

Latent Prints Overview



Latent prints are impressions produced by the ridged skin, known as friction ridges, on human fingers, palms, and soles of the feet. Examiners analyze and compare latent prints to known prints of individuals in an effort to make identifications or exclusions. The uniqueness, permanence, and arrangement of the friction ridges allow examiners to positively match two prints and to determine whether two friction ridge impressions originated from one source.

Latent Prints are among the most valuable and common types of physical evidence. All objects at the scene of the crime should be considered as possible sources of fingerprints that may lead to identification of the offender. By examining the evidence submitted, the laboratory may be able to:

- Determine the presence of latent prints
- Determine if the latent prints are identifiable
- Compare and identify latent prints with the inked prints of suspects and with others for elimination purposes
- Establish the identity of unknown deceased persons
- Identify the print via the Automated Fingerprint Identification System (AFIS)

A variety of techniques, including use of chemicals, powders, lasers, alternate light sources, and other physical means, are employed in the detection and development of latent prints. In instances where a latent print has limited quality and quantity of detail, personnel may perform microscopic examinations in order to make conclusive comparisons.

Louis Kriel, Impressions Manager, 404-270-8181

Services and Prioritization

The Latent Print Section accepts evidence from all case types but limits cases involving latent prints on suspected drugs and/or paraphernalia from possession cases due to volume. These cases are accepted only after consultation with law enforcement and prosecution officials. If it is decided that the LP section will accept this type of evidence, the content needs to be removed prior to submission of the evidence to LP section

Cases are prioritized based on the type of incident. Crimes against persons involving injury or death take precedence over property crimes when the incoming cases are assigned. This is a general rule and exceptions are made on a case by case basis.

The section processes evidence and compares question friction ridge impressions to submitted known samples, the GBI AFIS database, and the FBI IAFIS database, as warranted.

Latent Print (LP) Processing

Evidence Types

In fingerprint comparisons the continuity of the ridge flow is vital to the outcome of the comparisons. Smoother surfaces usually deliver better quality impressions, but depending on the specific surface, it is possible to obtain fingerprints from rough or textured surfaces. It is therefore recommended that investigators contact the section for guidance when in doubt about the suitability of items for submission.



Evidence types are categorized based on the porosity of the surfaces. Surfaces are generally divided into three types:

Porous Surfaces – These types of surfaces absorb water and water soluble deposits in the sweat very quickly after deposition. Examples:

- Paper, checks, currency, tissue, cigarette butts, cardboard, fabrics, untreated wood, etc.
- Probability of getting usable prints: High.
- Best methods for developing prints: A series of processes in the following order - Visual examination, DFO (1,8-Diazafluoren-9-one), Ninhydrin (1,2,3-triketohydrindine hydrate), Physical Developer (Silver Physical developer).



Non-Porous Surfaces – These types of surfaces do not absorb the sweat. The fingerprint deposits can remain on the surface for a very long time. Examples:

- Glass, certain type plastics, polythene bags, metal surfaces, glazed ceramics, glossy paints, etc.
- Probability of getting usable prints: High.
- Best methods for developing prints: A series of processes in the following order - Visual examination, Superglue (Cyanoacrylate Ester), Fluorescent Dye Stain (for example, Rhodamine 6G), various types and colors of fingerprint powders that are mainly used when the impressions are difficult to photograph due to location on the evidence.

Semi-Porous Surfaces - These types of surfaces absorb water and water soluble deposits in the sweat slowly after deposition. Examples:

- Certain type plastics, waxed surfaces, certain types of wall paints, papers with a glossy finish, varnished wood, etc.
- Probability of getting usable prints: High.
- Best methods for developing prints will depend on the specific level of porosity. Either one of the two processes or a combination of the two processes described above can be followed.

Special Surfaces

Wet surfaces - Surfaces that have been wetted before being submitted for processing (e.g., items left out in the rain, firearms discarded in lakes, etc.) generally require special handling by the section. Processes do exist to recover fingerprints on wet or previously wetted items.

- Probability of getting usable prints: Medium to Low.
- Best methods for developing prints:
 - **Porous** substrates tend to give better results with Physical Developer.
 - **Non-porous** substrates are usually treated with powder in suspension (e.g., Small Particle Reagent or Wet Powder).

Surfaces contaminated with blood –

Fingerprints made in blood or with blood require special treatment. Fingerprints can be left by hands contaminated with blood even after the blood has dried on the hands. Some blood specific reagents will produce positive results with areas that came in contact with the dried blood. When fingerprints are left on surfaces covered with blood, they are usually visible before processing and need to be photographed with special lighting techniques before any further processing.



