

# Digital Collections Digitization Guidelines

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## 1. Repository Access Overview

For items contained within the repository, a user may interact with digitized objects in four different ways. They may browse through existing digital exhibits, they may search and browse through existing digital collections, they may access digitized items through links in the finding aids, or they may search the repository.

The repository will provide one searchable interface to all of the digitized objects created by Digital Collections. Exceptions may exist however, for materials digitized for previous HTML-based exhibits and projects created for external stakeholders. The components required for discovery and access to all objects in the Digital Collections repository are aggregated from three main data sources; a Microsoft SQL database, Apache Solr, an open source search platform, and native XML files. Each digitized object (text, image, audio, video, or some combination of these) is described in a Metadata Encoding & Transmission Standard (METS) record that is recorded in a SQL database, which is then indexed for searching in SOLR. Additionally, all objects have a corresponding XML file, saved from the database, that contains the complete METS record as well as any additional data needed to create the item's repository webpage.

METS is a standardized schema for encoding descriptive, administrative, and structural metadata. A link to each METS record can be accessed by the end user on the item page for all objects in the Digital Collections repository. For the purpose of this document, we will only be addressing how the administrative aspect of the METS schema relates to the Digital Collections repository. Technical or administrative metadata is recorded in the standard that corresponds to the media file type and may stand alone or can be used as extensions of the METS schema. Metadata for images in XML (MIX) is the standard used to record technical metadata for digital still images. The AudioMD schema is used for detailing technical properties related to audio files and VideoMD is the corresponding schema for video objects. Access images are provided through aDORe djatoka, an open source JPEG2000 image server and dissemination service framework. Audio and Video access files are provided adhering to current HTML5 media standards. Through this web based asset management system users are provided with access to the repository's content and the digitized objects themselves.

Although Digital Collections is involved in the creation of EAD encoded finding aids, they are currently not indexed or searched within the repository. However, metadata records for digital objects contain links back to their collection finding aids when appropriate and possible. In addition, the finding aids contain links to materials in the repository.

## 1.1. Requests for digitization

All items digitized by Digital Collections from the Library's holdings for user request, staff selection, or digital projects will be stored in the repository and available to users through the repository search and additional outlets as necessary.

Staff wishing to have materials digitized for user request or staff selection can complete the Digital Imaging Request form at <http://digital.lib.ecu.edu/request/>. At the time of request, the staff member must include:

- their name
- a brief description of the request itself
- the format, resolution, or size desired
- the date the request is needed by.

In addition, staff are asked to supply some descriptive metadata to facilitate the addition of materials to the digital repository as they await full attention from the metadata librarian including:

- an identifier indicating the item's location — for example, a collection/series/box/folder number or a call number (required)
- title (required)
- creator
- date
- description of the item
- the assignment of the item to one of several theme-based collections.

## 1.2. Digital preservation

Storage in the repository does not constitute digital preservation. Although Digital Collections is committed to providing continuing access to their digitized output, the archiving necessary to constitute digital preservation has not yet been achieved.

### 1.2.1. *Metadata for Images in XML (MIX)*

A technical metadata standard for capturing information about the characteristics and capture of digital images. Much of the creation of MIX data is automated by the JSTOR/Harvard Object Validation Environment (JHOVE). The following elements are created by Digital Collections.

### 1.2.2. *AudioMD:*

A preliminary schema created by the Library of Congress for the capture of technical specifications of digital audio files. Much of the creation of the AudioMD data is automated by JHOVE's WAVE-Hul module. The following elements are recorded in our AudioMD:

- <amd:audio\_block\_size>
- <amd:audio\_data\_encoding>
- <amd:bits\_per\_sample>
- <amd:byte\_order>
- <amd:checksum>
  - Datetime
  - Type
  - Value
- <amd:first\_sample\_offset>
- <amd:format\_name>
- <amd:num\_sample\_frequency>
- <amd:duration>
- <amd:num\_channels>

Additionally, if the sound recording is not in preservation Broadcast WAVE format, we will still record the following:

- <amd:audio\_block\_size>
- <amd:checksum>
  - Datetime
    - Type
    - Value
- <amd:format\_name>

