

Scanning Specifications

These scanning specifications should be used for the majority of the items that are scanned for a MMP digitization project.

TEXT DOCUMENTS

Features of Original Object	Digital Master File	Access File
<p>Clean, high-contrast documents with printed type (e.g. laser printed or typeset)</p>	<p><u>File format:</u></p> <ul style="list-style-type: none"> • TIFF or JPEG2000 <p><u>Pixel array:</u></p> <ul style="list-style-type: none"> • 6000 pixels across the long dimension for 1-bit bitonal mode. • 4000 pixels across long dimension for 8-bit grayscale. <p><u>Resolution and bit depth:</u></p> <ul style="list-style-type: none"> • 1-bit bitonal mode: 600 PPI. The 600 PPI 1-bit files can be produced via scanning or created/derived from 400 PPI, 8-bit grayscale images. -or- • 8-bit grayscale mode: 400 PPI <p><u>Spatial Dimensions:</u></p> <ul style="list-style-type: none"> • 100% of original 	<p><u>Image file format:</u></p> <ul style="list-style-type: none"> • JPEG <p><u>Pixel array:</u></p> <ul style="list-style-type: none"> • 600 pixels across the long dimension <p><u>Resolution and bit depth:</u></p> <ul style="list-style-type: none"> • 8-bit grayscale ,150 – 200 PPI <p><u>Other file formats:</u></p> <ul style="list-style-type: none"> • PDF
<p>Documents with poor legibility or diffuse characters (e.g. carbon copies, Thermofax/Verifax), handwritten annotations or other markings, low inherent contrast, staining, fading, halftone illustrations, or photographs</p>	<p><u>File format:</u></p> <ul style="list-style-type: none"> • TIFF or JPEG2000 <p><u>Pixel array:</u></p> <ul style="list-style-type: none"> • 4000 pixels across long dimension. <p><u>Resolution and bit depth:</u></p> <ul style="list-style-type: none"> • 8-bit grayscale mode: 400 PPI <p><u>Spatial Dimensions:</u></p> <ul style="list-style-type: none"> • 100% of original 	<p><u>File format:</u></p> <ul style="list-style-type: none"> • JPEG <p><u>Pixel array:</u></p> <ul style="list-style-type: none"> • 600 pixels across the long dimension <p><u>Resolution and bit depth:</u></p> <ul style="list-style-type: none"> • 8-bit grayscale or 24-bit color ,150 – 200 PPI <p><u>Other file formats:</u></p> <ul style="list-style-type: none"> • PDF •

Montana Memory Project

Features of Original Object	Digital Master File	Access File
Documents as described for grayscale scanning and/or where color is important to the interpretation of the information or content, or desire to produce the most accurate representation	<p><u>File format:</u> TIFF or JPEG2000</p> <p><u>Pixel array:</u> 4000 pixels across long dimension.</p> <p><u>Resolution and bit depth:</u></p> <ul style="list-style-type: none"> • 24-bit RGB mode - 400 PPI <p><u>Spatial Dimensions:</u></p> <ul style="list-style-type: none"> • 100% of original 	<p><u>File format:</u></p> <ul style="list-style-type: none"> • JPEG <p><u>Pixel array:</u></p> <ul style="list-style-type: none"> • 600 pixels across the long dimension <p><u>Resolution and bit depth:</u></p> <ul style="list-style-type: none"> • 24-bit color ,150 – 200 PPI <p><u>Other file formats:</u></p> <ul style="list-style-type: none"> • PDF

YEARBOOKS

Features of Original Object	Digital Master File	Access File
School yearbook (Generally, clean, high-contrast documents with printed type and photographs)	<p><u>File format:</u></p> <ul style="list-style-type: none"> • TIFF or JPEG2000 <p><u>Pixel array:</u></p> <ul style="list-style-type: none"> • 6000 pixels across the long dimension for 1-bit bitonal mode. • 4000 pixels across long dimension for 8-bit grayscale. <p><u>Resolution and bit depth:</u></p> <ul style="list-style-type: none"> • 8-bit grayscale mode: 300 PPI OR • 24-bit color, 300 PPI <p><u>Spatial Dimensions:</u></p> <ul style="list-style-type: none"> • 100% of original 	<p><u>Image file format:</u></p> <ul style="list-style-type: none"> • JPEG <p><u>Pixel array:</u></p> <ul style="list-style-type: none"> • 600 pixels across the long dimension <p><u>Resolution and bit depth:</u></p> <ul style="list-style-type: none"> • 8-bit grayscale ,150 – 200 PPI <p><u>Other file formats:</u></p> <ul style="list-style-type: none"> • PDF

