

## C2: STANDARDS

The following tables contain standards summarized from various industry standards that should be followed for all digitization projects if possible. By adhering to these accepted standards, we are able to

- Ensure that the digital files created through digitization are of high quality and meet national and international standards
- Maintain the integrity and longevity of the digital files for long term digital preservation

These standards are subject to change as technology and practice evolve. Furthermore, each digitization project is unique in its setting and goals. The ultimate objective is to have a preservation master copy that is a faithful reproduction of the original from which additional copies can be made.

### Manuscripts and printed text

	<b>Preservation and Access Master</b>	<b>Print Access</b>	<b>Screen Access</b>	<b>Thumbnail</b>
<b>File format</b>	TIFF and TXT or PDF/A with OCR	JPEG, PNG or PDF with OCR	JPEG, PNG or PDF with OCR	JPEG or PNG
<b>Resolution</b>	300 – 600 dpi	150 – 300 dpi	150 dpi	150 dpi
<b>Bit depth</b>	24 bit RBG colour or 8 bit grayscale	24 bit RBG colour or 8 bit grayscale	24 bit RBG colour or 8 bit grayscale	24 bit colour RBG or 8 bit grayscale
<b>Dimensions</b>	3000 – 6000 pixels across the long edge	3000 pixels across the long edge	800 pixels across the long edge	200 pixels across the long edge
<b>Compression</b>	Uncompressed	Lossless compression	Lossless compression	Lossless compression

### Photographs

	<b>Preservation and Access Master</b>	<b>Print Access</b>	<b>Screen Access</b>	<b>Thumbnail</b>
<b>File format</b>	TIFF	JPEG or PNG	JPEG or PNG	JPEG or PNG
<b>Resolution</b>	300 – 600 dpi	150 – 300 dpi	150 dpi	150 dpi
<b>Bit depth</b>	24 bit RBG colour or 8 bit grayscale	24 bit RBG colour or 8 bit grayscale	24 bit RBG colour or 8 bit grayscale	24 bit RBG colour or 8 bit grayscale
<b>Dimensions</b>	3000 – 6000 pixels across the long edge	3000 pixels across the long edge	800 pixels across the long edge	200 pixels across the long edge
<b>Compression</b>	Uncompressed	Lossless compression	Lossless compression	Lossless compression

### Film, negatives, and slides

	<b>Preservation and Access Master</b>	<b>Print Access</b>	<b>Screen Access</b>	<b>Thumbnail</b>
<b>File format</b>	TIFF	JPEG or PNG	JPEG or PNG	JPEG or PNG
<b>Resolution</b>	800 – 1200 dpi	150 – 300 dpi	150 dpi	150 dpi
<b>Bit depth</b>	24 bit RBG colour or 8 bit grayscale	24 bit RBG colour or 8 bit grayscale	24 bit RBG colour or 8 bit grayscale	24 bit RBG colour or 8 bit grayscale
<b>Dimensions</b>	4000 – 6000 pixels across the long edge	3000 pixels across the long edge	800 pixels across the long edge	200 pixels across the long edge
<b>Compression</b>	Uncompressed	Lossless compression	Lossless compression	Lossless compression

### Graphic art

	<b>Preservation and Access Master</b>	<b>Print Access</b>	<b>Screen Access</b>	<b>Thumbnail</b>
<b>File format</b>	TIFF	JPEG or PNG	JPEG or PNG	JPEG or PNG
<b>Resolution</b>	600 - 800 dpi	150 – 600 dpi	150 dpi	150 dpi

<b>Bit depth</b>	24 bit RGB colour or 8 bit grayscale	24 bit RGB colour or 8 bit grayscale	24 bit RGB colour or 8 bit grayscale	24 bit RGB colour or 8 bit grayscale
<b>Dimensions</b>	6000 – 8000 pixels across the long edge	6000 pixels across the long edge	800 pixels across the long edge	200 pixels across the long edge
<b>Compression</b>	Uncompressed	Lossless compression	Lossless compression	Lossless compression

## Maps

	<b>Preservation and Access Master</b>	<b>Print Access</b>	<b>Screen Access</b>	<b>Thumbnail</b>
<b>File format</b>	TIFF	JPEG or PNG	JPEG or PNG	JPEG or PNG
<b>Resolution</b>	Less than 36 inches on the long edge: 600 dpi Greater than 36 inches on the long edge: 300 – 400 dpi	Less than 36 inches on the long edge: 300 dpi Greater than 36 inches on the long edge: 150 dpi	150 dpi	150 dpi
<b>Bit depth</b>	24 bit RGB colour or 8 bit grayscale	24 bit RGB colour or 8 bit grayscale	24 bit RGB colour or 8 bit grayscale	24 bit RGB colour or 8 bit grayscale
<b>Dimensions</b>	6000 – 8000 pixels across the long edge	6000 pixels across the long edge	1078 pixels across the long edge	200 pixels across the long edge
<b>Compression</b>	Uncompressed	Lossless compression	Lossless compression	Lossless compression

