LPU – 10

Forensic Imaging

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Crime Laboratory – Latent Fingerprint Unit	
Standard Operating Procedure Manual	
SOP # 10-1	Subject: Forensic Imaging, General
Approved: David C. Schultz	Matthew Mathis

Purpose:

This policy contains the procedures used by the Charlotte-Mecklenburg Latent Print Unit when using the Digital Imaging System for the digital capture of latent fingerprints. These refer to the digital recording and depiction of friction ridge impressions that are present or developed on evidence. Policies and procedures must be in place for the digital capture, storage, retrieval, display and transmission of friction ridge images retained as evidence. These policies and procedures are implemented to preserve identity, authenticity, integrity, and security of friction ridge digital images. A certain amount of latitude in the actual capture and enhancement of the images is left to the individual Fingerprint Analyst and/or laboratory management dependant on the physical conditions present on the evidence at time of recording. No protocol or procedure can replace sound judgment under all situations.

SWGIT POSITION ON FORENSIC IMAGE ANALYSIS

Forensic image analysis is a forensic science. It has been practiced since the early days of photography (1840's). In addition to being an accepted scientific practice in the forensic community, image analysis is also recognized in other disciplines including medicine, intelligence, geology, astronomy, agriculture, and others.

General:

Latent print image processing (capture & enhancement) will be done through the Adobe Photoshop Software program or CSIPIX Software and printed utilizing dye sublimation thermal printing to assure image longevity.

The digital imaging system will be used only by an Analyst of the Latent Print Unit for forensic fingerprint photography and to provide photographic support to other laboratory sections as needed. No other uses are permitted without the permission of the Section Administrator.

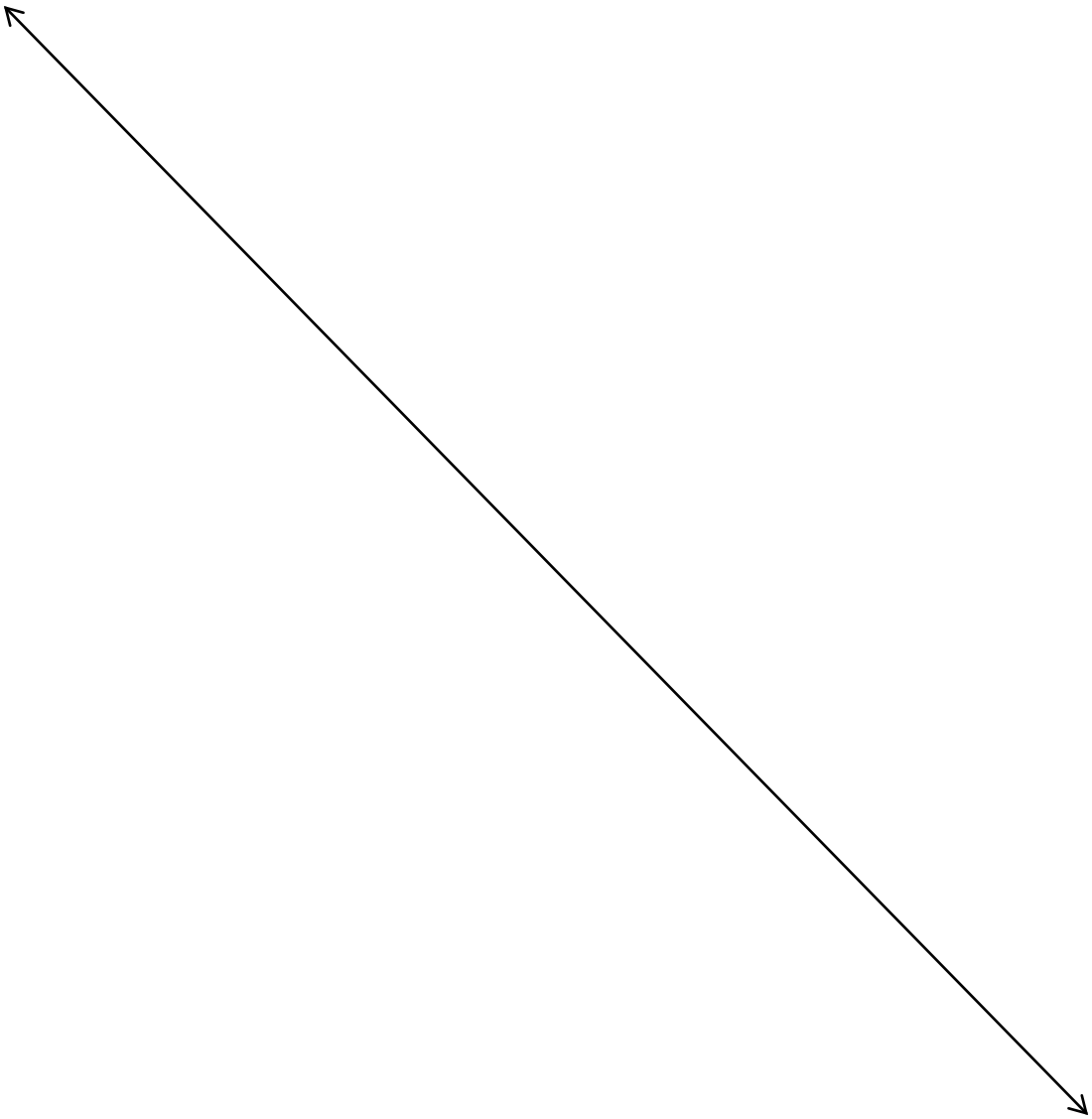
Image processing techniques approved for use on Working Images are those that have direct counterparts in traditional darkrooms. These include, but are not limited to, brightness and contrast adjustment, dodging and burning, color balancing, levels, curves, hue/saturation and invert. Additionally, using mode, channels and FFT filters is acceptable.