GRAPHIC ILLUSTRATIONS / ARTWORK

Features of Original Object	Digital Master File	Access File
Clean, high-contrast documents with printed type (e.g. laser printed or typeset)	<p><u>File format:</u></p> <ul style="list-style-type: none"> • TIFF or JPEG2000 <p><u>Pixel array:</u></p> <ul style="list-style-type: none"> • 6000 pixels across the long dimension for 1-bit bitonal mode. • 4000 pixels across long dimension for 8-bit grayscale. <p><u>Resolution and bit depth:</u></p>	<p><u>File format:</u></p> <ul style="list-style-type: none"> • JPEG <p><u>Pixel array:</u></p> <ul style="list-style-type: none"> • 600 pixels across the long dimension <p><u>Resolution and bit depth:</u></p> <ul style="list-style-type: none"> • 1-bit bitonal or 8-bit grayscale, 200 PPI

Montana Memory Project

Features of Original Object	Digital Master File	Access File
	<ul style="list-style-type: none"> 1-bit bitonal mode: 600 PPI. The 600 PPI 1-bit files can be produced via scanning or created/derived from 400 PPI, 8-bit grayscale images. -or- 8-bit grayscale mode: 400 PPI <u>Spatial Dimensions:</u> <ul style="list-style-type: none"> 100% of original 	
Documents with poor legibility or diffuse characters (e.g. carbon copies, Thermofax/Verifax), handwritten annotations or other markings, low inherent contrast, staining, fading, halftone illustrations, or photographs	<u>File format:</u> <ul style="list-style-type: none"> TIFF or JPEG2000 <u>Pixel array:</u> <ul style="list-style-type: none"> 4000 pixels across long dimension. <u>Resolution and bit depth:</u> <ul style="list-style-type: none"> 8-bit grayscale mode: 400 PPI <u>Spatial Dimensions:</u> <ul style="list-style-type: none"> 100% of original 	<u>File format:</u> <ul style="list-style-type: none"> JPEG <u>Pixel array:</u> <ul style="list-style-type: none"> 600 pixels across the long dimension <u>Resolution and bit depth:</u> <ul style="list-style-type: none"> 8-bit grayscale, 200 PPI
Documents as described for grayscale scanning and/or where color is important to the interpretation of the information or content, or desire to produce the most accurate representation	<u>File format:</u> <ul style="list-style-type: none"> TIFF or JPEG2000 <u>Pixel array:</u> <ul style="list-style-type: none"> 4000 pixels across long dimension. <u>Resolution and bit depth:</u> <ul style="list-style-type: none"> 24-bit color mode - 400 PPI <u>Spatial Dimensions:</u> <ul style="list-style-type: none"> 100% of original 	<u>File format:</u> <ul style="list-style-type: none"> JPEG <u>Pixel array:</u> <ul style="list-style-type: none"> 600 pixels across the long dimension <u>Resolution and bit depth:</u> <ul style="list-style-type: none"> 24-bit color, 200 PPI

MAPS AND PLANS

Features of Original Object	Digital Master File	Access File
Clean, high-contrast documents with printed type (e.g. laser printed or typeset)	<u>File format:</u> <ul style="list-style-type: none"> TIFF or JPEG2000 <u>Pixel array:</u> <ul style="list-style-type: none"> 6000 pixels across the long dimension for 1-bit bitonal mode. 4000 pixels across long dimension for 8- 	<u>File format:</u> <ul style="list-style-type: none"> JPEG <u>Pixel array:</u> <ul style="list-style-type: none"> 1078 pixels across the long dimension <u>Resolution and bit depth:</u> <ul style="list-style-type: none"> 1-bit bitonal or 8-bit grayscale, 150-200

