Code Annotated 10-7-301 (6), Public record or records or state record or records means all documents, papers, letters, maps, books, photographs, microfilms, electronic data processing files and output, films, sound recordings, or other material, regardless of physical form or characteristics made or received pursuant to law or ordinance or in connection with the transaction of official business by any governmental agency.

No records may be disposed of, erased, or destroyed without approval of an RDA from the Public Records Commission (PRC). These guidelines, along with any approved RDA, are intended to authorize the expeditious disposal of records possessing only brief administrative, fiscal, and legal, research, or reference value, in order to enhance the efficient management of public records.

Examples of those records include:

- Facsimile cover sheets containing only transmittal information, or information that does not add significance to the transmitted material
- Routing slips or other records that transmit attachment
- Personal messages not related to official business
- Preliminary or rough drafts containing no significant information that is not also contained in the final drafts of the records
- Documents downloaded from the World Wide Web or by file transfer protocol not used in the transaction of business
- Records that do not contain information necessary to conduct official business, meet statutory obligations, carry out administrative functions, or meet organizational objectives

The records described above may be destroyed or otherwise disposed of when their RDA authorizes the destruction. These guidelines are not intended to serve as authorization to destroy or otherwise dispose of unscheduled records. They are intended to complement the use of an approved RDA for the creating government agency, not replace or supersede it. Should a creating government agency lack an approved RDA, it may not destroy or otherwise dispose of any records in its custody, whether in electronic, paper or otherwise dispose of any records in its custody, until it receives approval of its RDA. While records of short term value may be discarded as described above, all state employees should be familiar with specific records retention schedules and applicable guidelines for their office and the public records law. When in doubt about whether a record has a short term value, or whether it has special significance or importance, retain the record in question. According to TCA 10-7-301 (13) and (14)

(13) Temporary records means material which can be disposed of in a short period of time as being without value in documenting the functions of an agency. Temporary records will be scheduled for disposal by requesting approval from the public records commission utilizing a records disposition authorization; and (14) Working papers means those records created to serve as input for final reporting documents, including electronic data processed records, and/or computer output microfilm, and those records which become obsolete immediately after agency use or publication. Please contact RMD for confirmation if needed.

Long Term and Permanent Preservation of Paper Records (10+ years)

Permanence has been described as “a measure of the chemical stability of paper.” Cellulose, the primary ingredient of paper, is a polymer—a very large and stable chain of atoms that gives paper the ability to bend and stretch without tearing or breaking. Embrittlement is the result of chemical deterioration, occurring when the bonds holding the polymer molecule together begin to break down.

Eventually the paper loses flexibility and cracks instead of bending. It is because acidity contributes strongly to embrittlement that specified permanent paper as non-acidic or alkaline, with a pH measure of 7.5 or higher. Another frequent sign of chemical change is discoloration. While yellowing or darkening alone does not affect the strength and flexibility of the paper or its longevity, it does affect the appearance, reducing the contrast between the paper and what is printed on it, and altering the color of illustrations.

Paper materials, including documents, manuscripts, drawings, prints, posters, and maps. Take care when handling any item to achieve cost efficient, effective preservation.

Proper Requirements for Permanent/Long Term Paper Records

Storage of long term and permanent paper records should be on acid free or alkaline paper, to stop the deteriorating of the paper. Alkaline paper is paper that has a pH value greater than 7; paper made by a n alkaline manufacturing process, paper longevity is enhanced. Permanent and long-term paper must have a minimum pH of 7, must have at least a 2 percent alkaline reserve as a buffering agent, and that the paper stock must include no groundwood or unbleached pulp. In addition, to ensure reasonable durability of the finished paper, the standard specifies a fold endurance of at least 30 double folds, and a minimum tear resistance. Using acid free or alkaline paper will increase the longevity of the paper documents that are being stored at Library & Archives or permanently within agency.

Consider the following when creating, handling, and storing permanent records:

- Records should be created using acid-free, alkaline-buffered paper and should be stored or housed in acid-free folders and boxes. Buffering paper neutralizes acidity
- Never use adhesive tape to repair archival or permanent records. It deteriorates over time, and the adhesive discolours and darkens the paper to which it was attached
- Use only rustproof paper clips
- Remove all other fasteners, such as rubber bands, grommets, and staples
- Because folds and creases can weaken paper, unfold materials and arrange for flat storage. To avoid further damage, do not unfold fragile documents that have been folded for many years. Consult with a paper conservator for guidance
- Papers with a high level of acidity, such as newspapers, should be reformatted to preserve the information

Photographs are among the most engaging historical records, but they can present unique challenges. Photographs are physically and chemically more complex than paper materials. To extend the life of photographs:

- Hold prints and negatives by the edges in order to avoid touching the emulsion surface
- Avoid using tape, metal clips, rubber bands, or adhesives.
- Avoid using ballpoint and felt-tip pens for identification purposes. Instead, use a soft pencil on the back of mat pictures with acid- and lignin-free materials
- Color will not last, so copy important photographs in black and white

