

Footwear Impressions SOP

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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 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. Digital cameras are not currently capable of the resolution required for evidential photography but may be used elsewhere.

3.1.2 Camera tripod.

3.1.3 Film: Recommended: black-and-white T-Max ISO100; Kodak Plus-X Pan; Kodak Technical Pan 2415. In some situations a slow speed color film may be utilized.

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 these should be treated as hazardous substances. Utilize a fume hood or appropriate respiratory protection.

- 3.2.1 8-hydroxyquinoline.
- 3.2.2 Ammonium thiocyanate.
- 3.2.3 Iodine and benzoflavone.
- 3.2.4 Physical developer.
- 3.2.5 Small particle reagent.
- 3.2.6 Amido black.
- 3.2.7 Leucomalachite green.
- 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

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 imprint 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 Paper, dust impressions

6.3.1 Photograph with scale.

6.3.2 Electrostatic dust lift.

6.4 Other Two-dimensional impressions

6.4.1 Photograph. Refer to 3.1.

6.4.2 Physical enhancement, if required. The method chosen will depend on the nature of the evidence.

6.4.2.1 Photocopy.

6.4.2.2 Electrostatic dust lift.

6.4.2.3 Gelatin lift.

6.4.2.4 Adhesive lift.

6.4.2.5 Brush powdering.

6.5 Preliminary pattern examination against known items.

6.5.1 Have 1:1 enlargements of the photographs made.

6.5.1.1 The 1:1 enlargements are not made.

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

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

7.0 Chemical enhancement, if required 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.

7.1 Fatty, oily, organic materials

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

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

7.2 Blood

7.2.1 Amido black.

7.2.2 Leucomalachite green.

7.3 Soils

7.3.1 8-hydroxyquinoline.

7.3.2 Ammonium thiocyanate.

7.4 Paper, cardboard

7.4.1 Physical developer.

7.4.2 Small particle reagent.

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

7.5.1 Fingerprint powder.

7.5.1.1 Lift with Handiprint® or fingerprint tape.

7.6 Other recognized techniques may be utilized when appropriate.

7.6.1 Consult the ISP Forensic Services Quality Manual for steps to be followed in validating a method not listed here.

8.0 Test Impressions

8.1 Fingerprint powder and white Handiprint®.

8.2 Fingerprint powder and transparent Handiprint®.

8.3 Black ink and dampened roller transport film.

8.4 Sandbox and photography.

8.5 Potter's clay.

8.6 Biofoam.

9.0 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.

9.1 Outsole design.

9.2 Mold-related characteristics

9.3 Size.

9.4 General wear pattern.

9.5 Individual characteristics.

10.0 Conclusions

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

10.1.1 The footwear did not make the impression.

10.1.1.2 Include a brief explanation of why.

10.1.2 The footwear could have made the impression but others with similar characteristics can not be excluded. This conclusion is based on the impression and the footwear having the same class characteristics.

10.1.3 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.

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

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

11.0 References

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

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

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**History Page
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Revision #	Issue Date	History
1	3/29/02	Current methodology used by ISPFS

Approval:

Technical Leader: _____ **Date:** 3/29/02
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