

**Idaho State Police
Forensic Services
Trace Section**

**History Page
Footwear Impression SOP**

Revision #	Issue Date	History
1	3/29/02	Current methodology used by ISPFS
2	3/04	Listed ESDA (6.3) as a technique. Modified 6.3 and 6.4 regarding handling of lifts/results.
3	12/04	Modified wording of conclusions. Added digital imaging guidelines.

Approval:

Technical Leader: _____

Dave Laycock
Dave Laycock

Date: 12/04

Issuance:

QC Manager: _____

Richard D. Groff
Rick D. Groff

Date: 1-25-05

Footwear Impressions SOP

1.0 Background

Footwear identification may be one of the oldest forms of forensic identification in the western world, dating back to a 1786 homicide investigation. Footwear evidence may provide the type, make, description, and approximate size of a shoe, as well as the number of suspects, sequence of events, and points of entry and exit. Footwear evidence may link crimes occurring in different jurisdictions. Specialized techniques may be required to locate and document the impressions, especially if they are latent.

2.0 Scope

This SOP lists steps/procedures to be taken in evaluating footwear impression evidence. Depending on the nature of the evidence, it is unlikely that all steps/procedures listed here will apply in any one case; the examiner will make the ultimate determination since each case has its own evidence and circumstances and requires individual assessment.

3.0 Equipment, Reagents

3.1 Photography

3.1.1 A 35 mm camera.

3.1.1.1 Digital cameras may be used in some circumstances, for example outsole design, but the analyst must ensure the resulting photos include appropriate detail. Use of the tag image file format (.tif) is strongly recommended.

3.1.1.1.1 Copy the original image file and use the copy for enhancement purposes. The original image file is to be saved in an unaltered condition, although JPEG files may be saved in TIFF format.

3.1.1.1.2 A written or an electronic log of the various enhancement steps should be kept.

3.1.2 Camera tripod.

3.1.3 Film: Recommended: black and white T-Max ISO100; Kodak Plus-X Pan; Kodak Technical Pan 2415. Color print film may be used with an ISO of 400 or less. Use Kodak, Fuji, or Agfa film.

3.1.4 Suitable light sources.

3.1.4.1 Oblique lighting.

3.1.4.2 Direct lighting. Blue full spectrum bulbs are recommended.

3.1.4.3 Alternate light source (ALS). Examine the evidence using the available filter/wavelength combinations. The combination that produces the most visible result is then used for photography.

3.1.4.3.1 Orange glasses in combination with ALS wavelengths less than 530 nm but greater than 400 nm.

3.1.4.3.2 Red glasses with 570 nm wavelength.

3.1.4.3.3 Yellow glasses with less than 400 nm wavelength (ultraviolet).

3.1.5 Suitable scales.

3.1.5.1 Metric scales are preferred. When practical, utilize the L-shaped Bureau Scale (Bodziak).

3.2 Reagents. ACS grade or better when available. With the exception of dental stone (avoid inhalation of dental stone) these should be treated as hazardous substances. Utilize a fume hood or appropriate respiratory protection.

3.2.1 8-hydroxyquinoline (8-quinolinol).

3.2.2 Ammonium thiocyanate.

3.2.3 Iodine and benzoflavone (alpha-naphthoflavone).

3.2.4 Physical developer.

3.2.5 Small particle reagent.

3.2.6 Amido black.

3.2.7 Leucocrystal violet.

3.2.8 Fingerprint powder.

3.2.9 Potassium sulfate.

3.2.10 Dental stone.

3.3 Other equipment.

3.3.1 Sandbox with sand or diatomaceous earth.

3.3.2 Biofoam.

3.3.3 Potter's clay.

3.3.4 Carbon paper.

3.3.5 Roller transport film.

3.3.6 Electrostatic dust print lifter.

3.3.7 Calipers.

3.3.8 Magnifying glasses.

4.0 Safety

The chemicals and reagents used must be considered potentially hazardous. For safety, many must be used in fume hoods or with respiratory protection. Consult the **material safety data sheets** before using any of the reagents/chemicals.