- Framing can be destructive to photographs if done incorrectly. High-quality frame shops should know the standards and procedures recommended for framing

Bound volumes, such as books, are composed of a variety of materials and can require complex preservation measures. Regular handling and improper storage also causes harm. To slow down the deterioration process:

- Make sure that space is available between volumes, crowding can cause damage, especially during retrieval
- Hold the book on either side of the spine to pull it off the shelf, do not hook a finger over the top of the spine and pull
- Use flat bookmarks, never leave a bookmark in a volume permanently
- Avoid placing heavy items in or on a volume
- Avoid using metal paper clips, holding a volume together with rubber bands, and turning down the edges of pages
- Do not use a volume as a surface for writing
- Photocopying volumes is discouraged, but if a volume can withstand photocopying, do not press the spine against the copier.

Storage Methods for Permanent Paper

Paper records stored over thirty years or permanently in agency should be stored under archival conditions. The environment should be temperature and humidity-controlled environment, with a working fire alarm and fire suppression system. The paper records should be copied to onto acid free paper utilizing acid free ink/toner. The documents are to be placed in acid free folders and placed in acid free boxes.

Any writing (notes or descriptions) that is to be done on the documents, folders, or boxes should be completed utilizing pencil or acid free ink pens. Folders are to be placed loosely in the boxes, do not pack the boxes tightly, too much pressure over time speeds the breakdown of the paper. The boxes should be placed on metal shelving and should not be on either the bottom or top shelf. Protect the boxes from direct sunlight if possible.

If storing print photographs, large format documents (blueprints, maps, & posters), books, scrapbooks, or other unusual items consult with Tennessee State Library & Archives and Records Management for assistance. There are specific practices for each of the above items. There are special products that may be purchased for the preservation of these documents as well.

Caring for Archival Records during their Active Life Cycle

Records that are classified as archival should receive proper care and attention while used and stored in the agency prior to their eventual transfer to Library & Archives. Permanent records should be clearly labeled and kept in an orderly manner in clean and safe storage areas with

appropriate environmental conditions. It is best for file names to be written directly on folders, rather than on adhesive labels, which often fall off over time. In keeping with preservation maintenance practices, these records should be printed on acid-free paper and kept in acid-free folders whenever possible.

If you must store permanent value records in agency, consider ordering acid-free boxes and archival supplies from the following contracted vendors:

- Conservation Resources International
- Demco
- Gaylord Brothers
- Archival Methods
- Hollinger – Metal Edge Inc.
- University Products, Inc.
- See Vendor List of conservation supply companies for contact information Appendix C

Permanent Records in the Archives

Tennessee State Library & Archives will accept the transfer of permanent paper records from state agencies on a case-by-case basis. Agencies are responsible for all permanent public records created and maintained during the course of business, regardless of the record's format. With assistance from the Library & Archives staff, each organization will establish appropriate methods to maintain the authenticity, integrity, and accessibility of these records until their official transfer to the permanent library collection. The Library & Archives staff highly recommends that organizations create and implement a records policy, as well as train staff on the proper methods for maintaining public records.

Library & Archives will make every reasonable effort to take in all permanent records that have reached their stated retention. However, due to limited space, Library & Archives may not be able to accept paper records after the records meet its retention. Records should not be transferred until official notification is received from the Library & Archive staff.

If an agency chooses to retain custody of any record, including permanent paper public records eligible for transfer to Library & Archives, it will assume the responsibility for maintaining that record in a manner that preserves its authenticity and integrity, and ensures its continued accessibility.

Preparing Records for Transfer to Tennessee State Library & Archives

Archival Technical Services (ATS) at Library & Archives is responsible for the acquisitions, processing, and collection management related to the records of the various state agencies of Tennessee, private manuscript collections related to Tennessee and Tennesseans, and the manuscript holdings of the Tennessee Historical Society (THS). ATS also manages the Legislative Recording Program, which creates digital audio recordings of all proceedings of the Tennessee General Assembly.

The transfer of paper for permanent archival storage requires extensive planning and scheduling. This will require agencies to plan out the process of transferring the original records to Library & Archives. Once a record series is scheduled to be transferred to Library & Archives a detailed plan should be created between the two agencies. Until the records are transferred to Library & Archives it is the agency's responsibility to maintain and safeguard the records. An agency storing records for over twenty years before transferring to Library & Archives should utilize acid free material as explained above to preserve the material prior to transfer.

When a transfer of permanent records to Library & Archives scheduled, certain transfer procedures for boxing, labeling, and listing contents must be followed to ensure that a uniform and useful transfer occurs.