- Probability of getting usable prints: High.

- Best methods for developing prints: Blood sensitive reagents can usually be applied after the normal processing.
 - **Porous substrates** - both DFO and Ninhydrin will react with blood since both are protein stains. Amido Black can be used to enhance contrast.
 - **Non-porous substrates** - DFO can be applied on dark colored substrates and Amido Black on light colored substrates after normal processing.

Surfaces contaminated with grease or oil – Because ordinary processes are inhibited by the grease or oil, these surfaces require special treatment. Examples: Disposable fast food containers and utensils

- Probability of getting usable prints: Medium on Non-porous and Low on Porous.
- Best methods for developing prints: Gentian Violet or Sudan Black.

Surfaces with adhesive sides

- Examples: Various tapes including electrical tape and duct tape, labels, envelopes and stamps.
- Probability of getting usable prints: High.
- Best methods for developing prints: Powder in suspension techniques such as Wet Powder after the non-adhesive side has been processed with normal processes.

Thermal paper – These papers usually turn black with ordinary porous processing techniques and need special treatment. Examples: Cash register receipts and fax paper.

- Probability of getting usable prints: High.
- Best methods for developing prints: Special application methods of DFO and Ninhydrin.

Firearms – Firearms usually require a very thorough visual examination as the substrates are often oily. Depending on the specific circumstances of the case, in some instances firearms may need to be dismantled and all individual parts processed.

- Probability of getting usable prints: Due to the variation in manufacturing protocol can range from High on some firearms to Low on others.
- Best methods for developing prints: Due to the substrate usually being metal and oily, the visual examination is vitally important. The usual non-porous process is followed on all parts that are not porous. Often the stock is untreated wood that needs to be treated with the porous process.

Cartridges and cartridge casings – Brass items need special treatment. Fingerprints have been successfully recovered from spent cartridge casings even after being exposed to the high heat from the explosion.

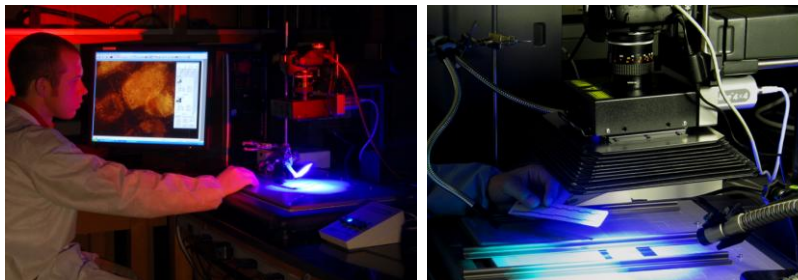
- Probability of getting usable prints: Medium to Low depending on the metal used for manufacturing as well as the state of corrosion of the evidence.
- Best methods for developing prints: Usual non-porous procedure with the addition of Gun Blue (Selenium Dioxide) as a last step.

Latex gloves – Gloves can be successfully processed as semi-porous surfaces. They should be submitted as soon as possible in order to obtain positive processing results.

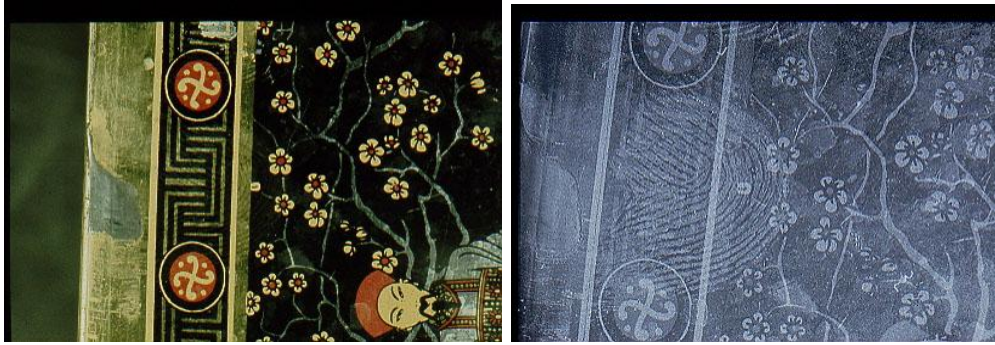
- Probability of getting usable prints: Medium to Low depending on how soon after deposition the evidence is processed.
- Best methods for developing prints: One or both of the porous and non-porous processes can be used. Recent research shows that powder in suspension yields good results, and positive results have been obtained at GBI with this process.

