Introduction

The National Institute of Standards and Technology (NIST) facilitated the development of this Footwear and Tire Examination Process Map through a collaboration between the NIST Forensic Science Research Program and the NIST administered Organization of Scientific Area Committees (OSAC) for Forensic Sciences (specifically OSAC's Footwear and Tire Subcommittee).

*This Footwear and Tire Examination Process Map (Current Practice) captures details about the various procedures, methods and decision points most frequently encountered in the discipline of footwear and tire examination from a national perspective and **is intended to reflect current practices**. The discipline requires examiners to make many decisions that can impact the quality and accuracy of results. The Footwear and Tire Examination Process Map can benefit the discipline by providing a behind-the-scenes perspective into the various components and decision points in the examination process.*

Process mapping is the visual representation of the critical steps and decision points of a process. Components of the process are deconstructed, placed into specific shapes within a flowchart and connected by one-way arrows to indicate directionality regarding decisions as well as progression throughout the overall process. The shape of each box assists the reader by representing a specific type of activity.

*This process map captures the **diverse** practices of multiple laboratories, with the goal of allowing a footwear and tire examiner to find their process represented in the map. To ensure this, the mapping team avoided creating a map of what **should** be done (i.e. best practices) and instead attempted to represent all reasonable variations of casework **currently performed** by footwear and tire examiners. For this reason, it is important to state that the OSAC Footwear and Tire Subcommittee does not necessarily support or endorse (as best practices) all of the different steps and paths depicted in this process map.*

This map is not intended to be a step-by-step instruction manual outlining minutia, nor is it intended to be so broad that it lacks utility. Rather, judgments were made by the process mapping group as to which steps should be combined and which steps should be divided further. Certain processes represented in the map have a required sequence while other components may vary by examiner or agency. Processes and decisions may also be dictated by agency policy or law.

Process Map Applications:

The Footwear and Tire Examination Process Map is intended to be used to help improve efficiencies while reducing errors, highlight gaps where further research or standardization would be beneficial, and assist with training new examiners. It may also be used to develop specific laboratory policies and identify best practices.

Scope of the Footwear and Tire Examination Process Map:

The scope of Footwear and Tire Examination Process Map is limited to core processes within the discipline of footwear and tire examination such as the examination of questioned footwear and tire impressions and the comparison of these impressions to known footwear or tires. Several topics are omitted from this map including crime scene collection and intercomparison of questioned impressions. These topics may subsequently be addressed by the process mapping team, an individual laboratory or a standardization committee.

OSAC
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1000 - Administrative Assessment

Evidence examination request

- Intake Criteria Assessment
- Case Suitabiity
- Case Intake/ Acceptance

2000 - Technical Assessment

- Examiner Evidence Intake
- Case Assessment
- Inventory
- Item Characterization

3000 - 5000 Questioned Impression Processing and Analysis

- Casts
- Gel Lifts
- ESDL/Stat Lifts
- Questioned Image Assessment
- Object: Dry Origin/ Non-Porous Substrate
- Object: Dry Origin/Porous Substrate
- Object: Wet Origin/ Non-Porous Substrate/ Non-Blood
- Object: Wet Origin/ Non-Porous Substrate/ Blood
- Object: Wet Origin/Porous Substrate/ Non-Blood
- Object: Wet Origin/Porous Substrate/Blood

6000 - Known Footwear/Tire Analysis

- Known Image Assessment
- Known Item Assessment
- Feature Assessment
- Suitability Determination of Knowns

7000 - Reference Search

- Determination of Suitability for reference search
- Database/ Resource Search
- Potential Make/Model Determination
- Review of Results

8000 - Comparison/Evaluation

- Image Examination/ Digital Processing
- Feature Assessment
- Feature Comparison
- Weighing of Similarities and Dissimilarities
- Render Conclusion

9000 - Verification and Reporting

- Verification
- Technical/ Administrative Review
- Report

Other - not included in this map*

- Crime Scene Collection
- Intercomparison of Questioned Impressions

Underlined Word
Word that will be defined in the glossary

Technology Assist
Technology that aids in the steps on this page

Input Box
Outlines the inputs at the beginning of each section

Output Box
Describes an output of the steps on the page

Discontinuation of Assessment or Examination

Legend

	Process start/end
	Process
	Decision
	Subprocess
	Document

OSAC
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This process map provides a visual description and attempts to represent all reasonable variations of casework currently performed by footwear and tire examiners. OSAC does not necessarily support or endorse (as best practices) all of the different steps and paths depicted in this process map.

Return to Overview

1000 - Administrative Assessment

1002
Receive Request for Examination

1004
Will the submission be evaluated against intake criteria?
- Yes
- No

1006
Case Intake Criteria Per Agency Policy (PAP)

- Is approval required?
- Was approval received?
- Is the requested service available?
- Is the Chain of Custody (CoC) intact?
- Is the number of items received within the limits?
- Is the analysis timeframe appropriate?
- Are the transmittal forms enclosed and filled out properly?
- Is the crime type suitable for acceptance?
- Is the request issued from an authorized entity?
- Has the case been examined/reviewed by another lab/agency?
- Is sufficient case related information provided (e.g. police report)?
- Is the request appropriate for the evidence enclosed?
- Are resources and expertise available?
- Are the items properly packaged? Is the evidence properly sealed? (e.g. packaged separately as needed or in right type of packaging)
- Is there a sufficient description of submission packaging?

1008
Does the submission meet intake criteria?
- Yes
- No

1010
Can the issue be addressed immediately e.g. contact submitter?
- Yes
- No

1012
Discontinue evidence receiving, document, and proceed PAP

1014
Are there any issues that need to be documented?
- Yes
- No

1016
Document and describe issue(s) as needed PAP

1018
Case Intake (PAP)

- Creation of case in Laboratory Information Management System (LIMS)
- Evidence held in evidence room until examiner/unit is ready to receive
- Inform units that the case has been accepted.
- **If court date(s):** Inform examiner of court date(s) and add examiner to calendar; discuss possible need for trial continuance; evaluate whether there are potential mandates that dictate case completion timeframe.
- Communicate wth submitter regarding any other timeframe(s) including case related deadlines.

1020
Output:
- Evidence item(s) for examination that meet agency/laboratory case acceptance criteria (e.g. are appropriately packaged, CoC is known, resources such as appropriate equipment and databases are in place to evaluate the item).
- Determination that the laboratory will proceed with evaluation/examination of case.

1022
Create appropriate case assignment(s) based on authorizations and/or qualifications PAP

1024
Were there multiple assignments for varying disciplines?
- Yes
- No

1026
Process case PAP

1028
Transfer Case to Assigned Examiner

1030
Output:
Case assigned to examiner

GO TO 2000 - Technical Assessment

Technology Assist

- LIMS

Return to Overview

2000 - Technical Assesment (1 of 2)

FROM 1030

2002
Input:
Evidence items for examination that meet agency/laboratory submission intake criteria; qualified examiner assigned to case

2004
Read laboratory exam request; Review LIMS data, including any prior examination or pre-emptive communications

2006
Is the request for footwear and/or tire examination?
- Yes
- No

2008
Discontinue evidence receiving and proceed PAP

2010
Screen request to determine if all required information (including chain of custody (CoC)) is present and that the requested analysis is appropriate

2012
Open package (outer container) and inventory all items received

2014
Document Evidence as Received:

-List and describe evidence as received including packaging description (e.g. materials, whether seals are intact)

-Document chain of custody information including item numbers

-Take descriptor images as needed PAP

Inventory Items:
May include known shoes/tires, images, casts, gel lifts, electrostatic lifts, stat lifts, or other types of items from scene (large or small: clothing, flooring, etc.)

2016
Is a known needed to proceed (PAP)?
- Yes
- No

2018
Is the known included in the inventoried items?
- Yes
- No

2020
Hold and preserve case while awaiting item(s) and proceed PAP

2022
Are there any discrepancies or issues found?
- Yes
- No

2024
Document PAP:

- Describe and document any differences involving CoC- or other discrepancy
- Include note or MFR (memorandum for record) to agent/investigator

2026
Reach out to submitter or evidence unit for resolution?
- Yes
- No

2028
Communicate with submitter or evidence unit

2030
Can issue be fixed/resolved?
- Yes
- No

2032
Continue?
- Yes
- No

2034
Document PAP

2036
Discontinue evidence receiving and proceed PAP

2038
Update and review LIMS/documentation

2040
Open individual items and perform cursory visual examination of the physical and/or digital evidence

2042
Perform pre-analysis tasks (take images, download files to computer etc.)

2044
Document via notes, images, or annotations on item PAP:

- *Item number(s)*
- *LIMS designation(s)*
- *Add sticker labels (indicating subdesignations)*
- *Document manufacturer's labels and sidewall information for Known footwear/tire*

2046
Outputs:
- Inventoried evidence items;
- Knowledge of whether work has been done by another unit or lab;
- Review of communications: knowledge of what the specific request is for;
- Discrepancies have been checked and/or resolved

GO TO 2050 - Technical Assessment (2 of 2)

Technology Assist
- LIMS

Return to Overview

2000 - Technical Assessment (2 of 2)

FROM 2046

2050

Input: Inventoried evidence items; knowledge of request(s) made

2052

Develop Mental Plan for Evidence Processing:
Develop approach for evidence analysis

-How to document items through imaging

-Determine whether additional chemical or physical processing or cleaning is needed

- Determined if lifting is required based on items

- Consider all items received: Cast, gel lift, electrostatic dust lift, stat lift, whether items are clothing, paper, tile, etc.

2054
Contact submitter or evidence unit to check if there is additional evidence?

Yes → 2056 Contact submitter or evidence unit as needed

No

2058
Is there any particular order for processing items PAP?

Yes → 2060 Go to appropriate item PAP

No

2062 - Item Characterization

- 2064 Cast → GO TO 3000 - Casts
- 2066 Gel Lift → GO TO 3200 - Gel Lifts
- 2068 Electrostatic Dust Lift/Stat Lift → GO TO 3300 - ESDL/Stat Lifts
- 2070 Images of Questioned Impression(s) → GO TO 3400 - Questioned Impression Image Assessment
- 2072 Object → GO TO 3500 - Objects
- 2074 Known Shoe/Tire/ Images of Known → GO TO 6000 - Known Assessment
- 2076 Known Test impression → GO TO 6200 - Imaging Test Impression

Technology Assist

- LIMS

Return to Overview

3000 - Casts (1 of 3)

FROM 2064

3002
Input: Cast of questioned footwear or tire impression

3004
Document and describe in case notes PAP:
- What material the cast is made with
- Number of pieces the cast arrived in
- General condition upon arrival

3006
Take images for initial documentation (including condition)?
- Yes → 3008 Take images PAP
- No

3010
Do I recognize the casting material?
- Yes
- No

3012
Does the cast need additional drying time?
- Yes → 3014 Allow for additional drying time or place under drying lamp
- No

GO TO 3040 - Casts (2 of 2)

3016
Conduct research?
- Yes → 3018 Contact submitter, other examiners, or manufacturer, or conduct internet search
- No

3020
Is there information available about the material?
- Yes
- No

3024
Does the casting material meet validation and reliability standards PAP?
- Yes
- No

3026
Conduct additional research?
- Yes → Return to 3018
- No

3028
Perform validation study on material?
- Yes → 3030 Conduct validation on material
- No

3032
Note limitation of material (e.g. unfamiliarity or quality issues)

Casting Considerations: Descriptive Information

Size
-Is the size appropriate?

Orientation Marks
-Description in COC
-Orientation marks on cast

Scene Documentation Marks
-Can cast and photos of same impression be related to one another?
-Impression number on cast from scene documentation?
-Is cast related through documentation to other items of evidence that have been submitted?
-Are the corresponding casts, lifts, photos, impressions labeled as such?

Casting Considerations: Quality and Materials (potential limitations)

Quality
Quality of pour:
-Folds in cast present?
-Features in cast that appear to be interferences from the technique or substrate present?
-Technique and texture
- How it was poured?
- Was a spray coating used?
- Is debris stuck in casting material?

Materials
-Has the material been validated? (i.e. Has the material been tested to assertain whether the casting material reliably captures size adn features accurately with no shrinking after drying etc.)
-Density: Too thick/thin?