Montana Memory Project

Features of Original Object	Digital Master File	Access File
	<p>grayscale.</p> <p><u>Resolution and bit depth:</u></p> <ul style="list-style-type: none"> • 1-bit bitonal mode: 600 PPI The 600 PPI 1-bit files can be produced via scanning or created/derived from 400 PPI, 8-bit grayscale images. -or- • 8-bit grayscale mode: 400 PPI <p><u>Spatial Dimensions:</u></p> <ul style="list-style-type: none"> • 100% of original 	<p>PPI</p> <p><u>Other file formats:</u></p> <ul style="list-style-type: none"> • PDF
<p>Documents with poor legibility or diffuse characters (e.g. carbon copies, Thermofax/Verifax), handwritten annotations or other markings, low inherent contrast, staining, fading, halftone illustrations, or photographs</p>	<p><u>File format:</u></p> <ul style="list-style-type: none"> • TIFF or JPEG2000 <p><u>Pixel array:</u></p> <ul style="list-style-type: none"> • 4000 pixels across long dimension. <p><u>Resolution and bit depth:</u></p> <ul style="list-style-type: none"> • 8-bit grayscale mode: 400 <p><u>Spatial Dimensions:</u></p> <ul style="list-style-type: none"> • 100% of original 	<p><u>File format:</u></p> <ul style="list-style-type: none"> • JPEG <p><u>Pixel array:</u></p> <ul style="list-style-type: none"> • 1078 pixels across the long dimension <p><u>Resolution and bit depth:</u></p> <ul style="list-style-type: none"> • 8-bit grayscale, 150-200 PPI
<p>Documents as described for grayscale scanning and/or where color is important to the interpretation of the information or content, or desire to produce the most accurate representation</p>	<p><u>File format:</u></p> <ul style="list-style-type: none"> • TIFF or JPEG2000 <p><u>Pixel array:</u></p> <ul style="list-style-type: none"> • 4000 pixels across long dimension. <p><u>Resolution and bit depth:</u></p> <ul style="list-style-type: none"> • 24-bit color mode - 400 PPI <p><u>Spatial Dimensions:</u></p> <ul style="list-style-type: none"> • 100% of original 	<p><u>File format:</u></p> <ul style="list-style-type: none"> • JPEG <p><u>Pixel array:</u></p> <ul style="list-style-type: none"> • 1078 pixels across the long dimension <p><u>Resolution and bit depth:</u></p> <ul style="list-style-type: none"> • 24-bit color, 150-200 PPI

Montana Memory Project

PHOTOGRAPHS - TRANSMISSIVE ORIGINALS (FILM, SLIDES AND NEGATIVES)*

Features of Original Object	Digital Master File	Access File
<p>35 mm and medium format, up to 4x5 in.</p>	<p><u>File format:</u></p> <ul style="list-style-type: none"> • TIFF or JPEG2000 <p><u>Pixel array:</u></p> <ul style="list-style-type: none"> • 4000 pixels across long dimension of image area, excluding mounts and borders. <p><u>Resolution and bit depth:</u></p> <ul style="list-style-type: none"> • Adjust the scan resolution to meet pixel array specifications, based on the format of the original object – approximately 2800 PPI for 35mm originals and ranging down to approximately 800 PPI for originals approaching 4x5 in. • 8-bit grayscale mode for black-and-white, can be produced from a 16-bit grayscale file. -or- • 24-bit color mode for color and monochrome (e.g. collodian wet-plate negative, pyro developed negatives, stained negatives, etc.), can be produced from a 48-bit RGB file. <p><u>Dimensions:</u></p> <ul style="list-style-type: none"> • Sized to match original, no magnification or reduction. 	<p><u>File format:</u></p> <ul style="list-style-type: none"> • JPEG <p><u>Pixel array:</u></p> <ul style="list-style-type: none"> • 600 pixels across the long dimension <p><u>Resolution and bit depth:</u></p> <ul style="list-style-type: none"> • 8-bit grayscale or 24-bit color, 150-200 PPI
<p>Equal to or larger than 4x5" and up to 8x10 in.</p>	<p><u>File format:</u></p> <ul style="list-style-type: none"> • TIFF or JPEG2000 <p><u>Pixel array:</u></p> <ul style="list-style-type: none"> • 6000 pixels across long dimension of image area, excluding mounts and borders. <p><u>Resolution and bit depth:</u></p>	<p><u>File format:</u></p> <ul style="list-style-type: none"> • JPEG <p><u>Pixel array:</u></p> <ul style="list-style-type: none"> • 600 pixels across the long dimension <p><u>Resolution and bit depth:</u></p> <ul style="list-style-type: none"> • 8-bit grayscale or 24-bit color, 150-200 PPI