Digital Photography

The results of all visual examinations and processing techniques completed by the examiners and technicians are documented and preserved through digital photography. The latent print section has two capturing stations (DCS-4) available for use. Each of these systems is composed of a high resolution digital camera, numerous forensic lighting attachments, and a computer loaded with digital enhancement software.



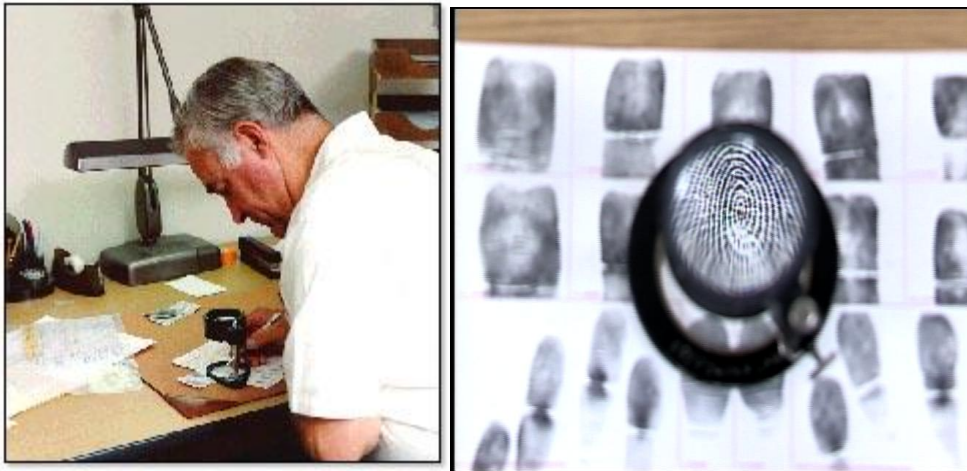
The enhancement software on the DCS-4 allows the examiners to make latent prints that are obscured by printed or textured backgrounds inks more visible. This is especially helpful for inked prints that have been deposited on checks, which have security printing.



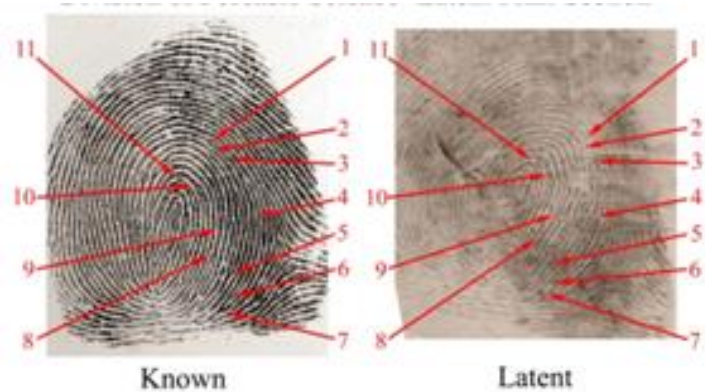
Digital enhancement can also be used to render latent prints from submitted lift cards more suitable for searching on the AFIS/ IAFIS databases.

Latent Print (LP) Examination

The service provided by this section is comparing the lifted or developed latent prints to known prints in an effort to identify who left the print at the crime scene. The latent print is first visually analyzed by a forensic latent print examiner to determine its value. The examiner then visually compares the latent print to the known print, looking for overall pattern-type similarities. If the pattern type is similar, the examiner then compares the minutiae (points where the ridges start, stop and separate).



If the two prints have the same pattern, the minutiae are located in the same sequence and spatial relationship in both prints, and there are no unexplained differences, the prints are considered to have originated from the same source.



If differences between the two prints exist that cannot be explained (in terms of deposition pressure, development medium, substrate/surface type, etc.) the prints cannot have come from the same source, or the individual is excluded.

In situations where there is not enough information in either the latent print or the known prints, the examiner may reach an inconclusive result. Many times the examiner may request to have additional known samples submitted to the laboratory in order to reach a definitive conclusion.

Automated Fingerprint Identification System (AFIS)

The Automated Fingerprint Identification System (AFIS) is a computerized system capable of reading, matching, and storing fingerprints for every criminal justice agency in the state of Georgia. AFIS-quality latent fingerprints are entered into the AFIS to search for possible matches against the state-maintained database of fingerprint records.