Tools prohibited for use on Working Images are those that only add or delete content from the image that serves no analytical purpose. These include, but are not limited to, rubber stamp, clone, airbrush, paintbrush, paint bucket, eraser and blur.

After the Working Image has been processed and the processes have been recorded, the image processing program is exited and the changes to the image and its history are saved as a separate file from the original in the PhotoShop history.

SAFETY CONSIDERATIONS: None

LIMITATIONS: Based upon existing equipment and technology



Crime Laboratory – Latent Fingerprint Unit	
Standard Operating Procedure Manual	
SOP # 10-2	Subject: Digital Evidence Glossary
Approved: David C. Schultz	Matthew Mathis

Administrative Review
A procedure used to check for consistency with agency/laboratory policy and for editorial practice.

Archive Copy
A copy of data placed on media suitable for long-term storage, from which subsequent working copies can be produced.

Archive Image
Any image placed on media that is suitable for long-term storage.
A bit stream duplicate of the original data placed on media that is suitable for long-term storage.

Archiving
Long-term storage of data.

Artifact
A visual/aural aberration in an image, video, or audio recording resulting from a technical or operational limitation. Examples include speckles in a scanned picture or “blocking” in images compressed using the JPEG standard.
Information or data created as a result of the use of an electronic device that shows past activity.

Authentication
The process of determining whether a recording or image is original, continuous, free from unexplained alterations (e.g., additions, deletions, edits, or artifacts) and is consistent with the stated operation of the recording device used to make it.

Capture
The process of recording data, such as an image, video sequence, or audio stream.

Capture card/frame grabber
A piece of computer hardware that accepts an analog or digital signal and outputs the signal as digital data.

Capture Device
A device used in the recording of data.

Carve
The extraction of a portion of data for the purpose of analysis.

CD/DVD (compact disc/digital versatile disc)
Optical disc formats designed to function as digital storage media.

Chain of Custody
The chronological documentation of the movement, location and possession of evidence.

Color Range
The range of colors that can be detected by a sensor.

Compression
The process of reducing the size of a data file. (See also, “Lossy Compression” and “Lossless Compression”.)

Compression ratio
The size of a data file before compression divided by the file size after compression.

Copy
An accurate reproduction of information.

Data
Information in analog or digital form that can be transmitted or processed.

Digital Evidence
Information of probative value that is stored or transmitted in binary form.

Digital Image
An image that is represented by discrete numerical values organized in a two-dimensional array. When viewed on a monitor or paper, it appears like a photograph.

Directory Listing
A list of all the files on media. It may also contain other information such as the size and dates of the files.

Duplicate
An accurate and complete reproduction of all data objects independent of the physical media.

Erased File Recovery
The process for recovering deleted files.

File Format
The structure by which data is organized in a file.

File Slack
The space between the end of file marker and the end of the last storage unit for that file. Ex: For the FAT file system, the space between the end of the file marker and the end of the cluster.

Forensic
The use or application of scientific knowledge to a point of law, especially as it applies to the investigation of crime.

Format
One or several combined elements that may be used to describe the video recording method. These include tape width (e.g. 8mm, ½ inch, ¾ inch, 1 inch), signal form (e.g. composite, Y/C, component), media (e.g. VHS tape, DVD, CD), data storage type (e.g. analog/digital, AVI/MPEG), and signal standard (e.g. NTSC, PAL, SECAM).