### 1.2.3. *Text Encoding Initiative (TEI)*

A full text encoding standard that captures structural details of texts (see <http://www.tei-c.org> for more information). The TEI schema consists of a header containing bibliographic information and a body section containing the marked-up text. In general, we subscribe to a level 3 encoding, as outlined by the Digital Library Federation's *Guidelines for Best Encoding Practice* (<http://www.diglib.org/standards/tei.htm>) with the addition of the following:

- <pb/> *required*
- <name> *optional*
- <persName> *optional*

Exceptions exist for transcripts of oral histories, which also use:

- <speaker>
- <milestone> *to indicate page breaks in the printed version of the transcript and to enhance readability online*

### 1.2.4. *Encoded Archival Description (EAD)*

Information about our implementation of EAD is found at: <http://ead2002.pbwiki.com>

## 2. Image/Text Digitization

Digital Collections can accommodate requests to digitize a number of analog formats including:

- Transmissive originals, both positive and negative, 35mm slide and film, 60mm x 220mm film  
*Transmissive originals refer to anything printed on a transparent surface such as slides or negatives*
- Reflective originals up to 33.5" x 23"  
*Reflective originals refer to anything printed on an opaque surface which can be placed on a flatbed scanner. Examples might include photographs, manuscript pages, or maps.*
- Bound materials less than  $\leq 2$ " thick: 13" x 10.5" with  $\frac{1}{2}$ " gutter; between 2" and 3" thick: 12" x 9.5" with  $\frac{1}{2}$ " gutter. Tightly bound materials will be inspected by Preservation and Conservation staff before being accepted for digitization.

### 2.1. Text

**Clean, high contrast, typed material where smallest significant > 1mm**

	Master	Access	Thumbnail
Format	TIFF	JPEG 2000	GIF
Bit Depth	24 bit color	24 bit color	8 bit indexed color
Resolution	450 DPI	Various	72 DPI
Dimensions	100% of original	Various	125 pixels across long dimension

**Material with poor legibility, handwritten annotations, fading, halftone illustrations, or where smallest significant < 1mm**

	Master	Access	Thumbnail
Format	TIFF	JPEG 2000	GIF
Bit Depth	24 bit color	24 bit color	8 bit indexed color
Resolution	600 DPI	Various	72 DPI
Dimensions	100% of original	Various	125 pixels across long dimension

#### 2.1.1.1. OCR

Digital Collections uses OmniPage Pro software. This package has an error rate of less than 2% and can support 114 languages. To work well, texts must be clearly printed in machine-created typeface. Fonts with heavy serifs or other highly stylized characteristics may not be compatible with the software. Handwritten material cannot be converted using OCR software. Once automatic conversion is done, Digital Collections will proof material to ensure the error rate is acceptable.

### 2.1.1.2. Transcription

When OCR is not a possibility, Digital Collections can provide transcriptions for scanned texts based on the project goals and the availability of resources.

## 2.2. Photographica

### 2.2.1. Transmissive Originals (Film, Slides, and Negatives)

#### Material up to 4" x 5" or a total of 20" square

	Master	Access	Thumbnail
Format	TIFF	JPEG 2000	GIF
Bit Depth	24 bit color or 16 bit grayscale	24 bit color	8 bit indexed color
Resolution	4000 pixels across the long dimension	Various	72 DPI
Dimensions	100% of original	Various	125 pixels across long dimension

#### Material between 4" x 5" and 8" x 10" or 20" to 80" square

	Master	Access	Thumbnail
Format	TIFF	JPEG 2000	GIF
Bit Depth	24 bit color or 16 bit grayscale	24 bit color	8 bit indexed color
Resolution	6000 pixels across the long dimension	Various	72 DPI
Dimensions	100% of original	Various	125 pixels across long dimension

#### Material > 8" x 10" or 80" square

	Master	Access	Thumbnail
Format	TIFF	JPEG 2000	GIF
Bit Depth	24 bit color or 16 bit grayscale	24 bit color	8 bit indexed color
Resolution	8000 pixels across the long dimension	Various	72 DPI
Dimensions	100% of original	Various	125 pixels across long dimension