- Review Records Disposition Authorizations
 - Find the appropriate Records Disposition Authorizations and locate the disposition for the records. The schedule will indicate which records series have been chosen for permanent retention and are eligible or required to be transferred to Library & Archives.
- Determine volume of records
 - To make sure that the correct number of boxes is on hand for packing, determine the volume of the records to be transferred and how they will fit in the box. One cubic-foot- sized box will hold 14 inches of letter-size files or 11 inches of legal-size files.
- Pack Boxes
 - Pack files into boxes in the same order in which they were kept in the office. Maintaining the original order of the files is an underlying principle of archival management and will accurately reflect the actual administrative use of the records. When boxing permanent records
 - Pack files in acid-free boxes with different records series boxed separately.
 - Place files upright in the box in the same logical order in which they were kept in the file drawer.
 - Make sure file names or numbers are visible.
 - Avoid over packing or under packing boxes to prevent damage to records. Carefully pack boxes so files and materials can be easily removed and replaced, leaving about one inch of free space. Materials must fit without causing the box to bulge and the lids must fit.
 - Do not send damaged boxes, such as those that are crushed or have ripped handles or water damage.
- Label Boxes
 - Use Library & Archive's template for box labels **Appendix D**
 - Apply 2" x 4" Avery label on the long side of the box
 - Include the following information
 - Department, Division, Series Title, RDA #, Box#
- Create Box List

- See Library & Archive's sample box list **Appendix E**
- Creating a box list will make it easier to retrieve your records from Library & Archives at a later date
- The box list can include description of contents, such as a list of folder titles
- Schedule Transfer
 - Contact Archival Technical Services to schedule a time to deliver your boxes to Library & Archives.
- Contact Records Management Division if you need them to facilitate the transfer of your records. Please provide a box count and number your boxes accordingly. A pickup location and scheduled time will also be required. RMD can pick up and deliver your boxes to Library & Archives.

File Management

File management is the process of determining how files will be arranged, categorized, accessed, and stored in all formats. The file plan is at the core of a records management program and should be implemented to support and document the creation of, access to, and disposal of an agency's records.

A good file plan provides:

- A "history" of how and why records series were created
- Systematic and cost-effective records storage and retrieval
- Easy identification of records for disposal
- Control of records with special security or access requirements
- Reduced or eliminated recordkeeping redundancy

Designing a File Plan

A file plan is a comprehensive outline that includes the records series, file organization, active file locations, file transfer instructions, file retention and disposition instructions, and other specific instructions that provide guidance for effective management of records, including vital records. File plans specify how records are to be organized once they have been created or received, provide a "roadmap" to the records created and maintained by an organizational unit, and facilitate dispositioning of the records.

A good file plan will provide an overview of all records kept by a particular agency or a specific department, division, or office. In addition to paper files, the file plan must address electronic recordkeeping systems and electronic documents stored on network drives. Involving users early in the design process will allow plan implementation to run smoothly. All file plans should be accompanied by policies and procedures that are widely disseminated and training that is scheduled on a regular basis.

Additional considerations when designing a file plan:

- *Simplicity* – align your plan with current and easily recognizable business processes
- *Consistency* – provide clear instructions and procedures for the classification of records
- *Flexibility* – allow for the inclusion of new files and records series in the future

Filing Practices

Filing practices must be applicable across all formats as much as is possible. If an office maintains both paper and electronic systems, it does not make sense for a single records series to have two different filing schemes.

The most common methods of arranging documents are alphabetical, numerical, or alphanumeric. The file arrangement should be based on how the records will be retrieved and the cutoff specified in the records retention and disposition schedule for that particular series.

Alphabetical Filing

There are two types of alphabetical filing:

- **Topical filing** arranges files in straight alphabetical order, such as subject correspondence arranged from A to Z, based on the name of the subject.
- **Classified filing** arranges related documents under a major subheading, such as customer- complaint correspondence filed under the general heading of customer relations.

Advantages of alphabetical filing:

- Avoids the need for an index
- Simple filing and easy browsing

Disadvantages of alphabetical filing:

- Increased risk of misfiling
- Retrieval problems due to name changes
- Increased inefficiency with large systems
- Ease with which unauthorized persons can locate records

Numerical Filing

Numerical filing by file number, Social Security number, date, or patient or case number is common.

Advantages of numerical filing include:

- Quicker comprehension of numerical sequences over alphabetical
- Ability to add new files without disturbing existing arrangement
- Easy identification of misfiled or out-of-sequence numbers

Disadvantages of numerical filing are:

- Necessity of an index since it is an indirect arrangement
- Possibility of transposing numbers when files are created

Alphanumeric Filing

An alphanumeric arrangement uses a combination of numeric digits and letters to create a flexible filing system. An index is required to use the system effectively.

Subjects may be substituted by using alphabetical or numerical codes, such as ADM-001 (Administrative Files, Director's Correspondence) and ADM-002 (Administrative Files, Assistant Director's correspondence).