Free Space
Data storage areas available for use by the computer. The area may already contain previously stored information. Also referred to as Unallocated Space.

Format Conversion
To transfer audio and/or video information from one media type to another and/or from one recording method to another.

Image
A bit stream duplicate of the original data.
An imitation or representation of a person or thing, drawn, painted, photographed, etc.

Image Analysis
A sub-discipline of Digital & Multimedia Evidence, which involves the application of image science and domain expertise to examine and interpret the content of an image and/or the image itself in legal matters.

Image Comparison (Photographic Comparison)
The process of comparing images of questioned objects or persons to known objects or persons or images thereof, and making an assessment of the correspondence between features in these images for rendering an opinion regarding identification or elimination.

Image Enhancement
Any process intended to improve the visual appearance of an image or specific features within an image.

Imaging Technology
Any system or method used to capture, store, process, analyze, transmit, or produce an image. Such systems include film, electronic sensors, cameras, video devices, scanners, printers, computers, etc.

Image Transmission
The act of moving images from one location to another.

Intermediate Storage
Any media or device on which data is temporarily stored for transfer to permanent or archival storage.

Log File
A record of actions, events, and related data.

Lossy Compression
Compression in which data is lost and cannot be retrieved in its original form.

Lossless Compression
Compression in which no data is lost and all data can be retrieved in its original form.

Media
Objects on which data can be stored.

Native File Format
The original form of a file. A file created with one application can often be read by others, but a file's native format remains the format it was given by the application that created it. In most cases the specific attributes of a file (for example, fonts in a document) can only be changed when it is opened with the program that created it.

Original Image
An accurate and complete replica of the primary image, irrespective of media. For film and analog video, the primary image is the original image.

Partition
User defined section of electronic media.

Physical Copy
An accurate reproduction of information contained on the physical device.

Primary Image
Refers to the first instance in which an image is recorded onto any media that is a separate, identifiable object. Examples include a digital image recorded on a flash card or a digital image downloaded from the Internet.

Processed Image
Any image that has undergone enhancement, restoration or other operation.

Proprietary File Format
Any file format that is unique to a specific manufacturer or product.

Reproducibility
The extent to which a process yields the same results on repeated trials.

Residue
(c) Data that is contained in unallocated space or file slack.
(a) The residue of a filtered signal is the algebraic difference between the filter output and its signal input.

Storage Media
Any object on which data is preserved.

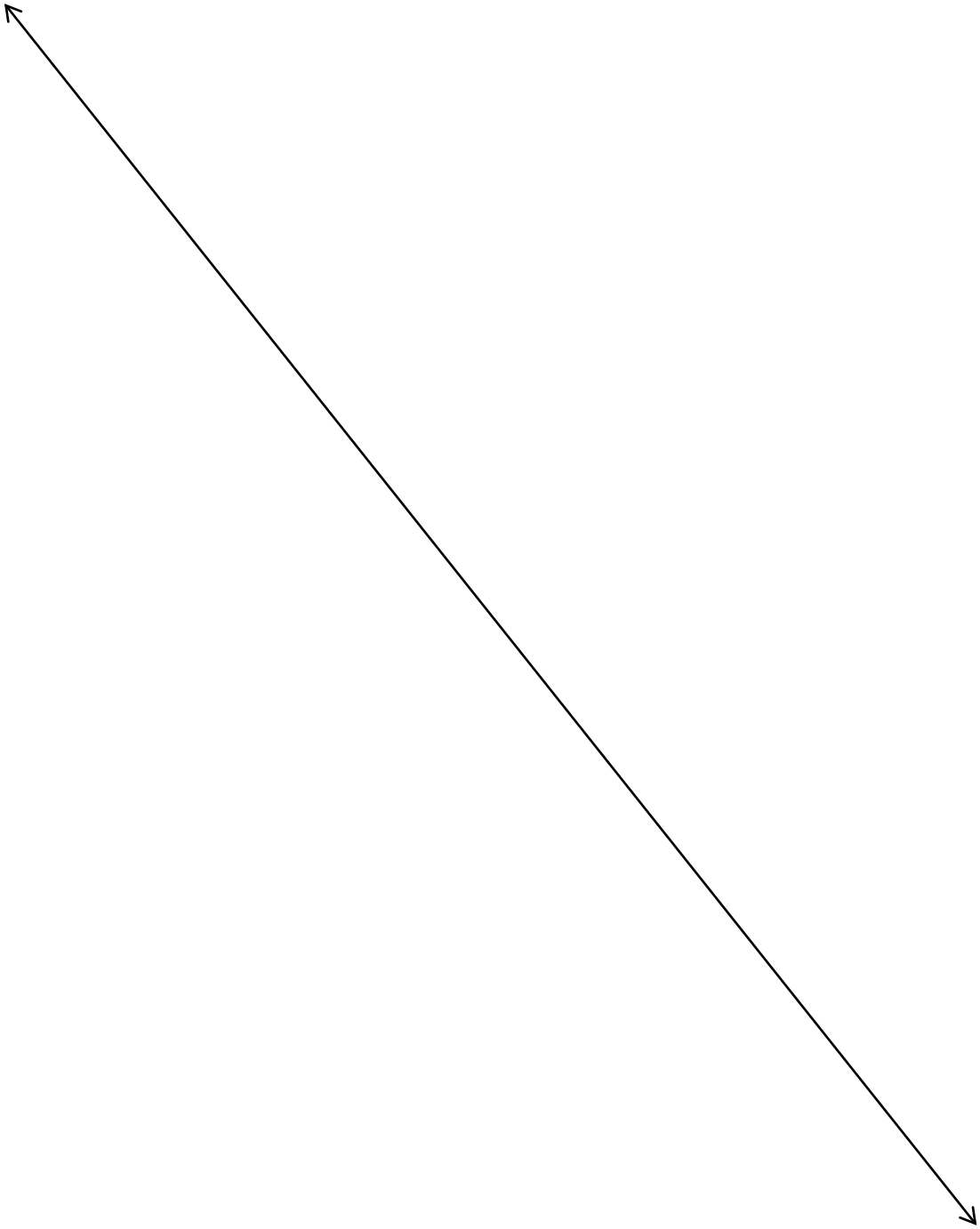
Traditional Enhancement Techniques
Techniques that have direct counterparts in traditional darkrooms. They include brightness & contrast adjustment, color balancing, cropping, and dodging & burning.