Technology Assist

Return to Overview

3000 - Casts (2 of 3)

FROM 3012/3014

3040 Do I need to clean the cast? — Yes → 3042 Consult with submitter re: collection of trace evidence? — Yes → 3044 Communicate with submitter

3042 — No → 3046 Save trace evidence? — Yes → 3048 Clean via dry brushing, saving trace evidence → 3052 Send evidence collected to appropriate unit → 3054 Wash cast? — Yes → 3056 Wash cast

3046 — No → 3050 Wash cast or clean via dry brush without saving debris

3040 — No

3054 — No

3056 / 3050 / 3040 → 3058 Conduct visual examination of cast to locate impression(s) and review any written notes on casts (e.g. utilize techniques involving white/visible light such as side/oblique lighting)

3058 → 3060 Does there appear to be detail present? — Yes

3060 — No → 3062 Continue? — Yes

3062 — No → 3064 Are there additional evidence items to process? — Yes → GO TO 2062 - Item Characterization

3064 — No → 3066 STOP/Discontinue and proceed PAP

3062 — Yes

3060 — Yes → 3068 Does the cast need to be reassembled? — Yes → 3070 Is there a high degree of confidence there are pieces that can be assembled in their original orientation? (e.g. pieces have enough detail to continue? Is sufficient size and detail present?) — Yes → 3078 Conduct own reassembly? — Yes → 3082 Reassemble (using glue, clay, or another substrate to assemble and hold together)

3068 — No

3070 — No → 3072 continue? — Yes

3072 — No → 3074 Are there additional evidence items to process? — Yes → GO TO 2062 - Item Characterization

3074 — No → 3076 STOP/Discontinue and proceed PAP

3078 — No → 3080 Send to appropriate section

3082 / 3080 → *3083 General Description*

- *Whether it is footwear or tire*
- *Directionality (e.g. measure location on item)*
- *Whether full or partial impression*
- *Measurements of length and width; and if the area is from the heel, arch, or ball (if footwear and it can be determined)*
- *Appearance of wear, damage, and/or inclusions in impression*
- *Any additional impressions on item*
- *Observed limitations*
- *Logo/Make/Model*
- *General description of available design features/pattern(s)*
- *Note substrate and matrix*
- *Descriptions of any other images and associated evidence (e.g. shirt and/or photos of shirt with impression)*

3083 → GO TO 3084 Casts (3 of 3)

Return to Overview

3000 - Casts (3 of 3)

FROM 3083

3084 Take my own images?

Yes

3090 Determine appropriate imaging settings to capture the available detail in the impression. (See Imaging Considerations (Taking Images))

3092 Capture images with selected settings

No

3086 Seek assistance from imaging unit or other source PAP

3088 Does the image capture the available detail?

Yes

No

3104
Output:
- Image(s) that contain sufficient detail for digital processing;
- Clean cast,
- Pieces of/partial cast, or reassembled cast
- Knowledge of any potential limitations of casting material.

3106 Are there additional evidence items to process?

Yes → GO TO 2062 - Item Characterization

No → GO TO 8000 - Image Examination/ Digital Processing

3094 Retain images?

Yes → 3096 Retain and file images PAP

No

3098 Continue with additional imaging?

No → RETURN TO 3334

No

3100 Are there additional evidence items to process?

Yes → GO TO 2062 - Item Characterization

No → 3102 STOP/ Discontinue and proceed PAP

Imaging Considerations (Taking Images)

Perspective
Scale (make sure this is present)
Appropriate scale type (e.g. L scale v others)
Focus
Resolution
Camera settings
Filter(s) Used (if any)
Lighting
-Use a stabilizer (PAP)? (e.g. Use a copy stand or tripod)
-Direct, oblique, transmitted, axial, or reflective light
Formatting:
- Usable format needed
- TIFF, JPEG, RAW
Identifiers Present (e.g. L, R, a, b, c, 1, 2, 3, and any agency specific labels PAP)
No distortion
Identify and account for presence of multiple impressions
Note if there has been any processing prior to images (e.g. Barriers or highlighters: wax, spray)
Depth of field (e.g. account for curved surface, proximity of camera to impression)
Contrast
Noise reduction
Camera position (e.g. Is plane parallel to substrate?)

Return to Overview

3200 - Gel Lifts

FROM 2066

3202
Input: Gel lift of impression(s), possible crime scene images

3204
Conduct visual examination of gel lift to locate impressions and review any written notes on lift (e.g. utilize techniques involving white/visible light such as side/oblique lighting or alternate light source (ALS) such as 415nm if suspected blood impression)

3206
Document possible limitations and note condition (See Gel Lift Assessment)

3208
Examine cover?
- Yes → 3210 Remove and examine cover for possible impression
- No

3210
Remove and examine cover for possible impression

3212
Are there impression(s) visible?
- Yes → 3214 Update test plan if needed (e.g. include cover examination in test plan if impression is visible on cover)
- No

3214
Update test plan if needed (e.g. include cover examination in test plan if impression is visible on cover)

3216
Try additional lighting?
- Yes → 3218 Determine new lighting technique
- No

3218
Determine new lighting technique

3220
Are there additional evidence items to process?
- Yes → GO TO 2062 - Item Characterization
- No → 3222 STOP/ Discontinue and proceed PAP

3222
STOP/ Discontinue and proceed PAP

3224
Are there corresponding crime scene image(s) of the source of the lift?
- Yes → 3226 Examine crime scene image(s) for detail, clarity, etc. as compared to the lift(s)
- No

3226
Examine crime scene image(s) for detail, clarity, etc. as compared to the lift(s)

3228
Continue with both crime scene image(s) and lift(s)?
- Yes → 3232 Update test plan (e.g. include crime scene images in test plan)
- No

3232
Update test plan (e.g. include crime scene images in test plan)

3234
Examine crime scene image(s) now?
- Yes → GO TO 3400 - Questioned Impression Image Assessment
- No

GO TO 3400 - Questioned Impression Image Assessment

3230
General Description

- *Whether it is footwear or tire*
- *Directionality (e.g. measure location on item)*
- *Whether full or partial impression*
- *Measurements of length and width; and if the area is from the heel, arch, or ball (if footwear and it can be determined)*
- *Appearance of wear, damage, and/or inclusions in impression*
- *Any additional impressions on item*
- *Observed Limitations*
- *Logo/Make/Model*
- *General description of available design features/pattern(s)*
- *Note substrate and matrix*
- *Descriptions of any other images and associated evidence (e.g. shirt and/or photos of shirt with impression)*

3236
Are multiple impressions visible?
- Yes → 3238 Note additional impressions PAP
- No

3238
Note additional impressions PAP

3240
Determine appropriate imaging settings to capture available detail in the impression. (See Imaging Considerations - Taking Images)

3242
Capture image(s) with selected settings

3244
Does the image capture the available detail?
- Yes → 3262
- No

3262
Output:
- Images/digital scans/captures of impression(s) with sufficient detail for further examination;
- Possible crime scene images;
- Possible gel lift cover with visible impression;
- Gel lift(s).

3248
Retain images?
- Yes → 3250 Retain and file images PAP
- No

3250
Retain and file images PAP

3252
Continue with additional imaging?
- Yes → RETURN TO 3240
- No

RETURN TO 3240

3254
Ask for assistance?
- Yes → 3256 Seek assistance from imaging unit or other source PAP
- No

3256
Seek assistance from imaging unit or other source PAP

RETURN TO 3244

3258
Are there additional evidence items to process?
- Yes → GO TO 2062 - Item Characterization
- No → 3260 STOP/ Discontinue and proceed PAP

3260
STOP/ Discontinue and proceed PAP

3264
Are there additional evidence items to process?
- Yes → GO TO 2062 - Item Characterization
- No → GO TO 8000 - Image Examination/ Digital Processing

GO TO 2062 - Item Characterization

GO TO 8000 - Image Examination/ Digital Processing

Gel Lift Assessment

Has the cover been placed on the impression?
Dry origin v wet origin?
Color of gel lift? Black v white v clear gel lifts
Does it look like a lifted processed impression?
- Ex. Enhanced blood impression, fingerprint powder

Is there evidence the lift has been damaged?
- Ex. Left in hot car as example, signs of strain that effect size of impression

Is there excessive debris? – evaluate the level of debris present
Are there identfiers that link it to other images or evidence?
Are there multiple impressions on the same lift?
- Ex. Someone stepped in the same place twice

Is the size of the gel lift suitable for the impression?
Is the quality of the gel lift suitable?
Has the gel lift been left on the substrate for a suitable length of time?
- Ex. Dust v blood

Is information present indicating technique used?
- Ex. Roller

Is there evidence or notes as to what other lifts/processing occurred beforehand?
Are multiple lift attempts indicated/labelled in some way?
- Ex. ESDL lift first then gel, or multiple lifts (may be labeled lift 1, lift 2, etc.). Sometimes multiple lifts can help reduce debris.

Is there evidence of improper packaging or handling?
- Ex. Interference from packaging (cardboard box fibers ex), if it arrives folded in half.

Imaging Considerations (Taking Images)

Perspective
Scale (make sure this is present)
Appropriate scale type (e.g. L scale v others)
Focus
Resolution
Camera settings
Filter(s) used (if any)
Lighting
- -Use a stabilizer (PAP)? (e.g. Use a copy stand or tripod)
- -Direct, oblique, transmitted, axial, or reflective light

Formatting:
- Usable format needed
- TIFF, JPEG, RAW

Identifiers present (e.g. L, R, a, b, c, 1, 2, 3, and any agency specific labels PAP)
No distortion
Identify and account for presence of multiple impressions
Note if there has been any processing prior to imaging
Depth of field (e.g. account for curved surface, proximity of camera to impression)
Contrast
Noise reduction
Camera position (e.g. Is plane parallel to substrate?)

Technology Assist

- Gel Lift scanner (trademark)

Return to Overview

3300 - ESDL/Stat Lifts

FROM 2068

3302
Input: ESDL/Stat lift of impression(s); possible crime scene images

3304
Conduct visual examination of lift to locate impressions (e.g. utilize techniques involving white/visible light such as side/oblique lighting or alternate light source (ALS))

3306
Document possible limitations and note condition (See ESDL/Stat Lift Assessment)

3308
Are there impression(s) visible?
- Yes → 3318
- No → 3310

3310
Try additional lighting?
- Yes → 3312 Determine new lighting technique
- No → 3314

3314
Are there additional evidence items to process?
- Yes → GO TO 2062 - Item Characterization
- No → 3316 STOP/ Discontinue and proceed PAP

3318
Are there corresponding crime scene image(s) of the source of the lift?
- Yes → 3320
- No → 3324

3320
Examine crime scene image(s) for detail, clarity, etc as compared to the lift(s)

3322
Continue with both crime scene image(s) and lift(s)?
- Yes → 3326
- No → 3324

3326
Update test plan (e.g. include crime scene images in test plan)

3328
Examine crime scene image(s) now?
- Yes → GO TO 3400 - Questioned Impression Image Assessment
- No → 3324

3324
General Description

- *Whether it is footwear or tire*
- *Directionality (e.g. measure location on item)*
- *Whether full or partial impression*
- *Measurements of length and width; and if the area is from the heel, arch, or ball (if footwear and it can be determined)*
- *Appearance of wear, damage, and/or inclusions in impression*
- *Any additional impressions on item*
- *Observed Limitations*
- *Logo/Make/Model*
- *General description of available design features/pattern(s)*
- *Note substrate and matrix*
- *Descriptions of any other images and associated evidence (e.g. shirt and/or photos of shirt with impression)*

3330
Are multiple impressions visible?
- Yes → 3332 Note additional impressions PAP
- No → 3334

3332
Note additional impressions PAP

3334
Determine appropriate imaging settings to capture available detail in the impression. (See Imaging Considerations - Taking Images)

3336
Capture images with selected settings

3338
Does the image capture the available detail?
- Yes → 3354
- No → 3340

3354
Output:
- Image(s) of impression(s) with sufficient detail for further examination;
- Possible crime scene images;
- ESDL/Stat lift(s)

3340
Retain images?
- Yes → 3342 Retain and file images PAP
- No → 3344

3342
Retain and file images PAP

3344
Continue with additional imaging?
- Yes → RETURN TO 3334
- No → 3346

3346
Ask for assistance?
- Yes → 3348 Seek assistance from imaging unit or other source PAP → RETURN TO 3338
- No → 3350

3348
Seek assistance from imaging unit or other source PAP

3350
Are there additional evidence items to process?
- Yes → GO TO 2062 - Item Characterization
- No → 3352 STOP/ Discontinue and proceed PAP

3352
STOP/ Discontinue and proceed PAP

3356
Are there additional evidence items to process?
- Yes → GO TO 2062 - Item Characterization
- No → GO TO 8000 - Image Examination/ Digital Processing

Technology Assist

[redacted]

Imaging Considerations (Taking Images)

Perspective
Scale (make sure this is present)
Appropriate scale type (e.g. L scale v others)
Focus
Resolution
Camera settings
Filter(s) used (if any)
Lighting
-Use a stabilizer (PAP)? (e.g. Use a copy stand or tripod)
-Direct, oblique, transmitted, axial, or reflective light
Formatting:
- Usable format needed
- TIFF, JPEG, RAW
Identifiers present (e.g. L, R, a, b, c, 1, 2, 3, and any agency specific labels PAP)
No distortion
Identify and account for presence of multiple impressions
Note if there has been any processing prior to imaging
Depth of field (e.g. account for curved surface, proximity of camera to impression)
Contrast
Noise reduction
Camera position (e.g. Is plane parallel to substrate?)

Electrostatic Dust Lift (ESDL)/Stat Lift Assessment

Does it look like it was lifted from a processed impression? (e.g. fingerprint powder)
Is there evidence the lift has been damaged?
Is there excessive debris? – evaluate the level of debris present
Are there identfiers that link it to other photos or evidence?
Are there multiple impressions on the same lift?
- Ex. Someone stepped in the same place twice

Is the size of the lift suitable for the impression?
Is the quality of the lift suitable?
Has the lift been left on the substrate for a suitable time?
Is there evidence or notes as to what other lifts/processing occurred before hand?
Are multiple lift attempts indicated/labelled in some way?
- Ex. Previous lifts (may be labeled lift 1, lift 2, etc.).