Montana Memory Project

Features of Original Object	Digital Master File	Access File
	<ul style="list-style-type: none"> • Adjust the scan resolution to meet pixel array specifications, based on the format of the original object – approximately 1200 PPI for 4x5 in. originals and ranging down to approximately 600 PPI for 8x10 in. originals. • 8-bit grayscale mode for black-and-white, can be produced from a 16-bit grayscale file. -or- • 24-bit RGB mode for color and monochrome (e.g. collodian wet-plate negative, pyro developed negatives, stained negatives, etc.), can be produced from a 48-bit RGB file. <p><u>Dimensions:</u></p> <ul style="list-style-type: none"> • Sized to match original, no magnification or reduction. 	
<p>Equal to or larger than 8x10 in.</p>	<p><u>File format:</u></p> <ul style="list-style-type: none"> • TIFF or JPEG2000 <p><u>Pixel array:</u></p> <ul style="list-style-type: none"> • 8000 pixels across long dimension of image area, excluding mounts and borders. <p><u>Resolution and bit depth:</u></p> <ul style="list-style-type: none"> • Adjust the scan resolution to meet pixel array specifications, based on the format of the original object – approximately 800 PPI for originals and approximately 8x10 in. and ranging down to the appropriate resolution 	<p><u>File format:</u></p> <ul style="list-style-type: none"> • JPEG <p><u>Pixel array:</u></p> <ul style="list-style-type: none"> • 600 pixels across the long dimension <p><u>Resolution and bit depth:</u></p> <ul style="list-style-type: none"> • 8-bit grayscale or 24-bit color, 150-200 PPI

Montana Memory Project

Features of Original Object	Digital Master File	Access File
	<p>to produce the desired size file from larger originals.</p> <ul style="list-style-type: none">• 8-bit grayscale mode for black-and-white, can be produced from a 16-bit grayscale file.-or-• 24-bit RGB mode for color and monochrome (e.g. collodian wet-plate negative, pyro developed negatives, stained negatives, etc.), can be produced from a 48-bit RGB file. <p><u>Dimensions:</u> Sized to match original, no magnification or reduction.</p>	

*Duplicate negatives and copy negatives can introduce problems in recommending scanning specifications, particularly if there is no indication of the size of the source object that was photographed. For copy negatives or transparencies of prints, use the specifications for that print size. For duplicates (negatives, slides, transparencies) match the size of the original object used to derive the duplicate. However, if the original size is not known, follow these recommendations:

- For a copy negative or transparency, scan at a resolution to achieve 4000 pixels across the long dimension.
- For duplicates, follow the scanning recommendations for the size that matches the actual physical dimensions of the duplicate.

For scanning negatives with multiple images on a single negative, see the section on scanning stereographs below.

Any reduction or enlargement in size must also be taken into account, if possible. If a ruler has been included in the scan, use it to verify that the image has not been reduced or enlarged before calculating appropriate resolution.

Often photographic negatives are the most difficult originals to scan. Unlike scanning positives, reflection prints, and transparencies or slides, there are no reference images to which to compare scans. Scanning negatives is very much like printing in the darkroom – it is up to the photographer/technician to adjust brightness and contrast to get a good image. Also, most scanners are not as well calibrated for scanning negatives compared to scanning positives.

Montana Memory Project

Be aware that during digital capture, pixels with histogram values of less than 9 or higher than 247 will be problematic for long-term viability of the digital master. Pixels of less than nine will have no detail in shadow areas and when printed will be “blocked.” Pixels with a value of higher than 247 will be without detail in the highlights and when printed, no ink will be used in those areas resulting in no detail/information.

To minimize the loss of detail, it is often necessary to scan negatives as positives (the image on the screen is negative), to invert the images in Photoshop, and then to adjust the images.

If black-and-white negatives are stained or discolored, we recommend making color RGB scans of the negatives and using the channel that minimizes the appearance of the staining / discoloration when viewed as a positive. The image can then be converted to a grayscale image.

The goal of the digital master is to create as exact a replica of the original as possible. To do this all stains, tears, fading, and any marks of deterioration must be captured in the master file.

Montana Memory Project

PHOTOGRAPHS - REFLECTIVE ORIGINALS (PRINTS)

Features of Original Object	Digital Master File	Access File
8x10 in. or smaller	<p><u>File format:</u></p> <ul style="list-style-type: none"> • TIFF or JPEG2000 <p><u>Pixel array:</u></p> <ul style="list-style-type: none"> • 4000 pixels across long dimension of image area, excluding mounts and borders. <p><u>Resolution and bit depth:</u></p> <ul style="list-style-type: none"> • Adjust the scan resolution to meet pixel array specifications, based on the format of the original object – approximately 400 PPI for 8x10 in. originals and ranging up to the appropriate resolution to produce the desired size file from smaller originals, approximately 570 PPI for 5x7 in. and 800 PPI for 4x5 in. or 3.5x5 in. originals. • 8-bit grayscale mode for black-and-white, can be produced from a 16-bit grayscale file. -or- • 24-bit RGB mode for color and monochrome (e.g. albumen prints or other historic print processes), can be produced from a 48-bit RGB file. <p><u>Dimensions:</u></p> <ul style="list-style-type: none"> • Sized to match original, no magnification or reduction. 	<p><u>File format:</u></p> <ul style="list-style-type: none"> • JPEG <p><u>Pixel array:</u></p> <ul style="list-style-type: none"> • 600 pixels across the long dimension <p><u>Resolution and bit depth:</u></p> <ul style="list-style-type: none"> • 8-bit grayscale or 24-bit color, 150-200 PPI