Unallocated Space
Data storage areas available for use by the computer. The area may already contain previously stored information. Also referred to as *Free Space*.

Verification
The process of confirming the accuracy of an item to its original.

Working Copy
A copy or duplicate of a recording or data that can be used for subsequent processing and/or analysis.

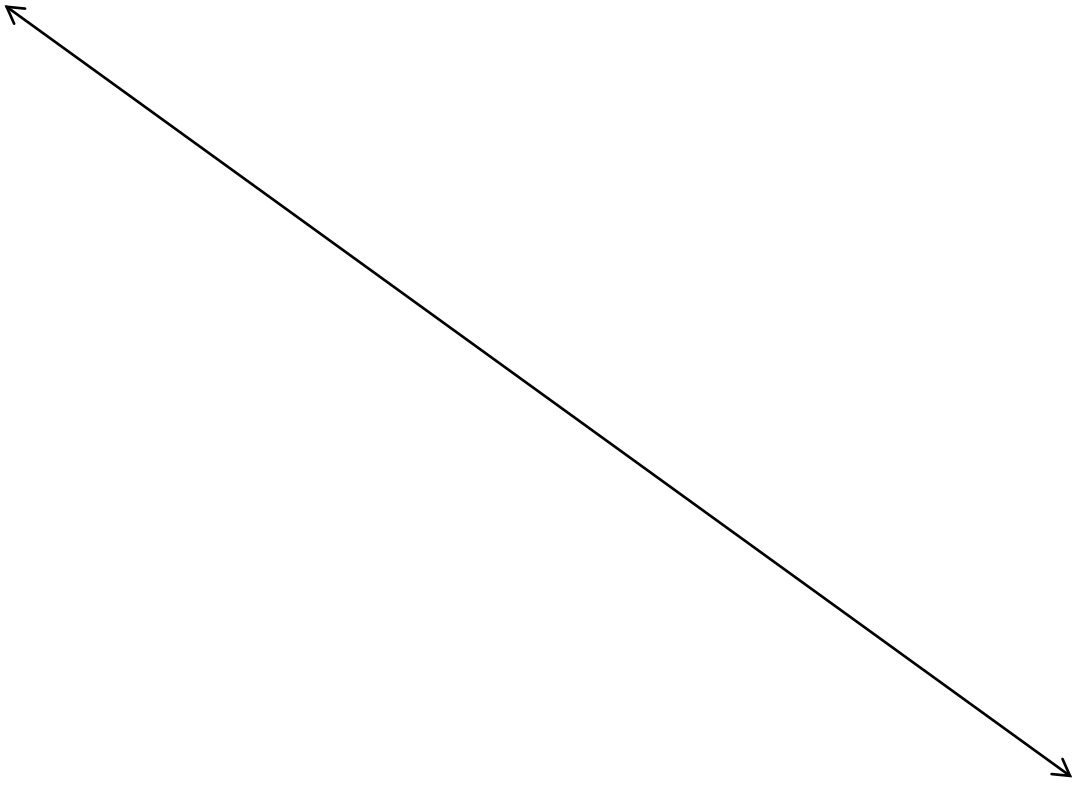
Write Block/Write Protect
Hardware and/or software methods of preventing modification of media content.