5.0 Document the evidence

5.1 Mark, photograph, and photocopy the items as necessary.

5.1.1 Photographs submitted by the agency may be retained in the case file. If not already submitted, request the negatives from the investigating agency.

5.1.2 When evidence can only be recorded or collected by photography and the image itself is not recoverable, the photograph or negative of the image must be treated as evidence.

6.0 Preliminary evidence examination and enhancement

6.1 Shoes

6.1.1 Trace or serological evidence.

6.1.1.1 Document if present, preferably with photography. Determine if the item(s) may have contributed characteristics noted in the impression evidence and/or casts.

6.1.1.2 Some trace evidence, such as small fragments of glass, may be left adhering to the footwear while test impressions are made. Consider the facts of the case and the potential significance of the trace.

6.2 Casts

6.2.1 Dental stone casts may be cleaned by soaking in saturated potassium sulfate for approximately one hour, then rinsed thoroughly. Plaster of Paris casts must not be soaked in water; detail will be lost. Plaster of Paris casts must be hand cleaned.

6.3 Digital images received from agencies.

6.3.1 Agencies should be discouraged from using digital photography in shoe and tire cases. When digital images are received as part of a case, the image files are to be copied and any alterations or enhancements must be done using the copies. The original files are to be saved in an unaltered condition, although JPEG files may be saved as TIFF files.

6.3.2 A written or an electronic log of the various enhancement steps should be kept.

6.4 Paper, dust impressions

6.4.1 Photograph with scale.

6.4.2 Electrostatic dust print lifter.

6.4.2.1 Lifts must be treated and stored as evidence.

6.4.3 Electrostatic detection apparatus (ESDA) processing.

6.4.3.1 Processed items must be treated and stored as evidence.

6.5 Other Two-dimensional impressions

6.5.1 Photographs.

6.5.1.1 35 mm film is the medium of choice.

6.5.2 Specialized lighting.

6.5.3 Scan the impression into Photo Shop®

6.5.3.1 The history of image processing should be printed in addition to the picture.

6.5.3.2 Save the image file in .tif format.

6.5.4 Other enhancement, as required. The method chosen will depend on the nature of the evidence.

6.5.4.1 Photocopy.

6.5.4.2 Gelatin lift.

6.5.4.3 Adhesive lift.

6.5.4.4 Brush powdering.

6.6 Chemical enhancement. Consult MSDS for hazards and proper handling of these reagents. Techniques are listed here according to the composition of the impression and/or the surface it is on. The enhanced impression should be photographed.

6.6.1 Fatty, oily, organic materials

6.6.1.1 Iodine fuming, followed by spraying with 7,8 benzoflavone.

6.6.1.1.1 Non-destructive; additional techniques may be used following iodine.

6.6.2 Blood

6.6.2.1 Amido black.

6.6.2.2 Leucocrystal violet.

6.6.3 Soils

6.6.3.1 8-hydroxyquinoline.

6.6.3.2 Ammonium thiocyanate.

6.6.4 Paper, cardboard

6.6.4.1 Physical developer.

6.6.4.2 Small particle reagent.

6.6.5 Wet origin impressions; the shoe or the receiving surface is wet or damp

6.6.5.1 Fingerprint powder.

6.6.5.2 Lift with Handiprint® or fingerprint tape.

6.6.6 Other recognized techniques may be utilized when appropriate. Consult the ISP Forensic Services Quality Manual for steps to be followed in utilizing a method not listed here.

7.0 Test Impressions

Test impressions are a valuable aid in the comparison process. They assist in the interpretation and identification of class and individual characteristics seen in the questioned impression.