The Latent Print section is also connected to the FBI Integrated Automated Identification System (IAFIS) and impressions that do not result in identification on the State system are routinely searched on the IAFIS system.



By examining the evidence submitted, the laboratory may be able to determine the presence of AFIS-quality fingerprints for possible AFIS entry or to establish the identity of unknown deceased persons.

Unidentified Latent Prints

Storage of unidentified latent fingerprints in AFIS will be determined by the quality of the latent fingerprint(s) submitted. Unidentified latent fingerprints of good quality will be entered into the unsolved latent fingerprint database and are compared daily to new fingerprint records being added to the main fingerprint database. Generally, unidentified latents will be stored in the unsolved database only after the victim(s) have been eliminated; this is especially true of cases of home burglaries and entering autos. If identification is made to a latent print in the unsolved database, a DOFS Official Report will notify the submitting agency.

If the submitting agency later identifies any latent fingerprints submitted to the laboratory for an AFIS search, or the case concerning the fingerprints is cleared for any reason, the agency should notify the laboratory so that these latent fingerprints can be purged from the database.

Identifying the Deceased

In order to identify a deceased subject, postmortem fingerprints should be taken for comparison purposes. These prints should be clear enough to be suitable for searching against the AFIS/ IAFIS databases if no other known prints are available. When possible, a GA-SID or FBI number should be provided in order to shorten the time necessary to obtain known prints and identify the decedent.

Complete major case prints along with footprints should routinely be taken of deceased subjects for potential investigative purposes and for comparison and elimination to latent prints collected from crime scenes. If legible prints cannot be obtained, please contact the Latent Print section for further instructions.

Evidence Submissions

Digital images of friction ridge impressions for examination will only be accepted if they were captured at a resolution in excess of 3 mega pixels, high resolution with the camera set at right angles to the substrate being photographed. The image must contain a reference scale at the same level as the impression. Images must be submitted in TIFF format without any other compression applied.

Printed photographs of friction ridge impressions will not be accepted as a general rule. The latent print examiner will need the original digital image in order to be able to produce a calibrated reproduction of the impression.

Evidence should be submitted for processing as soon as possible after its recovery. Cotton gloves should be used to pick up items of evidence, being careful not to wipe possible latent prints off the surface. Never wrap nonporous items in cotton or cloth – doing so may damage or destroy the latent impressions. Do not cover exhibits to be processed for latent prints with tape.

Packaging/Identification

The items should be placed in a bag and properly marked on the exterior with the agency name and case number. Identify all evidence, indicating if it is an original article, a lift, or CD/DVDs with digital images. Put developed latent lifts in envelopes, mark, and seal. Mark the packaging "Latent Print Evidence" and with the biohazard symbol if it contains bloodstained evidence.

Any number of paper specimens containing latent prints may be placed in a single container for transmittal. These may be protected by either of the following: place them in manila envelopes or plastic folders; put them between stiff cardboard; or wrap them in a box.

Large articles being submitted for processing should be secured with string or wire to a rigid surface to prevent shifting and contacting other items.

Exposure to water or dampness does not necessarily destroy all latent prints. Any wet or damp object must be air dried before it is packaged for shipment.

Items of evidence that are submitted for latent print processing may be submitted for testing in other sections prior to being processed in the Latent Print section. Some items may require coordination between sections to ensure that the proper sequences of analyses are completed. All testing that is requested should be noted on the same submission form.

If items have been processed prior to submission to the DOFS laboratory, package those items to prevent smudging of the latent prints or possible breakage. Chemically processed items should be protected from exposure to light or submitted to the laboratory prior to the use of silver nitrate.

Submission of Known Prints for Comparison

Known prints for comparison should be submitted when available, and may be packaged with latent lift cards or CD/DVDs. Photocopies of inked prints should only be submitted as a last resort. Ten-print cards printed from LiveScan devices are also acceptable. If inked or LiveScan prints are not available, the investigator may name the person or persons for comparison, and provide GA-SID or FBI numbers for the individuals. There is now a space on the Evidence Submission Form to provide these numbers. Treat all known print cards as evidence, seal, and package with a completed Evidence Submission Form.

Often, latent prints found at the scene of a crime involve areas of the palms, second and third joint of the fingers, and the finger sides and tips. For this reason, the investigator should take complete inked prints of all the ridges on the hands (major case prints) of subjects and persons known to have legitimately handled the evidence (elimination prints) to permit comparisons. Palm prints should always include prints of the lower finger joints, as well as an extra print of the outer edge of the palm.