Crime Laboratory – Latent Fingerprint Unit	
Standard Operating Procedure Manual	
SOP # 10-3	Subject: Latent Print Digital Image Documentation
Approved: David C. Schultz	Matthew Mathis

Friction ridge digital image documentation
Friction ridge digital images, case notes, or associated data shall include the following*:*

1. Case number
2. Date and initials of analyst.
3. Description or identifier of the item bearing the friction ridge impression.
4. If available, information about the orientation and/or location of the friction ridge impression on the object through description and/or diagram(s), this may be included on the image, the notes matrix in PLIMS or final report.
5. In addition this section shall comply with any additional requirements imposed by the CMPD QAM.



Crime Laboratory – Latent Fingerprint Unit	
Standard Operating Procedure Manual	
SOP # 10-4	Subject: Latent Print Digital Image Quality
Approved: David C. Schultz	Matthew Mathis

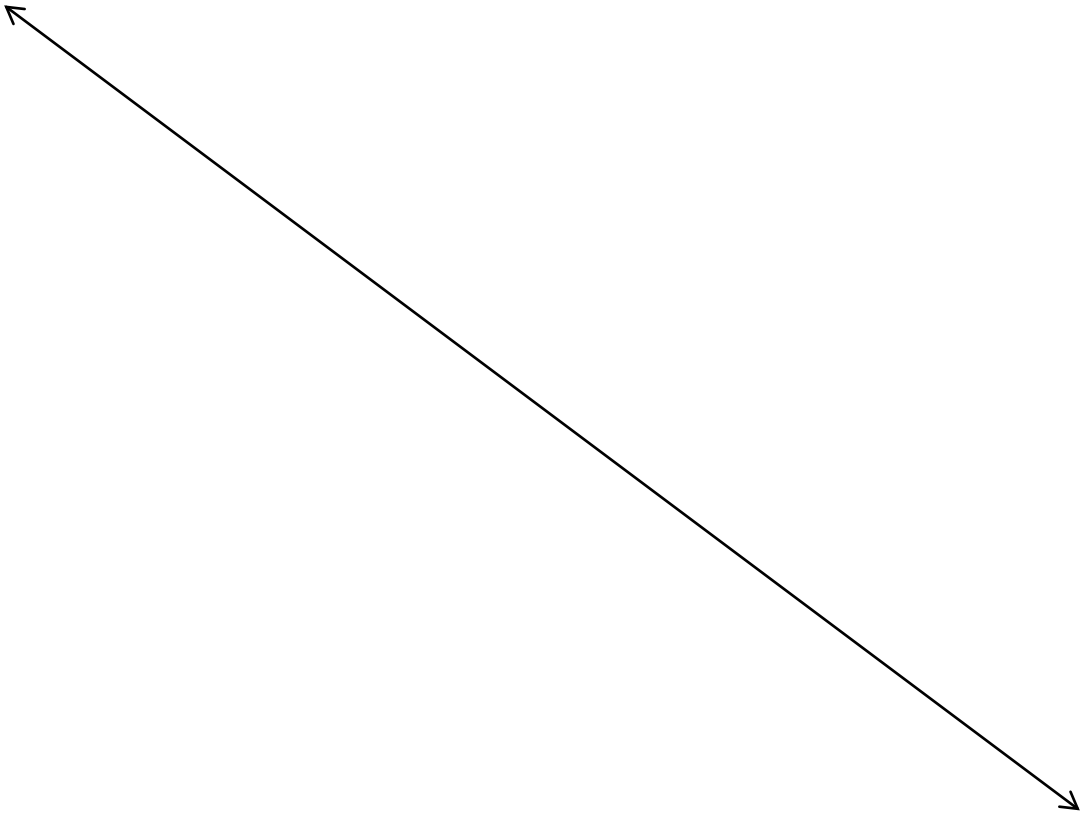
Friction Ridge Impression Digital Image Quality

1. Friction ridge impressions should be captured (color or grayscale) at 1000 PPI or higher resolution. Grayscale digital imaging should be at a minimum of 8 bits. Color digital imaging should be at a minimum of 24 bits.

2. Friction ridge impression digital images shall be stored and transmitted without compression or with lossless compression.