7.1 Fingerprint powder and white Handiprint®.

7.2 Fingerprint powder and transparent Handiprint®.

7.3 Black ink and dampened roller transport film.

7.4 Sandbox and photography.

7.5 Potter's clay.

7.6 Biofoam.

7.7 Inkless shoe print kit.

8.0 Comparison

The actual comparison proceeds from the general (class characteristics) to the specific (individual characteristics). At any step an unexplained difference between the known shoe and the impression leads to elimination of the shoe.

8.1 Outsole design.

8.1.1 Mold-related characteristics.

8.2 Size.

8.3 General wear pattern.

8.4 Individual characteristics.

8.5 Examination against known shoes.

8.5.1 If using photographs for the comparison, have 1:1 enlargements made.

8.5.1.1 The 1:1 enlargements are not made:

8.5.1.1.1 If immediate elimination of the shoe is possible from available photographs.

8.5.1.1.2 If the ruler (scale) in the photographs is clearly incorrectly positioned.

8.5.1.1.3 If the submitted negatives are of unsatisfactory quality.

8.5.1.2 If working with jpeg (.jpg) digital photos save them in .tif format.

8.5.2 When using an overlay ensure that the image is actual size.

9.0 Conclusions

9.1 Reports must be technically reviewed before being released.

9.2 When appropriate the results of a search for manufacturer brand names and descriptions based on the outsole design of an impression may be reported.

9.2.1 This information may aid investigators who have not submitted shoes for comparison.

9.2.2 The information would come from a database, a recognized catalog, or a retail outlet.

9.3 Examination of class and individual characteristics will lead to one of the following conclusions:

9.3.1 The impression is not suitable for a meaningful comparison.

9.3.1.1 The impression lacks class and individual characteristics.

9.3.2 The footwear did not make the impression.

9.3.2.1 Class and/or individual characteristics of the footwear and impression are different.

9.3.3 The footwear could have made the impression but others with similar characteristics cannot be excluded. Also acceptable: The shoe cannot be excluded.

9.3.3.1 This conclusion is based on the impression and the footwear having the same class characteristics.

9.3.3.2 There is a lack of corresponding individual characteristics in the footwear and the impression.

9.3.4 An association exists between the impression and the footwear, but there are insufficient individual characteristics to associate the footwear with the impression to the exclusion of all other shoes.

9.3.4.1 The impression and the footwear share class and some individual characteristics, but these characteristics are not sufficiently unique to allow an exclusive association between the impression and the shoe.

(next page)

9.3.5 The footwear made the impression to the exclusion of all other shoes.

9.3.5.1 The impression and the footwear share confirmable class and random individual characteristics that could not be repeated on another outsole with the same class characteristics.

10.0 References

Abbott, John Reginald 1964 Footwear evidence: the examination, identification, and comparison of footwear impressions. Charles C. Thomas, Springfield, Ill.

Bodziak, William J. 1990 Footwear impression evidence, first edition. Elsevier, New York.

Bodziak, William J. 2000 Footwear impression evidence: detection, recovery, and examination; edition 2. CRC Press New York.

Hilderbrand, Dwane S. 1999 Footwear, the missed evidence. Staggs Publishing, Temecula, CA.

Recommendations and guidelines for the use of digital image processing in the criminal justice system.

Version 1.2. Scientific Working Group on Imaging Technologies, June 2002.

Definitions and guidelines for the use of imaging technologies in the criminal justice system. Version 2.3.

Scientific Working Group on Imaging Technologies, June 2002.

Property of Idaho State Police Forensic Services
Uncontrolled Internet Copy
OBSOLETE DOCUMENT

**Idaho State Police
Forensic Services
Trace Section**

**History Page
Footwear Impression SOP**

Revision #	Issue Date	History
1	3/29/02	Current methodology used by ISPFS
2	3/04	Listed ESDA (6.3) as a technique. Modified 6.3 and 6.4 regarding handling of lifts/results.
3	12/04	Modified wording of conclusions. Added digital imaging guidelines.

Approval:

Technical Leader: _____ **Date:**
Dave Laycock

Issuance:

QC Manager: _____ **Date:**
Rick D. Groff