Advantages of alphanumeric filing:

- Eliminates the need for long titles
- Use of code system increases file security

Disadvantages of alphanumeric filing:

- Necessity of an index
- Must train users on how to use the codes and index

Essential Paper Records

Physical maintenance of paper records requires stable, secure, environmentally controlled storage and operational facilities within a larger framework. This framework should include offsite facilities for storing duplicate copies of digital media as well as vital records including microfilm copies of vital records kept in paper format, and system backup copies that will be available after a natural or human-made disaster.

Destruction

- **Straight-cut Shredding** – Simple cutting of paper into thin vertical strips. This is appropriate for most non-confidential records. However, it is easier to reassemble and/or still read portions of the original record than cross-cut shredding.
- **Cross-cut Shredding** – Paper is cut into small confetti-sized pieces. Washington State Archives recommends this form of shredding for sensitive/confidential paper records.
- **Recycling/Pulping** – Paper is mixed with water and chemicals to break it down into a mixture of strands of cellulose called pulp which can then be recycled into other paper products.
- **Shredding and Pulping** – A combination of shredding the records first and then pulping is a more certain method of destroying paper records. Records destroyed on behalf of state agencies by the State Records Center Warehouse are destroyed using this method.

Glossary

Archival quality: A quality of reproduction consistent with established standards specified by state and national agencies and organizations responsible for establishing such standards, such as the Association for Information and Image Management, the American National Standards Institute, or the National Institute of Standards and Technology.

Archival record: Material created or received in the conduct of affairs that is preserved because of the enduring historical value or as evidence of the roles and responsibilities of the creator.

Backup: A copy of an electronic record maintained to protect information loss.

Bits: Short for binary digits, the smallest unit of information in a binary system. Each bit is assigned a 1 (high current) or a 0 (low current), where eight bits make up a byte.

Conversion: The act of moving electronic records to a different format, especially data from an obsolete format to a current format.

Compression: A computer process using algorithms that reduces the size of electronic files so that they occupy less digital storage space.

Data compression: Any of several techniques that reduce the number of bits required to represent information in data transmission or storage.

Digital image: See Image

Digital imaging: See Imaging

Disposition: Action to be taken on a records series at a specific time. It will entail destruction, reformatting, transfer, or permanent retention.

Enterprise content management (ECM) system: Technologies used to capture, manage, store, preserve, and deliver content and documents related to organizational processes.

Electronic shredding: The process of overwriting data instead of merely deleting it. This involves overwriting the file's data clusters, renaming the file with a randomly generated name, truncating the file to 0 bytes in length and deleting the renamed and truncated file.

Essential record: A record vital to the operation of an organization and/or resumption of operations following a disaster.

File format: A specification for organizing data. Digital images and their associated metadata may be presented in a number of formats depending on compression schemes, intended use, or interoperability requirements. Some image formats are broadly decipherable, while others may only be accessible to certain application programs.

Image: A graphic representation of an object. More specifically, a raster-based, two-dimensional,

rectangular array of static data elements called pixels, intended for display on a computer monitor or for transformation into another format, such as a printed page.

Image compression: The application of data compression on digital images.

Imaging: The process of electronically capturing the visual appearance of (usually) paper documents, also called “scanning” or “digitizing.”

Index: Descriptive data associated with an image for retrieving that specific image from storage.

Life cycle: The creation, use, maintenance, and disposition of a public record.

Lossless compression: Reduction in file size without loss of information, achieved by storing data more efficiently.

Lossy compression: Reduction in file size that involves permanent loss of information. Algorithms selectively discard data in order to attain a greater size diminishment than is possible with lossless compression.

Magnetic media: Tape or disk coated with a magnetic surface used for storing electronic data.

Master image: A faithful digital reproduction of a document optimized for longevity and for production of a range of delivery versions.

Metadata: Data describing the context, content, and structure of records and their management through time.

Migration: The process of moving records from one hardware and/or software platform to another.

Nonproprietary: A format that is not owned by a private individual or corporation under a trademark or patent. It is in the public domain and is easily portable between various hardware and software systems.

Optical media: A data storage medium that utilizes laser technology to read information.

Pixel: Short for picture elements, which make up an image, similar to grains in a photograph or dots in a halftone. Each pixel can represent a number of different shades or colors, depending on how much storage space is allocated for it. Pixel size, frequency, and color determine the accuracy with which photographic images can be represented.

Proprietary: A format that is owned by a company or a private owner. Some proprietary formats are published and protected by intellectual property rights or copyright. Other proprietary formats are not published.

Public record: All documents, papers, letters, maps, books, photographs, microfilms, electronic data processing files and output, films, sound recordings, or other material, regardless of physical form or characteristics made or received pursuant to law or ordinance or in connection with the transaction of official business by any governmental agency.

Quality assurance: The process by which the total product is examined to ensure that the quality criteria initially established in the preproduction test has been met.

Quality control: Techniques to ensure accuracy and high quality through various stages of a process.