3. Images generated for other lab sections shall comply with that individual lab sections policies and technical requirements if applicable.

4. All images generated by the CMPD Latent Print unit shall be stored and archived as TIFF files.



Crime Laboratory – Latent Fingerprint Unit	
Standard Operating Procedure Manual	
SOP # 10-5	Subject: Latent Print Digital Image Integrity
Approved: David C. Schultz	Matthew Mathis

Friction Ridge Impression Digital Image Integrity

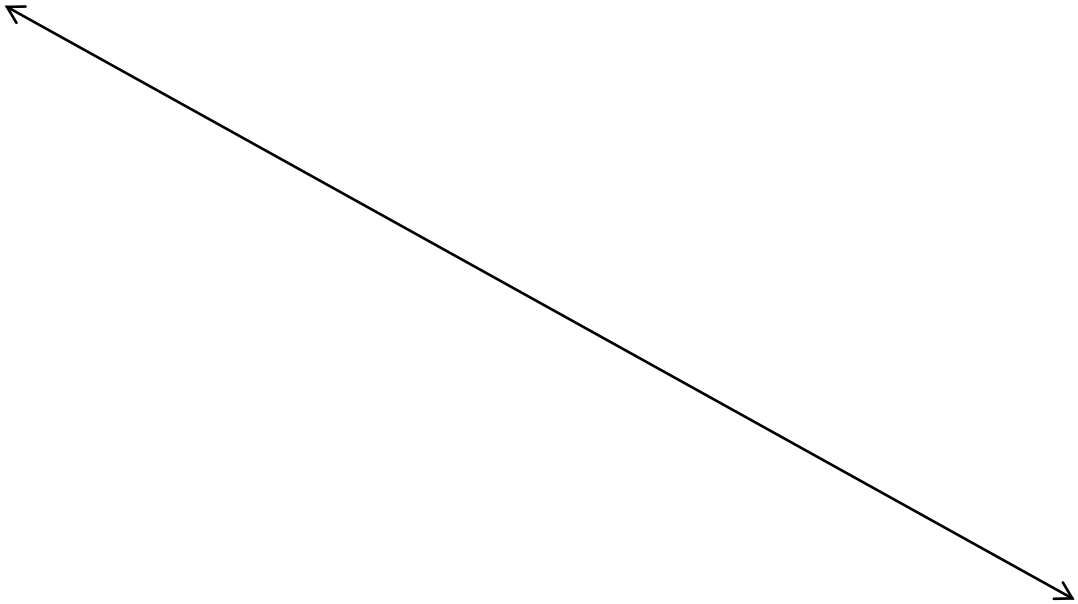
1. Each primary original digital image shall be stored in a manner which permits authentication. An original unaltered file will be created for every image from which working replicas will be created.

2. Original digital images are accurate replicas (pixel for pixel value) of the primary image.

3. Subsequent images resulting from digital processing techniques shall not replace, or be considered original images.

4. Digital images captured from lifts, or from conventional photographs or negatives, shall not replace the lift or photograph as original images.

5. Tools prohibited for use on Working Images are those that only add or delete content from the image that serves no analytical purpose. These include, but are not limited to, rubber stamp, clone, airbrush, paintbrush, paint bucket, eraser and blur if the software is so equipped.



Crime Laboratory – Latent Fingerprint Unit	
Standard Operating Procedure Manual	
SOP # 10-6	Subject: Casework Documentation
Approved: David C. Schultz	Matthew Mathis

Casework Documentation

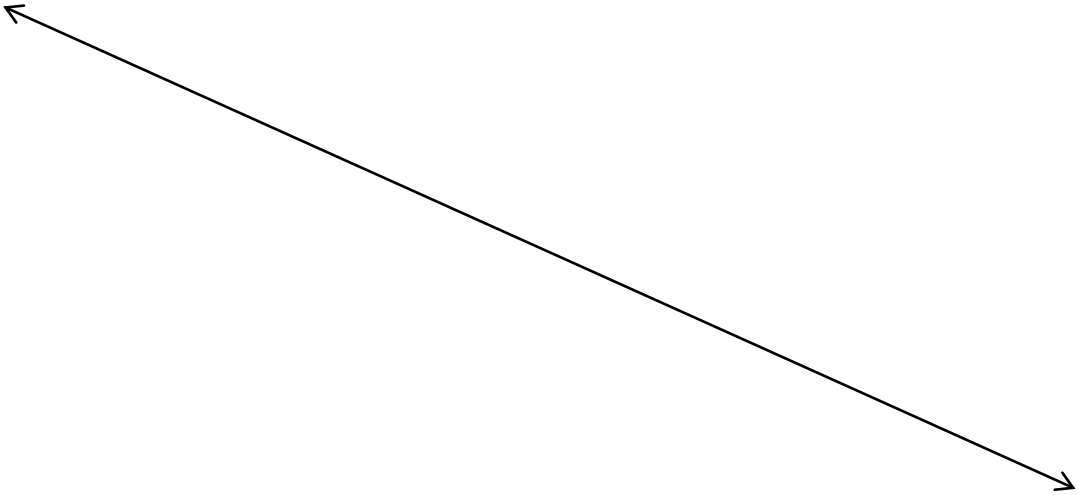
1. Documentation procedures in general, shall meet ASCLD LAB and CMPD PM-7 standards.