Sometimes multiple lifts can help reduce debris.
Is there evidence of improper packaging or handling?
Is there evidence the lifting film has been reused?

Return to Overview

3400 - Questioned Impression Image Assessment

FROM 2070/3234/3328

3402
Input: Images of Questioned Impressions; Crime scene images

3404
Evaluate images of questioned impression(s) for quality (See Image Assessment (Known and Questioned)

3406
General Description

- *Whether it is footwear or tire*
- *Whether there a scale present*
- *Directionality (e.g. measure location on item)*
- *Whether full or partial image of impression*
- *Measurements of length and width; and if the area is from the heel, arch, or ball (if footwear and it can be determined)*
- *Appearance of wear, damage, and/or inclusions in impression*
- *Observed Limitations*
- *Logo/Make/Model*
- *General description of available design features/pattern(s)*
- *Note substrate and matrix*
- *Descriptions of any other images and associated evidence (e.g. shirt and/or photos of shirt with impression)*

Image Assessment (Known and Questioned)

Perspective
Scale present?
Scale type appropriate?
Need for correction? (e.g. perspective and potential correction in image processing software)
Focus
Lighting
Are all images present?
Exam grade v midrange v overall Image
Formatting:
- Usable v unusableUnrecognizable
- JPEG v RAW
Identifiers: present v absent
Distortion
Presence of peripheral impressions
Has there been any processing prior to imaging? (e.g. barriers or highlighters: wax, spray)

3408
Is detail present?

Yes → 3418
Multiple impressions found?

Yes → 3420
Label impressions w unique identifiers (if possible PAP)

No → 3422
Label impression w unique identifiers (if possible PAP)

3424
Output:
• Image(s) of questioned impression(s) with sufficient detail for digital processing.

No → 3410
Archive images?

Yes → 3412
Save images to archive

No → 3414
Are there additional evidence items to process?

Yes → GO TO 2062 - Item Characterization

No → 3416
STOP/ Discontinue and proceed PAP

3426
Are there additional evidence items to process?

Yes → GO TO 2062 - Item Characterization

No → GO TO 8000 - Image Examination/ Digital Processing

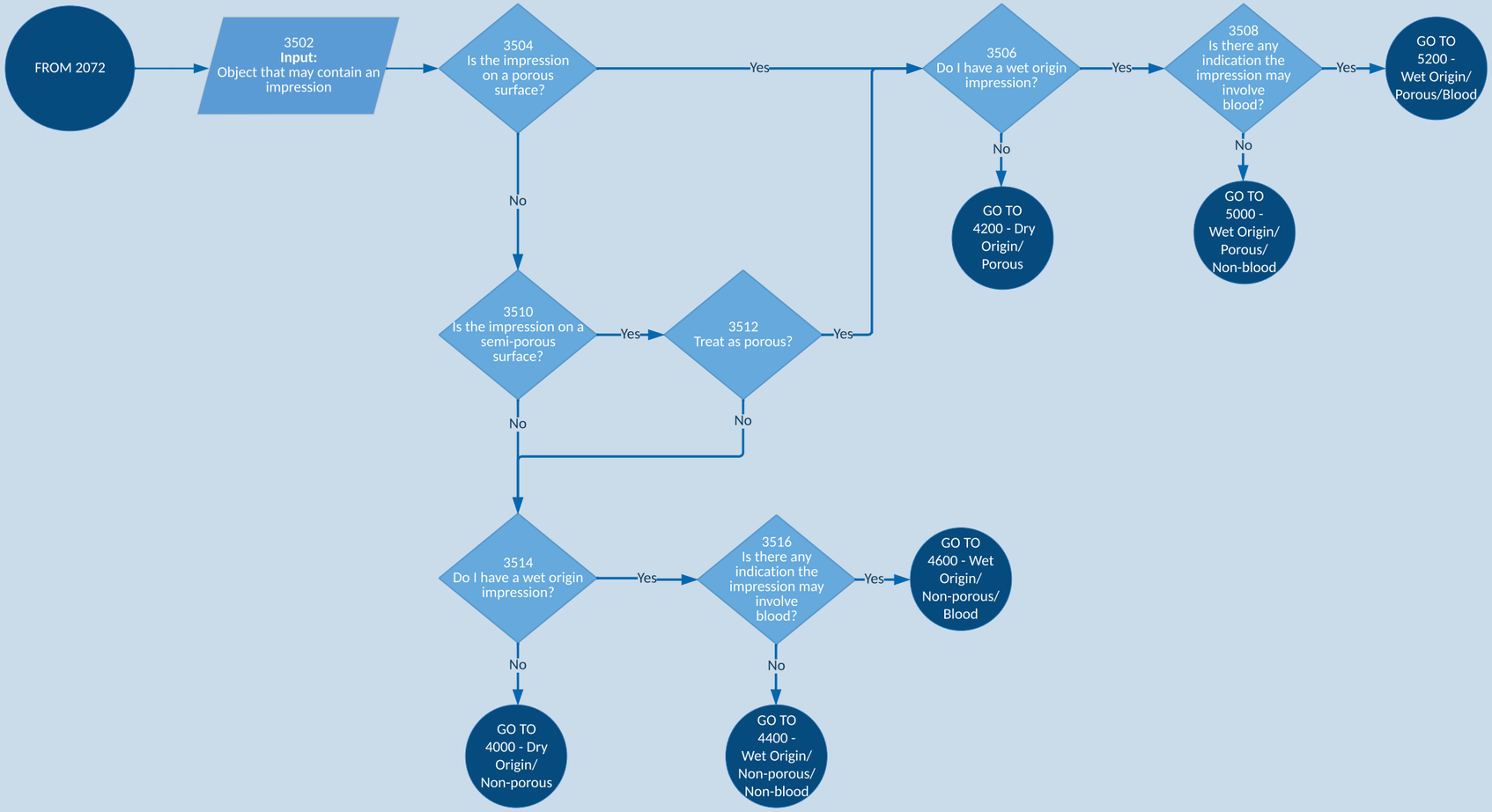
Technology Assist

- Image processing software

This process map provides a visual description and attempts to represent all reasonable variations of casework currently performed by footwear and tire examiners. OSAC does not necessarily support or endorse (as best practices) all of the different steps and paths depicted in this process map.

Return to Overview

3500 - Objects



Return to Overview

4000 - Object: Dry Origin/Non-Porous Substrate (1 of 2)

FROM 3514

4002
Input: Dry origin impression on non-porous substrate (possibly semi-porous)

4004
Conduct visual examination to locate impressions (e.g. techniques involving white/visible light such as side/oblique lighting or alternate light source (ALS)); document condition as received.

4006
Determine optimal lighting based on the following:

- 4008 Is the impression faint?
- 4010 Are there any 3-D qualities to the impression?
- 4012 Are there issues with color contrast to consider?
- 4014 Are there issues with lighting to consider?
- 4016 Is backlighting needed?
- 4018 Is the surface clear (e.g. glass)?
- 4020 Is there any background interference to consider?

4022 Are there impression(s) visible?
- Yes → 4032
- No → 4024 Conduct blind search using a lift technique?
  - Yes → 4026 Conduct Electrostatic Dust Lift (ESDL) → 4022
  - No → 4028 *Document observations and/or image PAP* → 4030 Discontinue and proceed PAP

4032
General Description

- *Whether it is footwear or tire*
- *Directionality (e.g. measure location on item)*
- *Whether full or partial impression*
- *Measurements of length and width; and if the area is from the heel, arch, or ball (if footwear and it can be determined)*
- *Appearance of wear, damage, and/or inclusions in impression*
- *Any additional impressions on item*
- *Observed Limitations*
- *Logo/Make/Model*
- *General description of available design features/pattern(s)*
- *Substrate and matrix*
- *Descriptions of any other images and associated evidence (e.g. shirt and/or photos of shirt with impression)*

4034
Determine appropriate imaging settings to capture available detail in the impression. (See Imaging Considerations - Taking Images)

4036
Capture images with selected settings

4038 Does the image capture the available detail?
- Yes → GO TO 4050
- No → 4040 Retain images?
  - Yes → 4042 Retain and file images PAP
  - No → 4044 Continue with additional imaging?
    - Yes → RETURN TO 4034
    - No → 4046 Ask for assistance?
      - Yes → 4048 Seek assistance from imaging unit or other source PAP → RETURN TO 4038
      - No → 4050 Conduct Lift?
        - Yes → GO TO 4060 - Dry Origin/ Non-porous (2 of 2)
        - No → 4052 Continue with any existing image(s)?
          - Yes → GO TO 4132 - Output - Dry Origin/ Non-porous (2 of 2)
          - No → 4054 Are there additional evidence items to process?
            - Yes → GO TO 2062 - Item Characterization
            - No → GO TO 9000 - Verification and Reporting

Technology Assist

- Alternate light source (ALS)

Imaging Considerations (Taking Images)

Perspective
Scale (make sure this is present)
Appropriate scale type (e.g. L scale v others)
Focus
Resolution
Camera settings
Filter(s) used (if any)
Lighting
-Use a stabilizer (PAP)? (e.g. Use a copy stand or tripod)
-Direct, oblique, transmitted, axial, or reflective light
Formatting:
- Usable format needed
- TIFF, JPEG, RAW
Identifiers present (e.g. L, R, a, b, c, 1, 2, 3, and any agency specific labels PAP)
No distortion
Identify and account for presence of multiple impressions
Note if there has been any processing prior to imaging
Depth of field (e.g. account for curved surface, proximity of camera to impression)
Contrast
Noise reduction
Camera position (e.g. Is plane parallel to substrate?)

Return to Overview

4000 - Object: Dry Origin/Non-Porous Substrate (2 of 2)

FROM 4050

4060 Does agency utilize multiple types of lift methods? — Yes → 4064 Does Agency policy dictate which method to use first? — Yes → 4090 Utilize lift method PAP

4060 — No → 4062 Utilize Available lift method PAP → GO TO 4092

4064 — No → 4068

4068 Use knowledge, experience, training, visual examination, surface characteristics, texture, and agency policy to select lift method(s) (if multiple lift methods will be used, also to determine succession plan):

- 4070 Round/Curved Surface → 4072 Gel Lift/ Silicone Based (Pliable) Lift/ Tape Lift/Other Adhesive Technique
- 4074 Metal surface → 4076 Perform ESDL using alternative technique (e.g. barrier beweeen ESDL device and item)? — Yes → 4078 Electrostatic Dust Lift (ESDL); No → 4080 Gel Lift/ Silicone Based (Pliable) Lift/ Tape Lift/Other Adhesive Technique/Stat lift
- 4082 Textured surface → 4084 Silicone Casting
- 4086 Other surfaces such as on-textured, non-curved, non-metallic,or fibrous surface (e.g. carpet, carboard) → 4088 Electrostatic Dust Lift (ESDL) or Stat Lift

Type of lift may occur in successsion (e.g. least destructive to most destructive) also possible for multiple ESDL

4090 Utilize lift method PAP → 4092 Conduct multiple lifts now? (e.g. some examiners choose to conduct multiple lifts in sequence prior to proceeding to imaging)

4092 — Yes → 4096 Conduct multiple lifts

4092 — No → 4094 Conduct single lift → 4098 Examine for detail, clarity, etc as compared to the item or image(s)

4096 → 4098

4098 → 4100 Impression(s) transferred appropriately to the lift?

4100 — Yes → 4111

4100 — No → 4102 Attempt another lift/ type of lift? — Yes → RETURN TO 4068

4102 — No → 4104 Retain lift(s) PAP? — Yes → 4106 Retain lift(s) PAP

4104 — No → 4108 Discard lift(s) PAP → 4110 STOP/Discontinue lift attempts and proceed PAP

4106 → 4107 Image retained lift(s)? — Yes → GO TO 4112

4107 — No → 4108

Technology Assist

- Alternate light source (ALS)

4111 *General Description or Additional Information Obtained*

- *Whether it is footwear or tire*
- *Directionality (e.g. measure location on item)*
- *Whether full or partial impression*
- *Measurements of length and width; and if the area is from the heel, arch, or ball (if footwear and it can be determined)*
- *Appearance of wear, damage, and/or inclusions in impression*
- *Any additional impressions on item*
- *Observed Limitations*
- *Logo/Make/Model*
- *General description of available design features/pattern(s)*
- *Substrate and matrix*
- *Descriptions of any other images and associated evidence (e.g. shirt and/or photos of shirt with impression) Other features or information previously not visualized*
- *Number of lifts*

4111 → 4112 Determine appropriate imaging settings to capture available detail in the impression. (See Imaging Considerations - Taking Images *located on 4000 - Objects: Dry Origin/Non-Porous Substrate (1 of 2)

4112 → 4114 Capture images with selected settings → 4116 Does the image capture the available detail?

4116 — Yes → 4132

4116 — No → 4118 Retain images?

4118 — Yes → 4120 Retain and file images PAP → 4122 Continue with additional imaging?