Record copy: An original, official, or master record that is distinct from a "working" or "convenience" copy. The copy is a duplicate used for reference purposes.

Records analysis: The examination and evaluation of systems and procedures related to the creation, processing, storage, and disposition of records.

Record Disposition Authorization: An approved retention schedule stating the required retention period and disposition action of a records series. The administrative, fiscal, historical, and legal value of a public record shall be considered in appraising its appropriate retention schedule.

Refresh: The process of periodically moving records from one storage medium to another.

Resolution: The measure of the quality of a digital image, usually expressed in dots per inch (DPI).

Retention period: The length of time a record is kept.

Scanning: See Imaging

Solid state media: A data storage medium that uses solid-state memory with no moving parts.

Standards: Rules typically developed, adopted, and promoted by large organizations that can advocate for their broad usage. Data standards enable the exchange of data while technology standards enable the delivery of data between systems.

Taxonomy: System or technique of classification.

Records Retention Standards: Appendices

Appendices:

- A. File Format Guidelines for Management and Long-Term Retention of Electronic Records
- B. File Formats for Transfer of Electronic Records to the Tennessee State Library & Archives
- C. Conservation Supply Companies on the State Suppliers List
- D. The Library & Archives Template for Box Labels

Appendix A: File Format Guidelines for Management and Long-Term Retention of Electronic Records

Guidelines and Recommendations:

The following table represents the digital formats that the Records Management Division recommends for in-house preservation and long-term records retention. For electronic records, long-term retention is considered any period of ten years or longer. The Records Management Division recommends that any state agency record series for which the required retention period is ten years or longer be maintained in the following formats. The record types included in this document are not exhaustive. State agencies producing specialized records may find that certain types of records are not covered by this document.

These guidelines classify formats into three categories:

- **Recommended for long-term retention:** File formats that meet the minimum requirements for long-term retention, including documentation, wide adoption, transparency, self-containment, and use within the archival community. In most cases, these are the formats the Tennessee State Library & Archives itself uses to preserve electronic records.
- **Acceptable for long-term retention:** File formats that do not meet the minimum requirements for long-term retention, but which come near to meeting the requirements and, for practical reasons, may be appropriate for long-term retention at some agencies. These formats are more likely to require frequent review and maintenance than formats recommended for long-term retention.
- **Not recommended for long-term retention:** File formats that are not appropriate for long-term retention. Files saved in these formats should not be relied on to last more than five years. Electronic records whose retention periods are over five years should not be stored in these formats.

File Format for Long-Term Retention of Electronic records

Type of record	Recommended for long-term retention	Acceptable for long-term retention	Not recommended for long-term retention
Word Processing documents	PDF/A-1 a (.pdf) (ISO 19005-1 compliant PDF/A) OpenDocument Text (.odt)	PDF/A-1 b (.pdf) (ISO 19005-1 minimally compliant PDF/A) Microsoft® Word Document (.doc) Microsoft® Open XML Document (.docx) Rich Text Format (.rtf)	Corel® WordPerfect® (.wpd) Lotus® WordPro (.lwp) PDF (.pdf)
Plain text documents	Plain Text (.txt) <i>US-ASCII or UTF-8 encoding</i> Comma-separated file (.csv) <i>US-ASCII or UTF-8 encoding</i> Tab-delimited file (.txt) <i>US-ASCII or UTF-8 encoding</i>	Other delimited text files (space-delimited, colon-delimited, etc.) <i>where the delimiting character is not present in the data</i>	
Structural markup text documents	SGML with DTD/Schema XML (.xml) with DTD/Schema		XML without DTD/Schema SGML without DTD/Schema
Spreadsheets	OpenDocument Spreadsheet (.ods) Comma-separated file (.csv) Tab-delimited file (.txt) PDF/A-1 a (.pdf) (ISO 19005-1 compliant PDF/A)	Microsoft® Excel® Spreadsheet (.xls) Microsoft® Excel® Open XML Spreadsheet (.xlsx) Other delimited text files (space-delimited, colon-delimited, etc.) <i>where the delimiting character is not present in the data</i>	
Audio	Broadcast WAVE Format LPCM (.wav) WAVE Format LPCM (.wav)	AIFF (uncompressed) (.aif, .aiff) Standard MIDI (.mid, .midi) Windows® Media Audio WMA (.wma) MPEG3 (.mp3) MP4 AAC (.m4a)	Audio CD (Compact Disc Digital Audio system, CDDA, CD-DA) DVD-Audio QuickTime® MP4 AAC Protected (.m4p, .m4b) QuickTime® MP3, iTunes (.mp3) RealAudio® (.rm, .ra) Shorten® (.shn) RIFF-RMID (.rmi) Extended MIDI (.xmi) Module Music Formats, Mods (.mod) SUN Audio, uncompressed (.au) Ogg FLAC (.ogg)