2. Casework documentation in PLIMS shall distinguish friction ridge impression (latent print) digital images from latent lifts in the parent item description.

3. The application of digital image processing (enhancement) techniques to a copy of an original digital image for comparison purposes shall be documented. This documentation must be sufficient to enable evaluation or replication of the digital image processing techniques. This standard can be met by software applications bundled with the enhancement software such as in Adobe Photoshop.

4. Digital images prepared for other purposes do not require digital image enhancement documentation, i.e., demonstrative court exhibits, display projects and training.

5. If only minor digital image adjustment are made to the entire image, similar to conventional photography/darkroom adjustment to brightness, contrast and color shift, etc., documentation is not required.



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Standard Operating Procedure Manual	
SOP # 10-7	Subject: Retention of Images / Image Deletion
Approved: David C. Schultz	Matthew Mathis

1. Latent print images of no value will not be retained and may be deleted to efficiently utilize available disc space.

2. Latent print images of value will not be deleted.

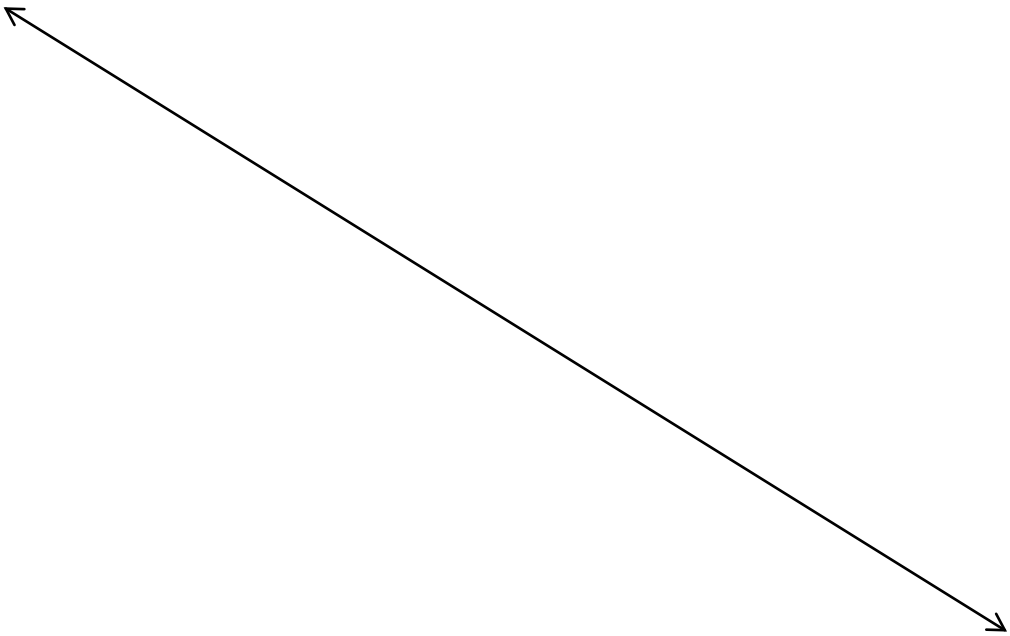
3. A master folder will be created for each case containing subfolders for each separate control number and working images.

4. Duplicate (working) folders will be stored under the master.

5. Images will be retained indefinitely and archived to CD or DVD as disc space is needed.

6. Original Image files will be backed up on redundant hard drives contained as part of the digital imaging system and will be backed up on the CMPD R Drive.