4118 — No → 4122

4122 — Yes → RETURN TO 4112

4122 — No → 4124 Ask for assistance?

4124 — Yes → 4126 Seek assistance from imaging unit or other source PAP → RETURN TO 4116

4124 — No → 4128 Continue with any existing image(s) (e.g. of item and/or lift(s)?

4128 — Yes → 4132

4128 — No → 4130 STOP/Discontinue with lift and proceed PAP

4132
Output:
- Image(s) of evidence item(s) and lift(s) with impression(s) containing sufficient detail for further examination;
- Evidence item(s);
- Lift(s)

4132 → 4134 Are there additional evidence items to process?

4134 — Yes → GO TO 2062 - Item Characterization

4134 — No → GO TO 8000 - Image Examination/ Digital Processing

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Return to Overview

4200 - Object: Dry Origin/Porous Substrate (1 of 3)

FROM 3506

4202
Input: Dry origin impression on non-porous substrate (possibly semi-porous)

4204
Conduct visual examination to locate impressions (e.g. techniques involving white/visible light such as side/oblique lighting or alternate light source (ALS)); document condition as received.

4206
Determine optimal lighting based on the following:

- 4208 Is the impression faint?
- 4210 Are there any 3-D qualities to the impression?
- 4212 Are there issues with color contrast to consider?
- 4214 Are there issues with lighting to consider?
- 4216 Is there any background interference to consider?

4218 Are there impression(s) visible?
- Yes → 4228
- No → 4220

4220 Conduct blind search using a lift technique?
- Yes → 4222 Conduct Electrostatic Dust Lift (ESDL) → 4218
- No → 4224

4224 *Document observations and/or image PAP*

4226 Discontinue and proceed PAP

4228 *General Description*

- *Whether it is footwear or tire*
- *Directionality (e.g. measure location on item)*
- *Whether full or partial impression*
- *Measurements of length and width; and if the area is from the heel, arch, or ball (if footwear and it can be determined)*
- *Appearance of wear, damage, and/or inclusions in impression*
- *Any additional impressions on item*
- *Observed Limitations*
- *Logo/Make/Model*
- *General description of available design features/pattern(s)*
- *Substrate and matrix*
- *Descriptions of any other images and associated evidence (e.g. shirt and/or photos of shirt with impression)*

4230
Determine appropriate imaging settings to capture available detail in the impression. (See Imaging Considerations - Taking Images)

4232
Capture images with selected settings

4234 Does the image capture the available detail?
- Yes → GO TO 4246
- No → 4236

4236 Retain images?
- Yes → 4238 Retain and file images PAP → 4240
- No → 4240

4240 Continue with additional imaging?
- Yes → RETURN TO 4230
- No → 4242

4242 Ask for assistance?
- Yes → 4244 Seek assistance from imaging unit or other source PAP → RETURN TO 4234
- No → 4246

4246 Conduct lift (or other impression/indentation detection method (e.g. ESDA))?
- Yes → GO TO 4260 - Dry Origin/ Porous (2 of 3)
- No → 4248

4248 Continue with any existing image(s)?
- Yes → GO TO 4394 - Output - Dry Origin/Porous (3 of 3)
- No → 4250

4250 Are there additional evidence items to process?
- Yes → GO TO 2062 - Item Characterization
- No → GO TO 9000 - Verification and Reporting

Imaging Considerations (Taking Images)

Perspective
Scale (make sure this is present)
Appropriate scale type (e.g. L scale v others)
Focus
Resolution
Camera settings
Filter(s) used (if any)
Lighting
-Use a stabilizer (PAP)? (e.g. Use a copy stand or tripod)
-Direct, oblique, transmitted, axial, or reflective light
Formatting:
- Usable format needed
- TIFF, JPEG, RAW
Identifiers present (e.g. L, R, a, b, c, 1, 2, 3, and any agency specific labels PAP)
No distortion
Identify and account for presence of multiple impressions
Note if there has been any processing prior to imaging
Depth of field (e.g. account for curved surface, proximity of camera to impression)
Contrast
Noise reduction
Camera position (e.g. Is plane parallel to substrate?)

Technology Assist

- Alternate light source (ALS)

Return to Overview

4200/4300 - Object: Dry Origin/Porous Substrate (2 of 3)

FROM 4246

FROM 5020/5050

4260 Does agency utilize multiple types of lifts (or other impression/indentation detection) method(s)?

Yes

4264 Does agency policy dictate which method to use first?

Yes

4286 Utilize lift method PAP

4288 Conduct multiple lifts now? (e.g. some examiners choose to conduct multiple lifts in sequence prior to proceeding to imaging)

Yes

4292 Conduct multiple lifts

No

4262 Utilize Available lift method PAP

GO TO 4288

No

No

4290 Conduct single lift

4294 Impression(s) transferred appropriately to the lift?

Yes

No

4268 Use knowledge, experience, training, visual examination, surface characteristics, texture, and agency policy to select lift method(s) (if multiple lift methods will be used, also to determine succession plan):

Type of lift may occur in successsion (e.g. least destructive to most destructive) also possible for multiple ESDL

- 4270 Round/curved surface → 4272 Gel Lift/ Silicone Based (Pliable) Lift
- 4274 Textured surface → 4276 Silicone Casting
- 4278 Indented impression on the evidence → 4280 Electrostatic Detection Apparatus (ESDA)
- 4282 Other surfaces such as non-textured, non-curved,or fibrous surface etc. (e.g. carpet, carboard) → 4284 Electrostatic Dust Lift (ESDL)

Technology Assist

- Alternate light source (ALS)

4296 Attempt another lift/ type of lift?

Yes → RETURN TO 4268

No

4298 Retain lift(s) PAP?

Yes → 4300 Retain Lift(s) PAP

No → 4302 Discard Lift(s) PAP

4301 Image retained lift(s)?

Yes → GO TO 4308

No → 4304 STOP/Discontinue lift attempts and proceed PAP

4306
General Description or Additional Information Obtained

- *Whether it is footwear or tire*
- *Directionality (e.g. measure location on item)*
- *Whether full or partial mpression*
- *Measurements of length and width; and if the area is from the heel, arch, or ball (if footwear and it can be determined)*
- *Appearance of wear, damage, and/or inclusions in impression*
- *Any additional impressions on item*
- *Observed Limitations*
- *Logo/Make/Model*
- *General description of available design features/pattern(s)*
- *Substrate and matrix*
- *Descriptions of any other images and associated evidence (e.g. shirt and/or photos of shirt with impression)*
- *Other features or information not previously visualized*

4308 Determine appropriate imaging settings to capture available detail in the impression. (See Imaging Considerations - Taking Images *located on Objects: Dry Origin/Porous Substrate (1 of 3))

4310 Capture image(s) with selected settings

4312 Does the image capture the available detail?

Yes

No

4314 Retain images?

Yes → 4316 Retain and file images PAP

No

4318 Continue with additional imaging?

Yes → RETURN TO 4308

No

4320 Ask for assistance?

Yes → 4322 Seek assistance from imaging unit or other source PAP → RETURN TO 4312

No

4324 Continue with existing image(s) of the lift?

Yes

No → 4326 Discontinue with Lift

4328 Perform chemical processing on the item?

Yes → GO TO 4350 - Dry Origin/Porous (3 of 3)

No

4330
Output:
- Image(s) of item(s) and lift(s) with impressions containing sufficient detail for digital processing;
- Item(s);
- Lift(s)

4332 Are there additional evidence items to process?

Yes → GO TO 2062 - Item Characterization

No → GO TO 8000 - Image Examination/ Digital Processing

Option → GO TO 5052-- If returning to Wet/Porous/ Non-blood (2 of 2)

This process map provides a visual description and attempts to represent all reasonable variations of casework currently performed by footwear and tire examiners. OSAC does not necessarily support or endorse (as best practices) all of the different steps and paths depicted in this process map.

Return to Overview

4300 - Object: Dry Origin/Porous Substrate (3 of 3)

FROM 4328

4350 Use a destructive technique on evidence item?
- Yes → 4352 Contact submitter for permission?
- No → GO TO 4358

4352 Contact submitter for permission?
- Yes → 4354 Contact submitter
- No → 4362

4354 Contact submitter → 4356 Permission obtained?
- Yes → 4362
- No → 4358

4356 Permission obtained? (No) → 4358 Continue with any existing image(s)?
- Yes → GO TO 4394
- No → 4360 Are there additional evidence items to process?
  - Yes → GO TO 2062 - Item Characterization
  - No → GO TO 9000 - Verification and Reporting

4362 Select Chemical Processing Method(s)

Use case scenario, visual examination, knowledge, experience, training, preference, characteristics of substrate and matrix, and agency policy to:
- Select chemical or physical processing (and associated applicable lighting scheme) and
- Determine processing sequence (e.g. least destructive to most destructive):

Consider the following methods:
- Bromophenol Blue
- Potassium Thiocyanate
- Ammonium Thiocyanate
- Other

→ 4364 Utilize selected method PAP → 4368 Did the processing technique improve the impression visualizaton?
- Yes → 4376
- No → 4370

4376 *General Description or Additional Information Obtained*
- *Whether it is footwear or tire*
- *Directionality (e.g. measure location on item)*
- *Whether full or partial impression*
- *Appearance of wear, damage, and/or inclusions in impression*
- *Measurements of length and width; and if the area is from the heel, arch, or ball (if footwear and it can be determined)*
- *Any additional impressions on item*
- *Observed limitations*
- *Logo/Make/Model*
- *General description of available design features/pattern(s)*
- *Substrate and matrix*
- *Descriptions of any other images and associated evidence (e.g. shirt and/or photos of shirt with impression)*
- *Other features or information previously not visualized*

→ 4370 Continue with additional processing?
- Yes → RETURN TO 4362
- No → 4372 Continue with any existing image(s)?
  - Yes → GO TO 4394
  - No → 4374 Are there additional evidence items to process?
    - Yes → GO TO 2062 - Item Characterization
    - No → GO TO 9000 - Verification and Reporting

4378 Determine appropriate imaging settings to capture available detail in the impression. (See Imaging Considerations - Taking Images - Dry Origin/Porous (1 of 3))

→ 4380 Capture images with selected settings → 4382 Does the image capture the available detail?
- Yes → 4394
- No → 4384 Retain images?
  - Yes → 4386 Retain and file images PAP
  - No → 4388 Continue with additional imaging?
    - Yes → RETURN TO 4378
    - No → 4390 Ask for assistance?
      - Yes → 4392 Seek assistance from imaging unit or other source PAP → RETURN TO 4382
      - No → 4394

4394 Output:
- Item(s) (that are chemically processed);
- Images of lift(s) and item(s) with impressions containing sufficient detail for further examination;
- Lift(s)

→ 4396 Are there additional evidence items to process?
- Yes → GO TO 2062 - Item Characterization
- No → GO TO 8000 - Image Examination/ Digital Processing

Technology Assist
- Alternate light source (ALS)

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Return to Overview

4400 - Object: Wet Origin/Non-Porous Substrate/Non-Blood (1 of 3)

FROM 3516/4644

4402
Input: Wet origin non-blood impression on non-porous substrate

4404
Conduct visual examination to locate impressions (e.g. techniques involving white/visible light such as side/oblique lighting or alternate light source (ALS)); document condition as received.

4406
Determine optimal lighting based on the following:

- 4408 Is the impression faint?
- 4410 Are there any 3-D qualities to the impression?
- 4412 Are there issues with color contrast to consider?
- 4414 Are there issues with lighting to consider?
- 4416 Is backlighting needed?
- 4418 Is the surface clear (e.g. glass)?

4420 Are there impression(s) visible? — Yes → 4434 Does the impression need to be dried? — Yes → 4436 Let dry (if possible), or use drying tool; No → (back)

No → 4422 Conduct a blind search using a processing method? — Yes → 4428 Does the item need to be dried? — Yes → 4430 Let surface dry (if possible) or use drying tool

No → 4424 *Document observations and/or image PAP* → 4426 Discontinue and proceed PAP

No → 4432 Use knowledge, experience, training, visual examination, surface characteristics, texture, and agency policy to determine appropriate physical/chemical processing method (if multiple methods will be used, also to determine succession plan):
- Fingerprint powder
- Gel lift
- Superglue fuming
- Dye stain

4438
General Description
- *Whether it is footwear or tire*
- *Directionality (e.g. measure location on item)*
- *Whether full or partial impression*
- *Measurements of length and width; and if the area is from the heel, arch, or ball (if footwear and it can be determined)*
- *Appearance of wear, damage, and/or inclusions in impression*
- *Any additional impressions on item*
- *Observed limitations*
- *Logo/Make/Model*
- *General description of available design features/pattern(s)*
- *Substrate and matrix*

4440
Determine appropriate imaging settings to capture available detail in the impression. (See Imaging Considerations - Taking Images)

4442
Capture images with selected settings

4444 Does the image capture the available detail? — Yes → 4446 Conduct a physical or chemical process prior to lifting? — Yes → GO TO 4470 - Wet Origin/ Non-porous/ Non-blood (2 of 3)

No → GO TO 4520 - Wet Origin/ Non-porous/ Non-blood (3 of 3)

No → 4448 Retain images? — Yes → 4450 Retain and file images PAP

No → 4452 Continue with additional imaging? — Yes → RETURN TO 4440

No → 4454 Ask for assistance? — Yes → 4456 Seek assistance from imaging unit or other source PAP → RETURN TO 4444

No → (back)

Imaging Considerations (Taking Images)

Perspective
Scale (make sure this is present)
Appropriate scale type (e.g. L scale v others)
Focus
Resolution
Camera settings
Filter(s) used (if any)
Lighting
-Use a stabilizer (PAP)? (e.g. Use a copy stand or tripod)
-Direct, oblique, transmitted, axial, or reflective light
Formatting:
- Usable format needed
- TIFF, JPEG, RAW
Identifiers present (e.g. L, R, a, b, c, 1, 2, 3, and any agency specific labels PAP)
No distortion
Identify and account for presence of multiple impressions
Note if there has been any processing prior to imaging
Depth of field (e.g. account for curved surface, proximity of camera to impression)
Contrast
Noise reduction
Camera position (e.g. Is plane parallel to substrate?)