File Format for Long-Term Retention of Electronic records

Type of record	Recommended for long-term retention	Acceptable for long-term retention	Not recommended for long-term retention
Digital Video	AVI, full frame (uncompressed), WAVE PCM audio (.avi)	AVI, containing H.264/MPEG-4 AVC (lossy) ¹ (.avi) MPEG-4, containing H.264/MPEG-4 AVC (lossy) (.mp4) MPEG-2, containing H.262/MPEG-2 (lossy) (.mp2) MOV, containing H.264/MPEG-4 AVC (lossy) (.mov) ASF, containing WMV (lossy) (.wmv) MXF, containing Motion JPEG 2000 ² (lossless) (.mxf) Ogg, containing Theora (lossy) (.ogg)	DVD-Video VOB (VIDEO_TS, AUDIO_TS) Blu-ray Disc™ HCAM® Digital VHS (D-VHS) DVCam®
Raster Images	TIFF (.tif, .tiff) <i>uncompressed</i>	JPG 2000 (.jp2) PNG (.png) PDF/A-1a (.pdf) (ISO 19005-1 compliant PDF/A) GIF (.gif)	JPEG (.jpg, .jpeg) RAW (.raw, various) Adobe® Photoshop® (.psd) Kodak PhotoCD Encapsulated PostScript (.eps) FlashPix™ (.fpx)
Vector Images (*See below for geospatial vector sets.)	Scalable Vector Graphics 1.1 (.svg) AutoCAD® Drawing Interchange Format (.dxf) PDF/A-1a (.pdf) (ISO 19005-1 compliant PDF/A)	AutoCAD® Drawing Format (.dwg)	Adobe® Illustrator (.ai) Corel®Draw CDR (.cdr) Micrografx Draw DRW (.dwr) Windows® Metafile WMF (.wmf, .emf) Standard for the Exchange of Product Model Data STEP (.stp) Computer Graphics Metafile DXF (.dxf)
Databases	Software Independent Archiving of Relational Databases (SIARD) Delimited Flat File (Plain Text) with DDL	Microsoft® Access® (.accdb) Microsoft® Access® (.mdb) dBase Format (.dbf)	
Presentations	OpenDocument Presentation (.odp) PDF/A-1a (.pdf) (ISO 19005-1 compliant PDF/A) for presentations without animation		Microsoft® PowerPoint Presentation (.ppt) Microsoft® Open XML PowerPoint® Presentation (.pptx)

¹ One of the H.264/MPEG-4 AVC profiles is sometimes described as lossless: MPEG-4 AVC High 4:4:4 Profile. For more information, see the Notes section of “MPEG-4, Advanced Video Coding, High 4:4:4 Profile,” *Sustainability of Digital Formats: Planning for Library of Congress Collections*, <http://digitalpreservation.gov/formats/fdd/fdd000218.shtml> (accessed 5/16/2012).

² See “MXF File, OP1a, Lossless JPEG 2000 in Generic Container,” *Sustainability of Digital Formats: Planning for Library of Congress Collections*, <http://digitalpreservation.gov/formats/fdd/fdd000206.shtml> (accessed 5/16/2012) and “Motion JPEG 2000 jp2 File Format,” *Sustainability of Digital Formats: Planning for Library of Congress Collections*, <http://digitalpreservation.gov/formats/fdd/fdd000127.shtml> (accessed 5/16/2012).

Appendix B: File Formats for Transfer of Electronic Records to the Tennessee State Library & Archives

The current document lists the file formats appropriate for transfer of digital public records to Tennessee State Library and Archives (Library and Archives) for permanent retention. To determine which records should be transferred, please consult your records retention and disposition schedules and contact your records analyst for more information about what records may be transferred to Library and Archives for permanent retention.

The following table represents the digital formats that Library and Archives accepts for transfer of digital public records. These guidelines organize formats into three categories:

- **Recommended for transfer:** You may transfer records in these formats to Library and Archives. File formats that meet the minimum requirements for transfer and long-term retention. In most cases, these are the formats in which the State Archives will maintain files.
- **Acceptable for transfer under certain circumstances:** You need to request permission to transfer records to the Library and Archives in these formats. These file formats that do not meet the minimum requirements for transfer and long-term retention.
- **Not recommended for long-term retention:** File formats that are not appropriate for long-term retention. Files saved in these formats should not be relied on to last more than five years. Electronic records whose retention periods are over five years should not be stored in these formats.