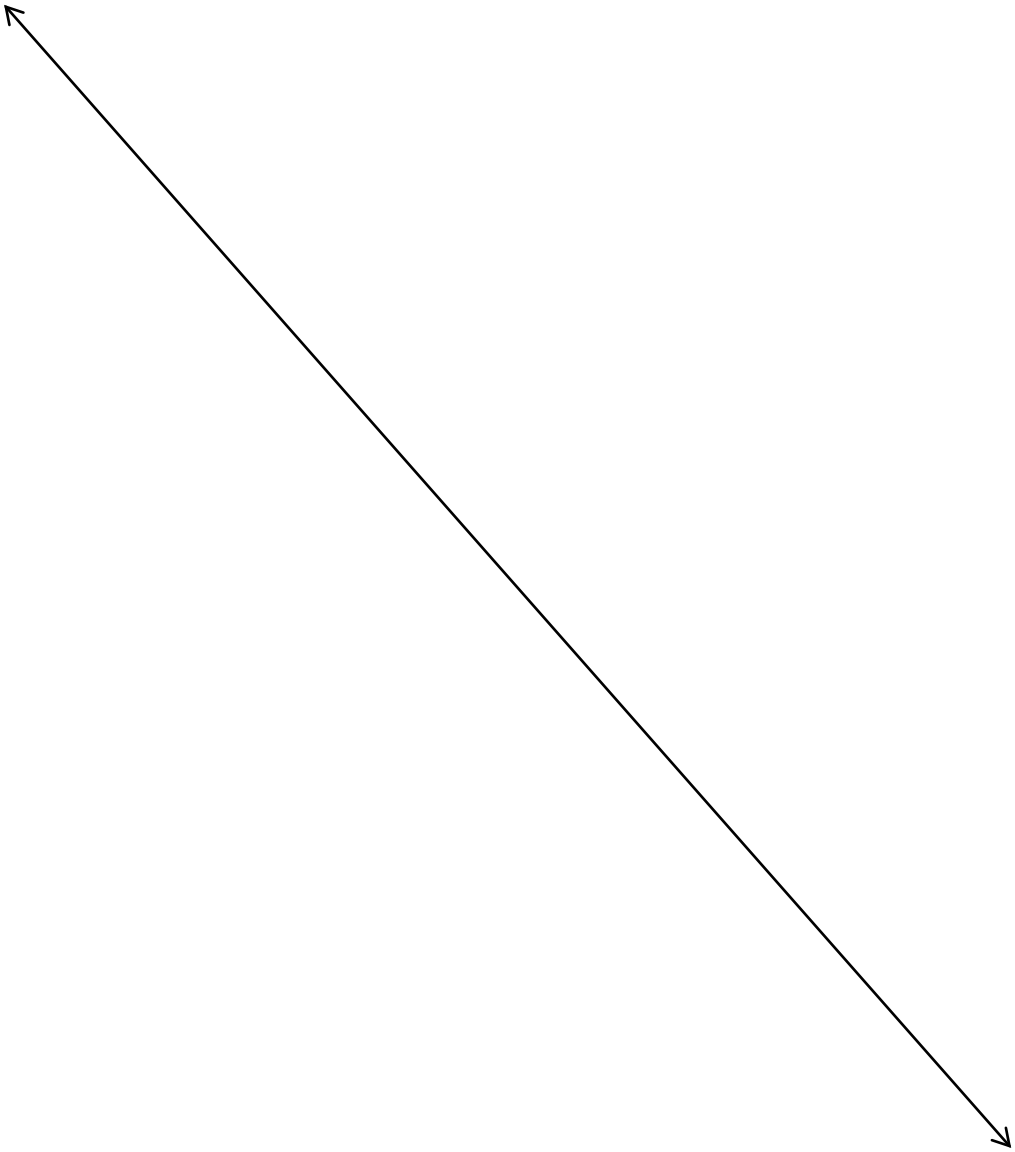
7. Secondary back up of all images, original and working, will be attached to the case record in PLIMS.



Crime Laboratory – Latent Fingerprint Unit	
Standard Operating Procedure Manual	
SOP # 10-8	Subject: Storage & Backup
Approved: David C. Schultz	Matthew Mathis

1. Archiving will be done to CD-R/DVD-R in the event that disc space is needed.

2. Archived CD/DVD's will be stored in the same manner as archived latent fingerprints.



Crime Laboratory – Latent Fingerprint Unit	
Standard Operating Procedure Manual	
SOP # 10-9	Subject: Storage Medium
Approved: David C. Schultz	Matthew Mathis

Acceptable methods of media and image storage for archival and working storage shall meet the following conditions.

1. Data stored on CD/DVD shall be stored on CD-R/DVD-R write once media or with disc finalization.

2. Storage media should be of high quality to ensure long storage life.

3. Only industry standard formats shall be used for data/image storage (TIFF)

4. CDs shall be stored in appropriate conditions and be protected from light and moisture.

5. There shall be no writing or sticky labels placed directly on either side of the CD/DVD as to protect the dye layer. All documentation shall be on the CD/DVD case.