Technology Assist

- Alternate light source (ALS)
- Drying tool

Return to Overview

4400/4500 - Object: Wet Origin/Non-Porous Substrate/Non-Blood (2 of 3)

FROM 4446

4470 Use a destructive technique on evidence item?

Yes → 4472 Contact submitter for permission?

Yes → 4474 Contact Submitter

No → 4474 Contact Submitter

4476 Permission obtained?

Yes → 4482

No → 4478 Continue with any existing image(s)?

Yes → GO TO 4566 - Output - Wet/ Non-porous/ Non-blood (3 of 3)

No → 4480 Are there additional evidence items to process?

Yes → GO TO 2062 - Item Characterization

No → GO TO 9000 - Verification and Reporting

4482 Select Physical/Chemical Processing Method(s)

Use visual examination, knowledge, experience, training, preference, characteristics of substrate (non-porous v semi-porous) and matrix, and/or agency policy to:

- Select chemical or physical processing (and associated applicable lighting scheme) and
- Determine processing sequence (e.g. most destructive to least destructive):

Consider the following methods:

- Powder (with possible lift)
- Cyanoacrylate/Dye Stain
- Other

4484 Utilize selected method PAP

4486 Did the processing technique improve the impression visualizaton?

Yes → *4494 General Description or Additional Information Obtained*

- *Whether it is footwear or tire*
- *Directionality (e.g. measure location on item)*
- *Whether full or partial impressionMeasurements of length and width; and if the area is from the heel, arch, or ball (if footwear and it can be determined)*
- *Appearance of wear, damage, and/or inclusions in impression*
- *Any additional impressions on item*
- *Observed limitations*
- *Logo/Make/Model*
- *General description of available design features/pattern(s)*
- *Substrate and matrix*
- *Descriptions of any other images and associated evidence (e.g. shirt and/or photos of shirt with impression)*
- *Other features or information previously not visualized*

No → 4488 Would additional processing help visualize the impression?

Yes → 4494

No → 4490 Continue with any existing image(s)?

Yes → GO TO 4566 - Output -Wet/ Non-porous/ Non-blood (3 of 3)

No → 4492 Are there additional evidence items to process?

Yes → GO TO 2062 - Item Characterization

No → GO TO 9000 - Verification and Reporting

4496 Determine appropriate imaging settings to capture available detail in the impression. (See Imaging Considerations - Taking Images)

4498 Capture images with selected settings

4500 Does the image capture the available detail?

Yes → 4502 Retain images?

No → 4502 Retain images?

4502 Retain images?

Yes → 4504 Retain and file images PAP

No → 4506 Continue with additional imaging?

4504 Retain and file images PAP → 4506 Continue with additional imaging?

4506 Continue with additional imaging?

Yes → GO TO 4496

No → 4508 Ask for assistance?

4508 Ask for assistance?

Yes → 4510 Seek assistance from imaging unit or other source PAP → RETURN TO 4500

No → 4512 Would additional processing help visualize the impression?

4512 Would additional processing help visualize the impression?

Yes → RETURN TO 4482

No → GO TO 4520 - Wet Origin/ Non-Porous/ Non-blood (3 of 3)

Technology Assist

- Alternate light source (ALS)

Imaging Considerations (Taking Images)

Perspective
Scale (make sure this is present)
Appropriate scale type (e.g. L scale v others)
Focus
Resolution
Camera settings
Filter(s) used (if any)
Lighting
-Use a stabilizer (PAP)? (e.g. Use a copy stand or tripod)
-Direct, oblique, transmitted, axial, or reflective light
Formatting:
- Usable format needed
- TIFF, JPEG, RAW
Identifiers present (e.g. L, R, a, b, c, 1, 2, 3, and any agency specific labels PAP)
No distortion
Identify and account for presence of multiple impressions
Note if there has been any processing prior to imaging
Depth of field (e.g. account for curved surface, proximity of camera to impression)
Contrast
Noise reduction
Camera position (e.g. Is plane parallel to substrate?)

Return to Overview

4500 - Object: Wet Origin/Non-Porous Substrate/Non-Blood (3 of 3)

FROM 4446/4512

4520 Attempt lift technique? — Yes → 4526 Does the Impression have a 3D quality? — Yes → 4528 Lift with dental stone; No → 4530 Gel lift

4520 — No → 4522 Continue with any existing images? — Yes → GO TO 4566

4522 — No → 4524 Are there additional evidence items to process? — Yes → GO TO 2062 - Item Characterization

4524 — No → GO TO 9000 - Verification and Reporting

4528 / 4530 → 4532 Examine for detail, clarity, etc as compared to the item or image(s) → 4534 Impression(s) transferred appropriately to the lift? — Yes →

4546
General Description or Additional Information Obtained

- *Whether it is footwear or tire*
- *Directionality (e.g. measure location on item)*
- *Whether full or partial impression*
- *Measurements of length and width; and if the area is from the heel, arch, or ball (if footwear and it can be determined)*
- *Appearance of wear, damage, and/or inclusions in impression*
- *Any additional impressions on item*
- *Observed limitations*
- *Logo/Make/Model*
- *General description of available design features/pattern(s)*
- *Substrate and matrix*
- *Descriptions of any other images and associated evidence (e.g. shirt and/or photos of shirt with impression)*
- *Other features or information not previously visualized*

→ 4548 Determine appropriate imaging settings to capture available detail in the impression. (See Imaging Considerations - Taking Images) → 4550 Capture images with appropriate settings → 4552 Does the image capture the available detail? — Yes →

4566
Output:
- Item(s) (that may or may not be chemically or physically processed);
- Image(s) of evidence item(s) and lift(s) with sufficient detail for further examination;
- Lift(s)

4552 — No → 4554 Retain images? — Yes → 4556 Retain and file images PAP

4554 — No → 4558 Continue with additional imaging? — Yes → RETURN TO 4548

4558 — No → 4560 Ask for assistance? — Yes → 4562 Seek assistance from imaging unit or other source PAP → RETURN TO 4552

4560 — No → 4564 Discontinue imaging and move forward with images, lift(s) and evidence item(s)

4534 — No → 4536 Retain lift(s) PAP? — Yes → 4538 Retain lift(s) PAP

4536 — No → 4540 Discard lift(s) PAP → 4542 Continue with any existing images? — Yes → GO TO 4566

4542 — No → 4544 Are there additional evidence items to process? — Yes → GO TO 2062 - Item Characterization

4544 — No → GO TO 9000 - Verification and Reporting

4566 → 4568 Are there additional evidence items to process? — Yes → GO TO 2062 - Item Characterization

4568 — No → GO TO 8000 - Image Examination/ Digital Processing

Imaging Considerations (Taking Images)

Perspective
Scale (make sure this is present)
Appropriate scale type (e.g. L scale v others)
Focus
Resolution
Camera settings
Filter(s) used (if any)
Lighting
-Use a stabilizer (PAP)? (e.g. Use a copy stand or tripod)
-Direct, oblique, transmitted, axial, or reflective light
Formatting:
- Usable format needed
- TIFF, JPEG, RAW
Identifiers present (e.g. L, R, a, b, c, 1, 2, 3, and any agency specific labels PAP)
No distortion
Identify and account for presence of multiple impressions
Note if there has been any processing prior to imaging
Depth of field (e.g. account for curved surface, proximity of camera to impression)
Contrast
Noise reduction
Camera position (e.g. Is plane parallel to substrate?)

Technology Assist

- Alternate light source (ALS)

Return to Overview

4600 - Wet Origin/Non-Porous Substrate/Blood (1 of 3)

FROM 3516

4602
Input: Blood Impression (or suspected blood) on non-porous substrate

4604
Conduct visual examination to locate impressions (e.g. techniques involving white/visible light such as side/oblique lighting or alternate light source (ALS)); document condition as received.

4606
Determine optimal lighting based on the following:

- 4608 Is the impression faint?
- 4610 Are there any 3-D qualities to the impression?
- 4612 Are there issues with color contrast to consider?
- 4614 Are there issues with lighting to consider?
- 4616 Is backlighting needed?
- 4618 Is the surface clear (e.g. glass)?
- 4620 Does the chemical process detemine the lighting? (e.g. flourescent lighting, UV light, etc.)
- 4622 Is there any background interference to consider?

4624 Are there impression(s) visible?
- Yes → 4632 Does the impression need to be dried?
  - Yes → 4634 Let dry or use drying tool → 4636 Perform presumptive test for blood?
  - No → 4636 Perform presumptive test for blood?
- No → 4626 Conduct blind search using a chemical process?
  - Yes → GO TO 4680 - Wet Origin/ Non-porous/ Blood (2 of 3)
  - No → 4628 *Document observations and/or image PAP* → 4630 Discontinue and proceed PAP

4636 Perform presumptive test for blood?
- Yes → 4638 Swab for Presumptive Test → 4640 Positive for blood?
- No → 4644 Continue assuming this is blood anyway?

4640 Positive for blood?
- Yes → 4646
- No → 4642 Re-swab?

4642 Re-swab?
- Yes → 4638 Swab for Presumptive Test
- No → 4644 Continue assuming this is blood anyway?

4644 Continue assuming this is blood anyway?
- Yes → 4646
- No → GO TO 4400 - Wet/non-porous Non-blood

4646
General Description
- *Whether it is footwear or tire*
- *Directionality (e.g. measure location on item)*
- *Whether full or partial impression*
- *Measurements of length and width; and if the area is from the heel, arch, or ball (if footwear and it can be determined)*
- *Appearance of wear, damage, and/or inclusions in impression*
- *Any additional impressions on item*
- *Observed Limitations*
- *Logo/Make/Model*
- *General description of available design features/pattern(s)*
- *Substrate and matrix*
- *Descriptions of any other images and associated evidence (e.g. shirt and/or photos of shirt with impression)*

4648
Determine appropriate imaging settings to capture available detail in the impression. (See Imaging Considerations - Taking Images)

4650
Capture images with selected settings

4652 Does the image capture the available detail?
- Yes → 4654 Conduct a physical or chemical process
- No → 4656 Retain images?

4654 Conduct a physical or chemical process
- Yes → GO TO 4680 - Wet Origin/ Non-porous/ Blood (2 of 3)
- No → GO TO 4750 - Wet Origin/ Non-porous/Blood (3 of 3)

4656 Retain images?
- Yes → 4658 Retain and file images PAP
- No → 4660 Continue with additional imaging?

4660 Continue with additional imaging?
- Yes → RETURN TO 4648
- No → 4662 Ask for assistance?

4662 Ask for assistance?
- Yes → 4664 Seek assistance from imaging unit or other source PAP → RETURN TO 4652
- No → 4652 Does the image capture the available detail?

Technology Assist
- Drying tool
- Alternate light source (ALS)

Imaging Considerations (Taking Images)

Perspective
Scale (make sure this is present)
Appropriate scale type (e.g. L scale v others)
Focus
Resolution
Camera settings
Filter(s) used (if any)
Lighting
-Use a stabilizer (PAP)? (e.g. Use a copy stand or tripod)
-Direct, oblique, transmitted, axial, or reflective light
Formatting:
- Usable format needed
- TIFF, JPEG, RAW
Identifiers present (e.g. L, R, a, b, c, 1, 2, 3, and any agency specific labels PAP)
No distortion
Identify and account for presence of multiple impressions
Note if there has been any processing prior to imaging
Depth of field (e.g. account for curved surface, proximity of camera to impression)
Contrast
Noise reduction
Camera position (e.g. Is plane parallel to substrate?)

Return to Overview

4600/4700 - Wet Origin/Non-Porous Substrate/Blood (2 of 3)

FROM 4626/4654

4680 Use a destructive technique on evidence item?
- Yes → 4682 Contact submitter for permission?
  - Yes → 4684 Contact submitter
    - 4686 Permission obtained?
      - Yes → (to 4688)
      - No → GO TO 4750 - Wet Origin/ Non-porous/Blood (3 of 3)
  - No → (to 4688)
- No → GO TO 4750 - Wet Origin/ Non-porous/Blood (3 of 3)

4688 Select Physical/Chemical Processing Method(s)

Use visual examination, knowledge, training, experience, preference, characteristics of substrate type (non-porous v semi-porous) and color, surface contaminants, and matrix, and/or agency policy to:
- Select chemical or physical processing technique (and associated applicable lighting scheme) and;
- Determine processing sequence (e.g. least destructive to most destructive) or if a fixative is needed.