File Formats for Transfer of Electronic Records to Tennessee State Library and Archives

Type of record	Recommended for transfer	Acceptable for transfer under certain circumstances	Not acceptable for transfer
Word Processing documents	PDF/A-1a (.pdf) (ISO 19005-1 compliant PDF/A) OpenDocument Text (.odt)	PDF/A-1b (.pdf) (ISO 19005-1 minimally compliant PDF/A) Microsoft® Word Document (.doc) Microsoft® Open XML Document (.docx) Rich Text Format (.rtf)	Corel® WordPerfect® (.wpd) Lotus® WordPro (.lwp) PDF (.pdf)
Plain text documents	Plain Text (.txt) <i>US-ASCII or UTF-8 encoding</i> Comma-separated file (.csv) <i>US-ASCII or UTF-8 encoding</i> Tab-delimited file (.txt) <i>US-ASCII or UTF-8 encoding</i>	Other delimited text files (space-delimited, colon-delimited, etc.) <i>where the delimiting character is not present in the data</i>	
Structural markup text documents	XML (.xml) <i>with DTD/Schema</i> SGML <i>with DTD/Schema</i>		XML without DTD/Schema SGML without DTD/Schema
Spreadsheets	OpenDocument Spreadsheet (.ods) Comma-separated file (.csv) Tab-delimited file (.txt) PDF/A-1a (.pdf) (ISO 19005-1 compliant PDF/A)	Microsoft® Excel® Spreadsheet (.xls) Microsoft® Excel® Open XML Spreadsheet (.xlsx) Other delimited text files (space-delimited, colon-delimited, etc.) <i>where the delimiting character is not present in the data</i>	
Audio	Broadcast WAVE Format LPCM (.wav) WAVE Format LPCM (.wav)	AIFF (uncompressed) (.aif, .aiff) Standard MIDI (.mid, .midi) Windows® Media Audio WMA (.wma) MPEG3 (.mp3) MP4 AAC (.m4a)	Audio CD (Compact Disc Digital Audio system, CDDA, CD-DA) DVD-Audio QuickTime® MP4 AAC Protected (.m4p, .m4b) QuickTime® MP3, iTunes (.mp3) RealAudio® (.rm, .ra) Shorten® (.shn) RIFF-RMID (.rmi) Extended MIDI (.xmi) Module Music Formats, Mods (.mod) SUN Audio, uncompressed (.au) Ogg FLAC (.ogg)

File Formats for Transfer of Electronic Records to Tennessee State Library and Archives

Type of record	Recommended for long-term retention	Acceptable for long-term retention	Not recommended for long-term retention
Digital Video	AVI, full frame (uncompressed), WAVE PCM audio (.avi)	AVI, containing H.264/MPEG-4 AVC (lossy) ¹ (.avi) MPEG-4, containing H.264/MPEG-4 AVC (lossy) (.mp4) MPEG-2, containing H.262/MPEG-2 (lossy) (.mp2) MOV, containing H.264/MPEG-4 AVC (lossy) (.mov) ASF, containing WMV (lossy) (.wmv) MXF, containing Motion JPEG 2000 ² (lossless) (.mxf) Ogg, containing Theora (lossy) (.ogg)	DVD-Video VOB (VIDEO_TS, AUDIO_TS) Blu-ray Disc™ HCAM® Digital VHS (D-VHS) DVCam®
Raster Images	TIFF (.tif, .tiff) <i>uncompressed</i> JPG 2000 (.jp2)	JPEG (.jpg, .jpeg) PNG (.png) PDF/A-1 a (.pdf) (ISO 19005-1 compliant PDF/A) GIF (.gif)	RAW (.raw, various) Adobe® Photoshop® (.psd) Kodak PhotoCD Encapsulated PostScript (.eps) FlashPix™ (.fpx) PDF (.pdf)
Vector Images (*See below for geospatial vector sets.)	Scalable Vector Graphics 1.1 (.svg) AutoCad Drawing Interchange Format (.dxf) PDF/A-1 a (.pdf) (ISO 19005-1 compliant PDF/A)		Adobe Illustrator (.ai) Corel®Draw CDR (.cdr) Micrografx Draw DRW (.dwr) Windows Metafile WMF (.wmf, .emf) Standard for the Exchange of Product Model Data STEP (.stp) Computer Graphics Metafile DXF (.dxf) AutoCAD Drawing Format (.dwg)
Databases	Software Independent Archiving of Relational Databases (SIARD) Delimited Flat File (Plain Text) with DDL	Microsoft® Access® (.accdb) Microsoft® Access® (.mdb) dBase Format (.dbf)	
Presentations	OpenDocument Presentation (.odp) PDF/A-1 a (.pdf) (ISO 19005-1 compliant PDF/A) <i>for presentations without animation</i>		Microsoft® PowerPoint® Presentation (.ppt) Microsoft® Open XML PowerPoint Presentation (.pptx)

¹ One of the H.264/MPEG-4 AVC profiles is sometimes described as lossless: MPEG-4 AVC High 4:4:4 Profile. For more information, see the Notes section of "MPEG-4, Advanced Video Coding, High 4:4:4 Profile," *Sustainability of Digital Formats: Planning for Library of Congress Collections*, <http://digitalpreservation.gov/formats/fdd/fdd000218.shtml> (accessed 5/16/2012).