## Audio recordings

	<b>Preservation and Access Master</b>	<b>Screen Access</b>
<b>File Format</b>	WAV, BWF or AIF (Apple)	MP3
<b>Sample Rate</b>	Spoken language: 44.1 kHz Music and ambient sounds: 96 kHz	44.1 kHz
<b>Bit Depth</b>	24 bit	16 bit
<b>Comments</b>	Highest recommended current quality, Standard for DVD/HD audio, Requires conversion to 16 bit and 44.1 kHz for most consumer audio devices	Lowest frequency range acceptable, Maximizes storage space, May not provide sufficient quality for future formats

## Video recordings

	<b>Preservation and Access Master<sup>1</sup></b>		<b>Screen Access<sup>2</sup></b>
<b>File format</b>	QuickTime .mov	<b>File format</b>	.mov
<b>Codec</b>	UYVY	<b>Codec</b>	QuickTime H.264
<b>Bit depth</b>	10 bit	<b>Frame size width</b>	640
<b>Frame size width</b>	720 pixels	<b>Frame size height</b>	360
<b>Frame size height</b>	576 pixels	<b>Pixel aspect ratio</b>	Square
<b>Frame rate</b>	25 frames per second	<b>Frame rate</b>	23.976
<b>Frame type</b>	Progressive	<b>Field Output</b>	Progressive
<b>Frame aspect ratio</b>	4:3	<b>Pixel depth</b>	24
<b>Pixel aspect ratio</b>	1:1	<b>Spatial quality</b>	75
<b>Colour space</b>	YCrCb	<b>Min. Spatial quality</b>	25
<b>Chroma sub sampling</b>	4:2:2	<b>Key frame interval</b>	30
<b>Audio component</b>	Uncompressed stereo audio	<b>Temporal quality</b>	50
<b>Compressor</b>	uncompressed PCM	<b>Min. temporal quality</b>	25
<b>Bit depth</b>	16bit / 24bit	<b>Average data rate</b>	1.331 Mbps

<sup>1</sup> To be truly a preservation master, video should be in an uncompressed state. However, in a raw, uncompressed state, 1 minute of video uses up to 1GB of storage. Another file format (codec with wrapper) suitable for preservation is JPEG 2000 with the MXF wrapper. JPEG 2000 offers lossless compression and reduces the file size by 3:1.

<sup>2</sup> These standards are applicable to born digital video as well. Born digital video captured at these standards can then serve as the Preservation and Access Masters.

<b>Sample rate</b>	48KHz	<b>Maximum data rate</b>	1.331 Mbps
<b>Number of channels</b>	2	<b>Audio Encoder</b>	AAC, Stereo (L R), 48.000 kHz
<b>Audio interleave</b>	1 sec	<b>File size</b>	599.04 MB/hour of source
<b>File size</b>	93 GB/hour (approx.)		

## GLOSSARY OF TERMS

**dpi** stands for dots per inch, a measurement of resolution for a digitized document (the higher the dpi, the better the tonality of the image.) The dpi setting of the scanner relates to the final pixel size of the scanned image.

**8-bit** refers to method of storing image information in a computer's memory or in an image file, such that each pixel is represented by one 8-bit byte.

**grayscale** refers to an image in which the value of each pixel is a single sample composed exclusively of shades of grey.

**JPEG** stands for Joint Photographic Experts Group and refers to a type of graphics file format commonly used for images, photographs, etc.

**PDF** stands for Portable Document Format and is Adobe's proprietary file format.

**OCR** stands for Optical Character Recognition. It is the electronic translation of scanned text into machine-encoded text. OCR makes it possible to edit the text, search for a word or phrase, etc.

**24-bit RGB** refers to 24 bits per pixel in which three 8-bit integers between 0 and 255 represent red, green and blue intensities.

**TIFF** stands for Tagged Image File Format and refers to a type of file format for storing images.

**96 kHz 24-bit** refers to sample rate for audio. It means that a sample at 24 bits is taken 96,000 times per second.

**BWF** stands for Broadcast Wave Format. It is a standard used by the broadcast industry whereby metadata can be added to Wave files.

**WAV** stands for Waveform Audio File Format. It is an audio file format standard for storing an audio bitstream.

**MP3** is a digital audio encoding format using a form of lossy data compress