Consider the following options:
- Light Surface: Leucocrystal violet (LCV), Amido black, Leucomalachite green, Hungarian red, Crowle's Double Stain, Coomassie Blue, 3,3'-Diaminobenzadine (D.A.B.)
- Dark Surface: Titanium dioxide
- Any surface color: Blue Star, Luminol, Acid Yellow 7 with forensic light source

4690 Utilize selected method PAP

4692 Did the processing technique improve the impression visualizaton?
- Yes → (to 4696)
- No → 4694 Would additional processing help visualize the impression?
  - Yes → (to 4688)
  - No → GO TO 4750 - Wet Origin/ Non-Porous/Blood (3 of 3)

4696
General Description or Additional Information Obtained
- *Whether it is footwear or tire*
- *Directionality (e.g. measure location on item)*
- *Whether full or partial impression*
- *Measurements of length and width; and if the area is from the heel, arch, or ball (if footwear and it can be determined)*
- *Appearance of wear, damage, and/or inclusions in impression*
- *Any additional impressions on item*
- *Observed limitations*
- *Logo/Make/Model*
- *General description of available design features/pattern(s)*
- *Substrate and matrix*
- *Descriptions of any other images and associated evidence (e.g. shirt and/or photos of shirt with impression)*
- *Other features or information not previously visualized*

4698 Determine appropriate imaging settings to capture available detail in the impression. (See Imaging Considerations - Taking Images)

4700 Capture images with selected settings

4702 Does the image capture the available detail?
- Yes → (to 4716)
- No → 4704 Retain images?
  - Yes → 4706 Retain and file images PAP → (to 4708)
  - No → (to 4708)

4708 Continue with additional imaging?
- Yes → RETURN TO 4698
- No → 4710 Ask for assistance?
  - Yes → 4712 Seek assistance from imaging unit or other source PAP → RETURN TO 4702
  - No → 4711 Conduct any additional processing?
    - Yes → RETURN TO 4688
    - No → 4714 Discontinue with physical/chemical processing of item → GO TO 4750 - Wet Origin/ Non-Porous/Blood (3 of 3)

4716 Would additional processing help visualize the impression?
- Yes → RETURN TO 4688
- No → GO TO 4750 - Wet Origin/ Non-Porous/Blood (3 of 3)

Technology Assist
- Alternate light source (ALS)

Imaging Considerations (Taking Images)

Perspective
Scale (make sure this is present)
Appropriate scale type (e.g. L scale v others)
Focus
Resolution
Camera settings
Filter(s) used (if any)
Lighting
-Use a stabilizer (PAP)? (e.g. Use a copy stand or tripod)
-Direct, oblique, transmitted, axial, or reflective light
Formatting:
- Usable format needed
- TIFF, JPEG, RAW
Identifiers present (e.g. L, R, a, b, c, 1, 2, 3, and any agency specific labels PAP)
No distortion
Identify and account for presence of multiple impressions
Note if there has been any processing prior to imaging
Depth of field (e.g. account for curved surface, proximity of camera to impression)
Contrast
Noise reduction
Camera position (e.g. Is plane parallel to substrate?)

Return to Overview

4700 - Object: Wet Origin/Non-Porous Substrate/Blood (3 of 3)

FROM 4654/4686/4694/4714/4716

4750 Attempt lift? — Yes → 4756 Gel lift (possibly with chemical processing after the lift)

4750 Attempt lift? — No → 4752 Continue with any existing images? — Yes → GO TO 4792

4752 — No → 4754 Are there additional evidence items to process? — Yes → GO TO 2062 - Item Characterization

4754 — No → GO TO 9000 - Verification and Reporting

4756 Gel lift (possibly with chemical processing after the lift) → 4758 Impression(s) transferred appropriately to the lift? — Yes → 4772

4758 — No → 4760 Retain lift(s) PAP? — Yes → 4762 Retain lift(s) PAP

4760 — No → 4764 Discard lift(s) PAP → 4768 Continue with any existing images? — Yes → GO TO 4792

4768 — No → 4770 Are there additional evidence items to process? — Yes → GO TO 2062 - Item Characterization

4770 — No → GO TO 9000 - Verification and Reporting

4772
General Description or Additional Information Obtained

- *Whether it is footwear or tire*
- *Directionality (e.g. measure location on item)*
- *Whether full or partial impression*
- *Measurements of length and width; and if the area is from the heel, arch, or ball (if footwear and it can be determined)*
- *Appearance of wear, damage, and/or inclusions in impression*
- *Any additional impressions on item*
- *Observed limitations*
- *Logo/Make/Model*
- *General description of available design features/pattern(s)*
- *Substrate and matrix*
- *Descriptions of any other images and associated evidence (e.g. shirt and/or photos of shirt with impression) Other features or information previously not visualized Other features or information not previously visualized*

4772 → 4774 Determine appropriate imaging settings to capture available detail in the impression. (See Imaging Considerations - Taking Images) → 4776 Capture images with appropriate settings → 4778 Does the image capture the available detail? — Yes → 4792

4778 — No → 4780 Retain images? — Yes → 4782 Retain and file images PAP

4780 — No → 4784 Continue with additional imaging? — Yes → RETURN TO 4774

4784 — No → 4786 Ask for assistance? — Yes → 4788 Seek assistance from imaging unit or other source PAP → RETURN TO 4778

4786 — No → 4790 Discontinue imaging and move forward with images, lift(s) and evidence item(s) → 4792

4792
Output:

- Item(s) (that may or may not be chemically processed)
- Image(s) of evidence item(s) and lift(s) with impressions containing sufficient detail for further examination
- Blood swab(s)
- Presumptive test results
- Lift(s)

4792 → 4794 Are there additional evidence items to process? — Yes → GO TO 2062 - Item Characterization

4794 — No → GO TO 8000 - Image Examination/ Digital Processing

Imaging Considerations (Taking Images)

Perspective
Scale (make sure this is present)
Appropriate scale type (e.g. L scale v others)
Focus
Resolution
Camera settings
Filter(s) used (if any)
Lighting
-Use a stabilizer (PAP)? (e.g. Use a copy stand or tripod)
-Direct, oblique, transmitted, axial, or reflective light
Formatting:
- Usable format needed
- TIFF, JPEG, RAW
Identifiers present (e.g. L, R, a, b, c, 1, 2, 3, and any agency specific labels PAP)
No distortion
Identify and account for presence of multiple impressions
Note if there has been any processing prior to imaging
Depth of field (e.g. account for curved surface, proximity of camera to impression)
Contrast
Noise reduction
Camera position (e.g. Is plane parallel to substrate?)

Technology Assist

- Alternate light source (ALS)

Return to Overview

5000 - Object: Wet Origin/Porous Substrate/Non-Blood (1 of 2)

FROM 3508/5214

5002
Input: Wet origin non-blood impression on porous substrate (possibly semi-porous)

5004
Conduct visual examination to locate impressions (e.g. techniques involving white/visible light such as side/oblique lighting or alternate light source (ALS)); document condition as received.

5006
Determine optimal lighting based on the following:

- 5008 Is the impression faint?
- 5010 Are there any 3-D qualities to the impression?
- 5012 Are there issues with color contrast to consider?
- 5014 Are there issues with lighting to consider?
- 5016 Is there any background interference to consider?

5018 Are there impression(s) visible?
- Yes → 5028 Do I need to dry the impression?
  - Yes → 5030 Let dry (if possible) or use drying tool
  - No
- No → 5020 Conduct blind search using a lift technique?
  - Yes → GO TO 4260 - Dry Origin/Porous (2 of 3)
  - No → 5022 Conduct blind search using a physical/chemical process?
    - Yes → GO TO 5070 - Wet Origin/Porous/ Non-blood (2 of 2)
    - No → 5024 *Document observations and/or image PAP* → 5026 Discontinue and proceed PAP

5032
General Description

- *Whether it is footwear or tire*
- *Directionality (e.g. measure location on item)*
- *Whether full or partial impression*
- *Measurements of length and width; and if the area is from the heel, arch, or ball (if footwear and it can be determined)*
- *Appearance of wear, damage, and/or inclusions in impression*
- *Any additional impressions on item*
- *Observed Limitations*
- *Logo/Make/Model*
- *General description of available design features/pattern(s)*
- *Substrate and matrix*
- *Descriptions of any other images and associated evidence (e.g. shirt and/or photos of shirt with impression)*

5034
Determine appropriate imaging settings to capture available detail in the impression. (See Imaging Considerations - Taking Images)

5036
Capture images with appropriate settings

5038 Does the image capture the available detail?
- Yes → 5050 Attempt lift now?
  - Yes → GO TO 4260 - Dry Origin/Porous (2 of 3)
  - No → FROM 4332- Dry Origin/Porous (2 of 3) → 5052 Use a physical/chemical process?
    - Yes → GO TO 5070 - Wet Origin/Porous/ Non-blood (2 of 2)
    - No → GO TO 5110 - Output - Wet/Porous/ Non-blood (2 of 2)
- No → 5040 Retain images?
  - Yes → 5042 Retain and file images PAP → 5044 Continue with additional imaging?
    - Yes → RETURN TO 5034
    - No → 5046 Ask for assistance?
      - Yes → 5048 Seek assistance from imaging unit or other source PAP → RETURN TO 5038
      - No
  - No

Imaging Considerations (Taking Images)

Perspective
Scale (make sure this is present)
Appropriate scale type (e.g. L scale v others)
Focus
Resolution
Camera settings
Filter(s) used (if any)
Lighting
-Use a stabilizer (PAP)? (e.g. Use a copy stand or tripod)
-Direct, oblique, transmitted, axial, or reflective light
Formatting:
- Usable format needed
- TIFF, JPEG, RAW
Identifiers present (e.g. L, R, a, b, c, 1, 2, 3, and any agency specific labels PAP)
No distortion
Identify and account for presence of multiple impressions
Note if there has been any processing prior to imaging
Depth of field (e.g. account for curved surface, proximity of camera to impression)
Contrast
Noise reduction
Camera position (e.g. Is plane parallel to substrate?)

Technology Assist

- Alternate light source (ALS)
- Drying tool

This process map provides a visual description and attempts to represent all reasonable variations of casework currently performed by footwear and tire examiners. OSAC does not necessarily support or endorse (as best practices) all of the different steps and paths depicted in this process map.

Return to Overview

5000 - Object: Wet Origin/Porous Substrate/Non-Blood (2 of 2)

FROM 5022/5052

5070 Use a destructive technique on evidence item? — Yes → 5072 Contact submitter for permission? — Yes → 5074 Contact submitter → 5076 Permission obtained? — Yes → 5080

5070 — No → 5080

5072 — No → 5080

5076 — No → 5078 Use a non-destructive processing method (e.g. Iodine)? — Yes → 5080

5078 — No → GO TO 5088

5080 Select Physical/Chemical Processing Method(s)

Use visual examination, knowledge, training, experience, preference, characteristics of substrate type (non-porous v semi-porous) and color, surface contaminants, and matrix, and/or agency policy to:

- Select chemical or physical processing technique (and associated applicable lighting scheme) and;
- Determine processing sequence (e.g. least destructive to most destructive) and if a fixative is needed.

Consider the following options:

- Iodine (for lipids, documents)
- Potassium Thiocyanate
- Fingerprint powder
- Amido Black
- Ninhydrin
- 1,2 Indanedione- Zinc Chloride
- DFO
- Silver Nitrate/Physical Developer
- Other

→ 5082 Utilize selected method PAP → 5084 Did the processing technique improve the impression visualizaton? — Yes → 5092

5092
General Description or Additional Information Obtained

- *Whether it is footwear or tire*
- *Directionality (e.g. measure location on item)*
- *Whether full or partial impressionMeasurements of length and width; and if the area is from the heel, arch, or ball (if footwear and it can be determined)*
- *Appearance of wear, damage, and/or inclusions in impression*
- *Any additional impressions on item*
- *Observed limitations*
- *Logo/Make/Model*
- *General description of available design features/pattern(s)*
- *Substrate and matrix*
- *Descriptions of any other images and associated evidence (e.g. shirt and/or photos of shirt with impression)*
- *Other features or information not previously visualized*

→ 5094 Determine appropriate imaging settings to capture available detail in the impression. (See Imaging Considerations - Taking Images) → 5096 Capture images with selected settings

5084 — No → 5086 Continue with additional processing? — Yes → RETURN TO 5080

5086 — No → 5088 Continue with any existing images? — Yes → GO TO 5110

5088 — No → 5090 Are there additional evidence items to process? — Yes → GO TO 2062 - Item Characterization

5090 — No → GO TO 9000 - Verification and Reporting

5096 → 5098 Does the image capture the available detail? — Yes → 5099 Would further processing help improve the impression visualization? — Yes → RETURN TO 5080

5098 — No → 5100 Retain images? — Yes → 5102 Retain and file images PAP

5099 — No → 5110

5100 — No → 5104 Continue with additional imaging? — Yes → RETURN TO 5094

5102 → 5104

5104 — No → 5106 Ask for assistance? — Yes → 5108 Seek assistance from imaging unit or other source PAP → RETURN TO 5098

5106 — No → 5110

5110 Output:

- Item(s) (that are chemically processed);
- images of item(s) with impressions containing sufficient detail for further examination

→ 5112 Are there additional evidence items to process? — Yes → GO TO 2062 - Item Characterization

5112 — No → GO TO 8000 - Image Examination/ Digital Processing

Imaging Considerations (Taking Images)

Perspective
Scale (make sure this is present)
Appropriate scale type (e.g. L scale v others)
Focus
Resolution
Camera settings
Filter(s) used (if any)
Lighting
-Use a stabilizer (PAP)? (e.g. Use a copy stand or tripod)
-Direct, oblique, transmitted, axial, or reflective light
Formatting:
- Usable format needed
- TIFF, JPEG, RAW
Identifiers present (e.g. L, R, a, b, c, 1, 2, 3, and any agency specific labels PAP)
No distortion
Identify and account for presence of multiple impressions
Note if there has been any processing prior to imaging
Depth of field (e.g. account for curved surface, proximity of camera to impression)
Contrast
Noise reduction
Camera position (e.g. Is plane parallel to substrate?)