² See "MXF File, OP1a, Lossless JPEG 2000 in Generic Container," *Sustainability of Digital Formats: Planning for Library of Congress Collections*, <http://digitalpreservation.gov/formats/fdd/fdd000206.shtml> (accessed 5/16/2012) and "Motion JPEG 2000 jp2 File Format," *Sustainability of Digital Formats: Planning for Library of Congress Collections*, <http://digitalpreservation.gov/formats/fdd/fdd000127.shtml> (accessed 5/16/2012).

File Formats for Transfer of Electronic Records to Tennessee State Library and Archives

Type of record	Recommended for long-term retention	Acceptable for long-term retention	Not recommended for long-term retention
Email	Microsoft Outlook Personal Storage Table (.pst)	<p>Multiple emails MBOX, MIME (.mbx, .mbox)</p> <p><i>Individual email messages saved in any of the following formats:</i> Email Message, MIME (.eml, .txt), with email header Plain Text (.txt), with email header Rich Text (.rtf), with email header PDF/A-1a (.pdf) (ISO 19005-1 compliant PDF/A), with email header HTML (.html), with email header Microsoft® Outlook® Message (.msg), with email header</p>	<p><i>Individual email messages saved in any of the following formats:</i> Apple® Mail (.emlx), with or without email header Plain Text (.txt) without email header Rich Text (.rtf) without email header PDF/A-1a (.pdf) (ISO 19005-1 compliant PDF/A), without email header PDF, with or without email header HTML (.html) without email header</p>
Websites / Social Media	<p>Note: Library and Archives is currently collecting state agency webpages, Twitter, YouTube, Flickr, and other online content through an automated web-crawling tool.</p> <p>Web Archive (.warc, .war)</p>		
Geospatial Vector Data	<p>Main file (.shp) Index file (.shx) Database file (.dbf) Projection file (.prj) Shapefile spatial index file (.sbn) Shapefile spatial index file (.sbx) Geospatial metadata file (.shp.xml)</p>		

Appendix C: Conservation Supply Companies

Conservation Resources International, LLC.

7350 A, Lockport Place

Lorton, VA 22079

Phone: 800-634-6932

Fax: 703-321-0629

<http://www.conservationresources.com/>

*Acid-free paper, boxes, and materials

Gaylord Archival®

PO Box 4901

Syracuse, NY 13221-4901

Phone: 800-448-6160

Fax: 800-272-3412

<http://www.gaylord.com/>

*All types of archival supplies

Hollinger Metal Edge, Inc.

9401 Northeast Drive

Fredericksburg, VA 22408

Phone: 800-634-0491

Fax: 800-947-8814

<http://www.hollingermetaledge.com/>

Demco, Inc.

PO Box 7488

Madison, WI 53707

Phone: 800-356-1200

Fax: 800-245-1329

<http://www.demco.com/>

* All types of archival supplies

Archival Methods

655 Driving Park Ave. Suite #5/ Dock #8

Rochester, NY 14613

Phone: 1-866-877-7050

Fax: 585-334-7067

<http://www.archivalmethods.com/>

University Products, Inc.

517 Main St.

Holyoke, MA 01041

Phone: 1-800-628-1912

Fax: 1-800-532-9281

<http://www.universityproducts.com/>

* All types of archival supplies

Appendix D: The Library & Archives Template for Box Labels

*TENNESSEE STATE LIBRARY AND ARCHIVES***DEPARTMENT****DIVISION
SERIES TITLE****RDA #****BOX #1***TENNESSEE STATE LIBRARY AND ARCHIVES***DEPARTMENT****DIVISION
SERIES TITLE****RDA #****BOX #6***TENNESSEE STATE LIBRARY AND ARCHIVES***DEPARTMENT****DIVISION
SERIES TITLE****RDA #****BOX #2***TENNESSEE STATE LIBRARY AND ARCHIVES***DEPARTMENT****DIVISION
SERIES TITLE****RDA #****BOX #7***TENNESSEE STATE LIBRARY AND ARCHIVES***DEPARTMENT****DIVISION
SERIES TITLE****RDA #****BOX #3***TENNESSEE STATE LIBRARY AND ARCHIVES***DEPARTMENT****DIVISION
SERIES TITLE****RDA #****BOX #8***TENNESSEE STATE LIBRARY AND ARCHIVES***DEPARTMENT****DIVISION
SERIES TITLE****RDA #****BOX #4***TENNESSEE STATE LIBRARY AND ARCHIVES***DEPARTMENT****DIVISION
SERIES TITLE****RDA #****BOX #9***TENNESSEE STATE LIBRARY AND ARCHIVES***DEPARTMENT****DIVISION
SERIES TITLE****RDA #****BOX #5***TENNESSEE STATE LIBRARY AND ARCHIVES***DEPARTMENT****DIVISION
SERIES TITLE****RDA #****BOX #10**