Montana Memory Project

Features of Original Object	Digital Master File	Access File
<p>Equal to or larger than 8x10 in. and up to 11x14 in.</p>	<p><u>File format:</u></p> <ul style="list-style-type: none"> • TIFF or JPEG2000 <p><u>Pixel array:</u></p> <ul style="list-style-type: none"> • 6000 pixels across long dimension of image area, excluding mounts and borders. <p><u>Resolution and bit depth:</u></p> <ul style="list-style-type: none"> • Adjust the scan resolution to meet pixel array specifications, based on the format of the original object – approximately 600 PPI for originals appropriately 8x10 in. and ranging down to approximately 430 PPI for 11x14 in. originals. • 8-bit grayscale mode for black-and-white, can be produced from a 16-bit grayscale file. -or- • 24-bit RGB mode for color and monochrome (e.g. albumen prints or other historic print processes), can be produced from a 48-bit RGB file. <p><u>Dimensions:</u> Sized to match original, no magnification or reduction.</p>	<p><u>File format:</u></p> <ul style="list-style-type: none"> • JPEG <p><u>Pixel array:</u></p> <ul style="list-style-type: none"> • 600 pixels across the long dimension <p><u>Resolution and bit depth:</u></p> <ul style="list-style-type: none"> • 8-bit grayscale or 24-bit color, 150-200 PPI

Montana Memory Project

Features of Original Object	Digital Master File	Access File
<p>Equal to or larger than 11x14 in.</p>	<p><u>File format:</u></p> <ul style="list-style-type: none"> • TIFF or JPEG2000 <p><u>Pixel array:</u></p> <ul style="list-style-type: none"> • 8000 pixels across long dimension of image area, excluding mounts and borders. • Adjust the scan resolution to meet pixel array specifications, based on the format of the original object – approximately 570 PPI for originals approximately 11x14 in. and ranging down to the appropriate resolution to produce the desired size file from larger originals. • 8-bit grayscale mode for black-and-white, can be produced from a 16-bit grayscale file. -or- • 24-bit RGB mode for color and monochrome (e.g. albumen prints or other historic print processes), can be produced from a 48-bit RGB file. <p><u>Dimensions:</u></p> <ul style="list-style-type: none"> • Sized to match original, no magnification or reduction. 	<p><u>File format:</u></p> <ul style="list-style-type: none"> • JPEG <p><u>Pixel array:</u></p> <ul style="list-style-type: none"> • 600 pixels across the long dimension <p><u>Resolution and bit depth:</u></p> <ul style="list-style-type: none"> • 8-bit grayscale or 24-bit color, 150-200 PPI

*For stereograph images and other multiple image prints, modified recommended scanning specifications are to scan to original size (length of both photos and mount) and to add 2000 pixels to the long dimension, in the event that only one of the photographs is requested for high-quality reproduction. For example, if the stereograph is 8 in. on the long dimension, a resolution of 500 ppi would be required to achieve 4000 pixels across the long dimension for that size format. In this case, adding 2000 pixels to the long dimension would require that the stereograph be scanned at 750 ppi to achieve the desired 6000 pixels across the long dimension.

Montana Memory Project

For photographic prints, size measurements for determining appropriate resolution are based on the size of the image area only, excluding any borders, frames or mounts. However, in order to show that the entire record has been captured, it is good practice to capture the border area in the master scan file. In cases where a small image is mounted on a large board (particularly where large file sizes may be an issue) 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 4000 pixels across the long dimension.

AUDIO FILES

Features of Original Object	Digital Master File (also Production Master)	Access File (as applicable)
Analog recording— cassette, reel-to-reel	<u>File format:</u> <ul style="list-style-type: none">• Wav <u>Compression:</u> <ul style="list-style-type: none">• lossless <u>Bit rate:</u> <ul style="list-style-type: none">• 24-bit <u>Sample rate:</u> <ul style="list-style-type: none">• 44.1 kHz <u>Volume:</u> <ul style="list-style-type: none">• Best possible without distortion	<u>File format:</u> <ul style="list-style-type: none">• Wma, mp3 <u>Compression:</u> <ul style="list-style-type: none">• High quality <u>Bit rate:</u> <ul style="list-style-type: none">• 16-bit <u>Sample rate:</u> <ul style="list-style-type: none">• 44.1 kHz <u>Volume:</u> <ul style="list-style-type: none">• Best possible without distortion

Montana Memory Project