Technology Assist

- Alternate light source (ALS)

Return to Overview

5200 - Object: Wet Origin/Porous Substrate/Blood (1 of 2)

FROM 3508

5202
Input: Blood impression (or suspected blood) on Porous Substrate

5204
Conduct visual examination to locate impressions (e.g. techniques involving white/visible light such as side/oblique lighting or alternate light source (ALS)); document condition as received.

5206
Perform presumptive test for blood?
- Yes → 5208
- No → 5216

5208
Swab for Presumptive Test

5210
Positive for blood?
- Yes → 5216
- No → 5212

5212
Re-swab?
- Yes → 5208
- No → 5214

5214
Continue assuming this is blood anyway?
- Yes → 5216
- No → GO TO 5000 - Wet Origin/Porous Non-blood

5216
Determine optimal lighting based on the following:

- 5218 Is the impression faint?
- 5220 Are there issues with color contrast to consider?
- 5222 Are there issues with lighting to consider?
- 5224 Is there any background interference to consider?

5226
Are there impression(s) visible?
- Yes → 5234
- No → 5228

5228
Conduct blind search using a chemical process?
- Yes → GO TO 5300 - Wet Origin/Porous/ Blood (2 of 2)
- No → 5230

5230
Document observations and/or image PAP

5232
Discontinue and proceed PAP

5234
Does the impression need to be dried?
- Yes → 5236
- No → 5238

5236
Let dry or use drying tool

5238
General Description

- *Whether it is footwear or tire*
- *Directionality (e.g. measure location on item)*
- *Whether full or partial impression*
- *Measurements of length and width; and if the area is from the heel, arch, or ball (if footwear and it can be determined)*
- *Appearance of wear, damage, and/or inclusions in impression*
- *Any additional impressions on item*
- *Observed limitations*
- *Logo/Make/Model*
- *General description of available design features/pattern(s)*
- *Substrate and matrix*
- *Descriptions of any other images and associated evidence (e.g. shirt and/or photos of shirt with impression)*

5240
Determine appropriate imaging settings to capture available detail in the impression. (See Imaging Considerations - Taking Images)

5242
Capture images with selected settings

5244
Does the image capture the available detail?
- Yes → 5256
- No → 5246

5246
Retain images?
- Yes → 5248
- No → 5250

5248
Retain and file images PAP

5250
Continue with additional imaging?
- Yes → RETURN TO 5240
- No → 5252

5252
Ask for assistance?
- Yes → 5254
- No → (loop to 5244)

5254
Seek assistance from imaging unit or other source PAP

RETURN TO 5244

5256
Conduct a chemical process?
- Yes → GO TO 5300 - Wet Origin/Porous/ Blood (2 of 2)
- No → GO TO 5342 - Output - Wet Origin/Porous/ Blood (2 of 2)

Imaging Considerations (Taking Images)

Perspective
Scale (make sure this is present)
Appropriate scale type (e.g. L scale v others)
Focus
Resolution
Camera settings
Filter(s) used (if any)
Lighting
-Use a stabilizer (PAP)? (e.g. Use a copy stand or tripod)
-Direct, oblique, transmitted, axial, or reflective light
Formatting:
- Usable format needed
- TIFF, JPEG, RAW
Identifiers present (e.g. L, R, a, b, c, 1, 2, 3, and any agency specific labels PAP)
No distortion
Identify and account for presence of multiple impressions
Note if there has been any processing prior to imaging
Depth of field (e.g. account for curved surface, proximity of camera to impression)
Contrast
Noise reduction
Camera position (e.g. Is plane parallel to substrate?)

Technology Assist

- Alternate light source (ALS)
- Drying tool

Return to Overview

5300 - Object: Wet Origin/Porous Substrate/Blood (2 of 2)

FROM 5228/5256

5302 Use a destructive technique on evidence item?
- Yes → 5304 Contact submitter for permission?
- No → GO TO 5318

5304 Contact submitter for permission?
- Yes → 5306 Contact submitter
- No → 5310 Select Chemical Processing Method(s)

5306 Contact submitter

5308 Permission obtained?
- Yes → 5310 Select Chemical Processing Method(s)
- No → GO TO 5318

5310 Select Chemical Processing Method(s)

Use visual examination, knowledge, experience, training, preference, characteristics of substrate and matrix, surface contaminants, and/or agency policy to:
- Select chemical or physical processing (and associated applicable lighting scheme) and
- Determine processing sequence (e.g. least to most destructive).

Consider the following options:
- -1,2-Indanedione Zinc Chloride or DFO (1,8-Diazafluoren-9-one) with Forensic Light Source
- Ninhydrin
- Leucocrystal Violet (LCV)
- Physical Developer/Silver Nitrate
- Coomassie Blue
- Crowle's Double Stain
- D.A.B.
- Other (e.g. Blue Star, Luminol)

5312 Utilize selected method PAP

5314 Did the processing technique improve the impression visualizaton?
- Yes → *5322 General Description or Additional Information Obtained*
  - *Whether it is footwear or tire*
  - *Directionality (e.g. measure location on item)*
  - *Whether full or partial impression*
  - *Measurements of length and width; and if the area is from the heel, arch, or ball (if footwear and it can be determined)*
  - *Appearance of wear, damage, and/or inclusions in impression*
  - *Any additional impressions on item*
  - *Observed limitations*
  - *Logo/Make/Model*
  - *General description of available design features/pattern(s)*
  - *Substrate and matrix*
  - *Descriptions of any other images and associated evidence (e.g. shirt and/or photos of shirt with impression)*
  - *Other features or information not previously visualized*
- No → 5316 Continue with additional processing?

5316 Continue with additional processing?
- Yes → RETURN TO 5310
- No → 5318 Continue with any existing images?

5318 Continue with any existing images?
- Yes → GO TO 5342
- No → 5320 Are there additional evidence items to process?

5320 Are there additional evidence items to process?
- Yes → GO TO 2062 - Item Characterization
- No → GO TO 9000 - Verification and Reporting

5324 Determine appropriate imaging settings to capture available detail in the impression. (See Imaging Considerations - Taking Images)

5326 Capture images with selected settings

5328 Does the image capture the available detail?
- Yes → 5330 Would further processing help improve the impression visualization?
  - Yes → RETURN TO 5310
  - No → 5342
- No → 5332 Retain images?

5332 Retain images?
- Yes → 5334 Retain and file images PAP
- No → 5336 Continue with additional imaging?

5334 Retain and file images PAP

5336 Continue with additional imaging?
- Yes → RETURN TO 5324
- No → 5338 Ask for assistance?

5338 Ask for assistance?
- Yes → 5340 Seek assistance from imaging unit or other source PAP → RETURN TO 5328
- No → 5342

5342
Output:
- Item(s) (that may or may not be chemically processed);
- Images of item(s) with impressions containing sufficient detail for further examination

5344 Are there additional evidence items to process?
- Yes → GO TO 2062 - Item Characterization
- No → GO TO 8000 - Image Examination/ Digital Processing

Imaging Considerations (Taking Images)

Perspective
Scale (make sure this is present)
Appropriate scale type (e.g. L scale v others)
Focus
Resolution
Camera settings
Filter(s) used (if any)
Lighting
-Use a stabilizer (PAP)? (e.g. Use a copy stand or tripod)
-Direct, oblique, transmitted, axial, or reflective light
Formatting:
- Usable format needed
- TIFF, JPEG, RAW
Identifiers present (e.g. L, R, a, b, c, 1, 2, 3, and any agency specific labels PAP)
No distortion
Identify and account for presence of multiple impressions
Note if there has been any processing prior to imaging
Depth of field (e.g. account for curved surface, proximity of camera to impression)
Contrast
Noise reduction
Camera position (e.g. Is plane parallel to substrate?)

Technology Assist
- Alternate light source (ALS)

This process map provides a visual description and attempts to represent all reasonable variations of casework currently performed by footwear and tire examiners. OSAC does not necessarily support or endorse (as best practices) all of the different steps and paths depicted in this process map.

Return to Overview

6000 - Known Assessment (1 of 3): Image/Item Assessment

FROM 2074

6002
Input: Images of Known and/or Known Item

6004
Obtained the known item (footwear/tire)?
- Yes → 6010
- No → 6006

6006
Request known item?
- Yes → 6008 Make request for known item → 6004
- No

6010
Label with unique identifiers (if needed)

6012
Possess images of the known item?
- Yes → 6014
- No

6014
Review submitted images for quality (see Known Image Considerations and Image Assessment (Known and Questioned)

6016
Do the submitted images contain sufficient detail for further examination?
- Yes
- No

6018
Take own images?
- Yes → 6020
- No

6020
Determine appropriate imaging settings to capture available detail in the impression. (See Imaging Considerations - Taking Images)

6022
Capture images with selected settings

6024
Seek assistance from imaging unit or other source PAP

6026
Does the image capture the available detail?
- Yes
- No

6028
Retain images?
- Yes → 6030 Retain and file images PAP
- No

6032
Continue with additional imaging?
- Yes → RETURN TO 6020
- No

6034
Ask for assistance?
- Yes → GO/RETURN TO 6024
- No

6036
Are there additional items to process?
- Yes → GO TO 2062 - Item Characterization
- No → 6037 STOP/ Discontinue with Known and proceed PAP

6038
General Description (via images or inspection of item)

- ***Visual Description of Known Item:***
  - *Whether it is footwear or tire*
  - *Whether there a scale present (if images)*
  - *Observed limitations*
  - *Condition of item: wear, damage, and/or inclusions*
  - *Note date of collection of Known (time between incident and evidence recovery)*
  - *Logo/Make/Model*
  - ***Foowear:***
    - *Left v right*
    - *Manufacturer size*
    - *Manufacturer label information (UPC code, sizes as per country, factory code(s) etc)*
    - *Measurements of length and width*
    - *General description of pattern (e.g. herringbone design)*
  - ***Tire:***
    - *Department of Transportation (DOT) number*
    - *Location and orientation on vehicle (e.g. inside/outside)*
    - *Type of vehicle (if possible)*
    - *Size*
    - *Codes*

Imaging Considerations (Taking Images)

Perspective
Scale (make sure this is present)
Appropriate Scale Type (e.g. L Scale v others)
Focus
Resolution
Camera Settings
Filter(s) Used (if any)
Lighting
-Use a stabilizer (PAP)? (e.g. Use a Copy Stand or Tripod)
-Direct, oblique, transmitted, axial, or reflective light
Formatting:
- Usable format needed
- TIFF, JPEG, RAW
Identifiers Present (e.g. L, R, a, b, c, 1, 2, 3, and any agency specific labels PAP)
No Distortion
Identify and Account for Presence of multiple Impressions
Note if there has been any processing prior to photos (e.g. Barriers or Highlighters: Wax, Spray)
Depth of Field (e.g. account for curved surface, proximity of camera to impression)
Contrast
Noise Reduction
Camera position (e.g. Is plane parallel to substrate?)