## 2.2.2. Reflective Originals (Prints)

### Material up to 8" x 10" or 80" square

	Master	Access	Thumbnail
<b>Format</b>	TIFF	JPEG 2000	GIF
<b>Bit Depth</b>	24 bit color	24 bit color	8 bit indexed color
<b>Resolution</b>	4000 pixels across the long dimension	Various	72 DPI
<b>Dimensions</b>	100% of original	Various	200 pixels across long dimension

### Material between 8" x 10" and 11" x 14 or 80" to 154" square

	Master	Access	Thumbnail
<b>Format</b>	TIFF	JPEG 2000	GIF
<b>Bit Depth</b>	24 bit color	24 bit color	8 bit indexed color
<b>Resolution</b>	6000 pixels across the long dimension	Various	72 DPI
<b>Dimensions</b>	100% of original	Various	125 pixels across long dimension

### Material > 11" x 14" or 154" square

	Master	Access	Thumbnail
<b>Format</b>	TIFF	JPEG 2000	GIF
<b>Bit Depth</b>	24 bit color	24 bit color	8 bit indexed color
<b>Resolution</b>	8000 pixels across the long dimension	Various	72 DPI
<b>Dimensions</b>	100% of original	Various	125 pixels across long dimension

Exclude mounts or borders on long dimension when calculating resolution. In cases where a small image is mounted on a large board, it may be desirable to scan the image area only at the appropriate resolution for its size, and then scan the entire mount at a resolution that achieves 4,000 pixels across the long dimension.

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These specifications are based on the California Digital Library Guidelines for Digital Images (California Digital Library 2008) and BCR CDP Digital Imaging Best Practices Version 2.0 (BCR 2008).

### 3. Audio Digitization

Analog Audio Digitization Standards (minimum)	Master			Access		Working Master		
	Sampling Rate	Bit Depth	File Format	Bit Rate	File Format	Sampling Rate	Bit Depth	File Format
Spoken Language	96 kHz	24-bit	WAV (PCM uncompressed)	128 kbps	MP3	44.1 kHz	16-bit	FLAC
Field Recordings - Spoken Language	96 kHz	24-bit	WAV (PCM uncompressed)	128 kbps	MP3	44.1 kHz	16-bit	FLAC
Field Recordings - Natural Sounds	96 kHz	24-bit	WAV (PCM uncompressed)	192 kbps	MP3	44.1 kHz	16-bit	FLAC
Music	96 kHz	24-bit	WAV (PCM uncompressed)	192 kbps	MP3	44.1 kHz	16-bit	FLAC
If original audio source is digital, store at original sampling frequency and bit depth.								

Audio media formats we can currently digitize & convert:

Analog audio media formats: 3" 5" 7" and 10" Reel to reel and open magnetic tape media, Cassette Tape, Minicassette, Microcassette, 4-track tape, DAT tape, ADAT, Stereo and Mono 33 1/3 and 45 rpm Vinyl records and other Microgroove analog disc media, Acetate analog discs, Flexi discs, 78 rpm records and other mono analog disc media.

Digital audio media formats: CD, CD-R, Mini CD-R, DVD audio, MiniDisc, 3.5-inch microfloppy disk, USB and Firewire internal and external hard drives.

## 4. Moving Pictures

Motion picture digitization.

Source: VHS, VHS-C (NTSC)

PRESERVATION MASTER FROM NTSC VHS, VHS-C		
Attribute	Value	Details/Rationale
Container file format	.mov (QuickTime)	Semi-open, well documented video container format that is widely adopted.
Video bitstream encoding	ProRes 422	10-bit mezzanine codec which, although lossy and compressed, provides excellent visual fidelity to original and sufficient overhead for additional processing without quality loss.
Frame width (pixels)	720	Standard for capturing all signal information of NTSC VHS image, including overscan areas. (Non-square pixels, so aspect ratio is still 4:3)
Frame height (pixels)	486	
Scanning	Interlaced	Preserves interlacing of original NTSC format.
Frame rate (fps)	29.97	Standard for broadcast TV and consumer/commercial VHS systems.
Audio bitstream encoding	Linear PCM	Linear pulse-code modulation (uncompressed audio stream).
Audio channels	Stereo	Captures single or double linear audio track from VHS tape.
Audio sampling rate	96 kHz	Ensures complete capture of audio information from VHS tape.
Audio bit depth	24 bits	Captures entire dynamic range of audio recorded to VHS with headroom for additional processing.

**ACCESS DERIVATIVE  
FROM VHS, VHS-C**

<b>Attribute</b>	<b>Value</b>	<b>Details/Rationale</b>
Container file format	.mp4 (MPEG-4 Part 14)	Widely-adopted ISO standard container for compressed video and audio.
Video bitstream encoding	H.264 High (MPEG-4 Part 10)	Lossy, compressed codec which provides excellent visual fidelity at small file sizes.
Frame width (pixels)	640	Resizes to correct aspect ratio of 4:3 when rendering with square pixels.
Frame height (pixels)	480	
Target video bit rate	1000 kbit/s	Balances visual quality with reduced file size.
Scanning	Progressive (deinterlaced with motion compensation)	Converts interlaced original to non-interlaced version for viewing on modern devices
Audio bitstream encoding	AAC (MPEG-4 Part 3)	Advanced Audio Coding (audio codec for MPEG-4 standard) provides good fidelity and compression.
Audio channels	2 (Stereo)	Preserves original stereo presentation when present.
Target audio bit rate	128 kbit/s	Balances audio quality with reduced file size.

Source: 8mm or 16mm film (including Super 8 and Super 16)

PRESERVATION MASTER FROM 8MM OR 16MM FILM		
Attribute	Value	Details/Rationale
Container/wrapper	QuickTime (.mov)	Semi-open, well documented video container format that is widely adopted.
Video bitstream encoding	ProRes 422 HQ	10-bit mezzanine codec which, although lossy and compressed, provides excellent visual fidelity to original and ample overhead for additional processing without quality loss.
Frame width (pixels)	2048	2K resolution captures all analog picture information from original frame.
Frame height (pixels)	1556	
Frame rate (fps)	16, 18, or 24 (per original)	16 and 18 fps were common home movie frame rates. 24 fps was the standard for professional films in the U.S.
Scanning	Progressive	Each video frame has a corresponding frame in the original film
Audio bitstream encoding	PCM	Pulse-code modulation (uncompressed audio stream).
Audio channels	Stereo	Captures single or double linear audio track.
Audio sampling rate	96 kHz	Ensures complete capture of audio information from optical/magnetic original.
Audio bit depth	24-bit	Captures entire dynamic range of original audio with headroom for additional processing.

ACCESS DERIVATIVE FROM 8MM OR 16MM FILM		
Attribute	Value	Details/Rationale
Container file format	.mp4 (MPEG-4 Part 14)	Widely-adopted ISO standard container for compressed video and audio.
Video bitstream encoding	H.264 High (MPEG-4 Part 10)	Lossy, compressed codec which provides excellent visual fidelity at small file sizes.
Frame width (pixels)	1920	Standard for HD playback. Pillar boxing (black bars) may be used to fill out the 16:9 frame if necessary.
Frame height (pixels)	1080	
Target video bit rate	5000 kbit/s	Balances visual quality with reduced file size.
Audio bitstream encoding	AAC (MPEG-4 Part 3)	Advanced Audio Coding (audio codec for MPEG-4 standard) provides good fidelity and compression.
Audio channels	2 (Stereo)	Preserves original stereo presentation when present.
Target audio bit rate	128 kbit/s	Balances audio quality with reduced file size.

Video media formats we can currently digitize & convert:

VHS, Video8, Hi8, Digital8, MiniDV, LaserDisc, DVD, MiniDVD-R.

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Our standards are drawn from national and international best practices of institutions and agencies that are at the forefront of audio and moving pictures production and digital archiving. When converting content from an analog to digital format, our goal is to provide a surrogate that replicates characteristics of the original such that it meets the requirements of our users.