Image Assessment (Known and Questioned)

Perspective
Scale present?
Scale type appropriate?
Need for correction? (e.g. perspective and potential correction in image processing software)
Focus
Lighting
Are all images present?
Exam grade v midrange v overall images
Formatting:
- Usable v unusable/unrecognizable
- JPEG v RAW
Identifiers: present v absent
Distortion
Presence of peripheral impressions

6040
Clean the item?
- Yes → 6042
- No

6042
Consult with submitter and/or trace evidence unit(s) re: trace evidence?
- Yes → 6044 Communicate with submitter and/or trace evidence unit → 6046
- No

6046
Save trace evidence?
- Yes
- No

6048
Clean without saving debris

6050
Clean and save debris; disposition the debris PAP

6052
Image?
- Yes → 6054 Take images of cleaned item
- No

6056
Conduct cursory comparison?
- Yes → 6058 Select questioned impression for comparison
- No

6060
Can I visually exclude?
- Yes → 6062 Continue processing known(s) for test impression(s)?
- No

6062
Continue processing known(s) for test impression(s)?
- Yes
- No

6064
Exclusion/Document Rationale/Image PAP

6066
Are there additional evidence items to process?
- Yes → GO TO 2062 - Item Characterization
- No → GO TO 9000 - Verification and Reporting

6068
Output:
- Image(s) of Known impression(s) with sufficient detail for digital processing;
- Known item

GO TO 6100 - Known Assessment (2 of 3): Test Impressions

Return to Overview

6100 - Known Assessment (2 of 3): Test Impressions

FROM 6068

6102 Choose appropriate path based on whether the item is footwear or tire

- Footwear →
- Tire ↓

6104 Use case scenario to detemine how to make test impression?

- Yes → **6106** Review case info/scenario to determine whether a dynamic and/or static impression will be taken
- No ↓

6108 Use knowledge, experience, training, shoe size, surface, method availability, and agency policy to select test impression type and method(s):

- 2D (e.g. powder and adhesive overlays, ink, "identicator"-inkless pad)
- 3D (e.g. sand, dirt, Mikrotrack, Biofoam)

6110 Create test impression

6112 Does the test impression capture the available detail?

- Yes →
- No ↓

6114 Retain test impression?

- Yes → **6116** Retain, file, or archive test impression
- No ↓

6118 Create additional test impression?

- Yes → RETURN TO 6108
- No ↓

6120
Document

- *Make/model*
- *Right or left*
- *Creator of test impression*
- *Item number and subdesignations*
- *Initial and date*
- *Method of test impression creation*
- *General condition of footwear*
- *Manufacturer information*
- *Any limitations associated with the test impression method*

GO TO 6200 - Known Assessment (3 of 3): Imaging Test Impressions

6140 Received actual vehicle?

- Yes →
- No ↓

6142 Is there a vehicle to put the tires on that is the right size/type/otherwise comparable?

- Yes →
- No ↓

6144 Roll out manually?

- Yes → **6148** Roll out manually
- No ↓

6146 STOP/Discontinue and proceed PAP

6150 Use knowledge, experience, training, tire size, surface, method availability, and agency policy to select test impression type and method(s):

- 2D (e.g. coating with powder and adhesive overlays; ink and paper (pushing vehicle over substrate)
- 3D (e.g. sand, dirt)

*May result in examiner utilizing clear overlays, opaque, or a combination of the two. (See Tech Assist)

6152 Segment the tire into sections and demarcate the sidewall

6154 Create test impression: Record each section on the test impression (recording takes place as it is being rolled out)

6156 Does the test impression capture the available detail?

- Yes →
- No ↓

6158 Retain test impression?

- Yes → **6160** Retain, file, or archive test impression; or return test impressions to submitting agency PAP
- No ↓

6162 Create additional test impression?

- Yes → RETURN TO 6150
- No ↓

6164
Document and/or Image:

- *Directionality*
- *Vehicle (Make, model, license, VIN#)*
- *Which tire*
- *Rotation*
- *General condition of tire*
- *Position on vehicle*
- *Inside and outside of tire (by section)*
- *Mark tires to demarcate/track test location as compared to the impression*
- *Document any limitations associated with the tet impression method*

Technology Assist

Footwear:

- Powder
- Adhesive Overlays
- Ink
- Inkless shoe print kit
- Sand
- Dirt
- MikroTrak
- Biofoam

Tire:

- Tread Indicator: Method used to segment tire into sections
- Coatings: Used to apply to tire surface in order to push tire along substrate to create impression overlay (magnapowder, vaseline, printers ink, cardstock ink, fingerprint ink)
- Substrates: Clear acetate roll, paper (that is at leat the circumference of the tire), foam board

Return to Overview

6200 - Known Assessment (3 of 3): Imaging Test Impressions

FROM 2062/6120

6202
Determine appropriate imaging settings to capture available detail in the impression. (See Imaging Considerations - Taking Images)

6204
Capture images with selected settings

6206
Does the image capture the available detail?
- Yes → 6222
- No → 6208

6208
Retain images?
- Yes → 6210
- No → 6212

6210
Retain and file images PAP

6212
Continue with additional imaging?
- Yes → RETURN TO 6202
- No → 6214

6214
Ask for assistance?
- Yes → 6216
- No → 6218

6216
Seek assistance from imaging unit or other source PAP

6218
Are there additional evidence items to process?
- Yes → GO TO 2062 - Item Characterization
- No → 6220

6220
STOP/ Discontinue and proceed PAP

6222
Intercompare test impressions?
- Yes → 6224
- No → 6226

6224
Perform intercomparison on test impressions and note variability across known (e.g. size, randomly acquired characteristics (RACs) etc.)

6226
Output:
- Image(s) of known and/or test impression(s) with sufficient detail for further examination;
- Test impression(s);
- Results of intercomparison;
- Known item

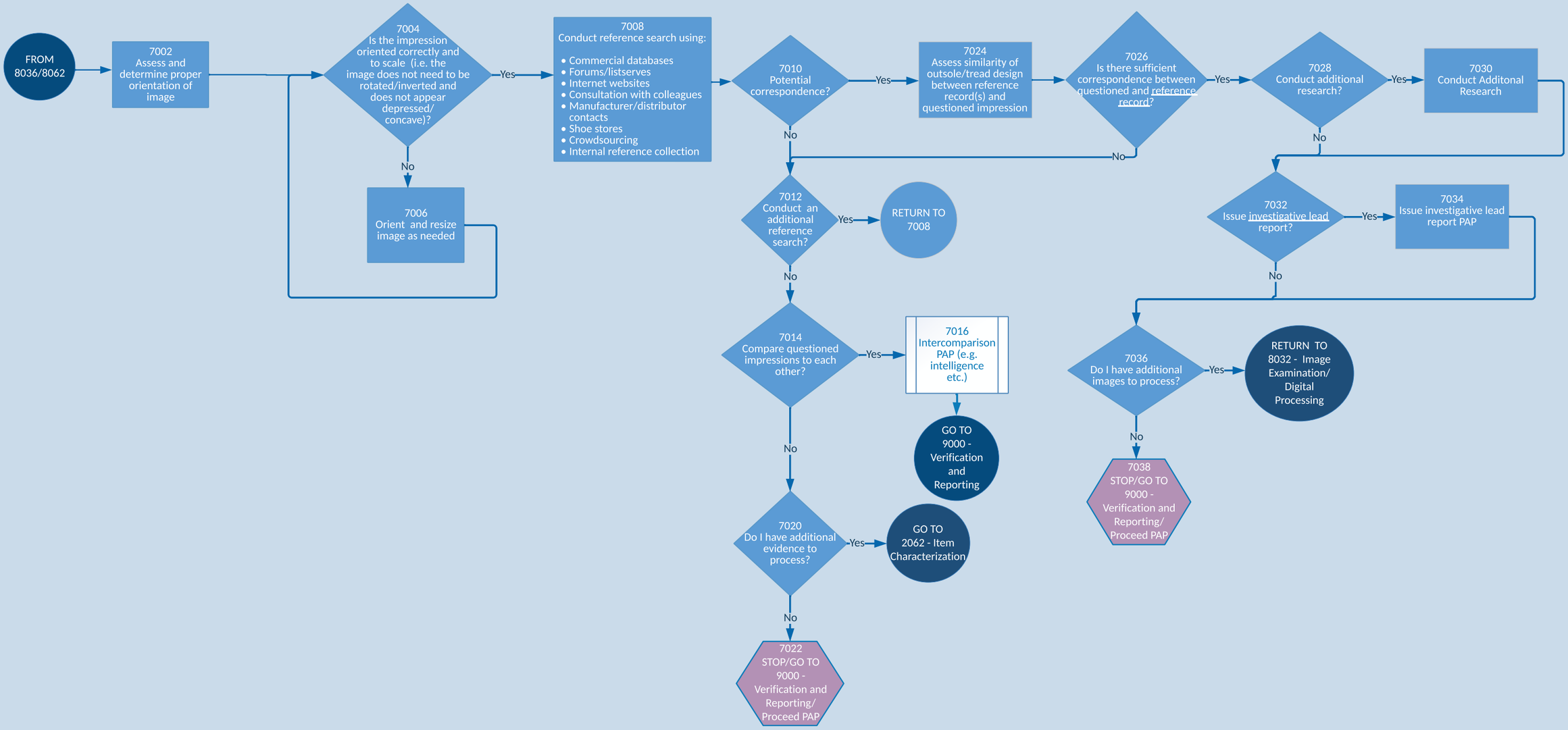
6228
Are there additional evidence items to process?
- Yes → GO TO 2062 - Item Characterization
- No → GO TO 8000/8050 - Image Examination/ Digital Processing

Imaging Considerations (Taking Images)

Perspective
Scale (make sure this is present)
Appropriate Scale Type (e.g. L Scale v others)
Focus
Resolution
Camera Settings
Filter(s) Used (if any)
Lighting
-Use a stabilizer (PAP)? (e.g. Use a Copy Stand or Tripod)
-Direct, oblique, transmitted, axial, or reflective light
Formatting:
- Usable format needed
- TIFF, JPEG, RAW
Identifiers Present (e.g. L, R, a, b, c, 1, 2, 3, and any agency specific labels PAP)
No Distortion
Identify and Account for Presence of multiple Impressions
Note if there has been any processing prior to photos (e.g. Barriers or Highlighters: Wax, Spray)
Depth of Field (e.g. account for curved surface, proximity of camera to impression)
Contrast
Noise Reduction
Camera position (e.g. Is plane parallel to substrate?)

Return to Overview

7000 - Reference Search



This process map provides a visual description and attempts to represent all reasonable variations of casework currently performed by footwear and tire examiners. OSAC does not necessarily support or endorse (as best practices) all of the different steps and paths depicted in this process map.

Return to Overview

8000 - Image Examination and Digital Processing

FROM 3106/3264/3356/3426/4134/4332/4396/4568/4794/5112/5344/6228

8002
Input: Images of evidence and/or known impression(s) with sufficient detail for digital processing; test plan; case information.

8004
Load images into image processing software (may be done via batching)

8006
Conduct Initial Suitability Assessment and Organization Activities

- Assess images for suitability, evaluating factors such as clarity, quality, and identifying the largest continuous impression (See Image Assessment)
- Create working copy of all files and rename PAP
- Note the following PAP:
  - File metadata to include image description
  - Connection to other impressions
  - Which images to proceed with in case notes
  - Any limitations of images in case notes (scale etc- see image assessment)
- Group images PAP (e.g. by exhibit or impression number)
- Create contact sheet(s) PAP (e.g. creating contact sheet that contains examination quality images)

8010
Determine which images will be processed based on:

Knowledge, experience, and/or other factors such as clarity, numeric/exhibit order, submitter request, or importance based on case info

8012
Document

- *File names and description(s) of images to be further analyzed*
- *Rationale for image choice decisions*
- *Suitability decisions (e.g. including any limitations)*
- *Note if multiple impressions (if possible)*
- *Contact sheet with file names*

8014
Have these images already been digitally processed?
Yes → (back to 8032)
No →

8016
Process images to improve clarity, detail, contrast etc?
Yes → 8018
No → GO TO 8100 - Comparison (1 of 2)

8018
Choose image to proceed with for examination

8020
Assess and determine proper orientation of impression (See Alerts and Considerations)

8022
Is the impression oriented correctly and to scale (i.e. the image does not need to be rotated/inverted and does not appear depressed/concave)?
No → 8024 Orient and resize image as needed
Yes →

8026
Use experience, training, and knowledge to perform image processing (including but not limited to):

- Levels with highlighting; invert b/w; contrast; masks; gradient maps; HDR toning; hue saturation, color balance; channel mixer; shadows/highlights; crop; dodge and burn
- These techniques may be documented in a single layer or multiple layers.

8028
Document processing techniques used (e.g. history log, digital processing software used etc.)

8030
Do I have additional images to process?
Yes → (back to 8016)
No → GO TO 8034

Alerts and Considerations:

- Scale turned around
- Ruler appears distorted/incorrect
- Knowledge of type lift type used
- Knowledge of known processing regarding lift

*May also need to rely on other information from crime scene, tangential info, or directional labels for orientation

FROM 9006

8032
Choose an image of an questioned impression for analysis (based on overall quality)

8034
Do I have known item?
Yes →
No →

8036
Conduct reference search?
Yes → GO TO 7000 - Reference Search
No →

8038
Attempt further image processing?
Yes → 8040 Process image to improve clarity, visualization, detail, contrast
No →

8042
Compare questioned impressions to each other?
Yes →
No →

8044
Do I have additional evidence to process?
Yes → GO TO 2062 - Item Characterization
No → GO TO 9000 - Verification and Reporting

FROM 6228

8048
Perform a cursory evaluation of images/pattern(s)?
Yes →
No → GO TO 8100 - Comparison (1 of 2)

8050
Select the known(s) for evaluation (See Selection of Knowns)

8052
Assess and determine proper orientation of impression (See Alerts and Considerations)

8054
Are the impression(s) oriented correctly and to scale (i.e. the images do not need to be rotated/inverted and do not appear depressed/concave)?
No → 8056 Orient and resize image(s) as needed
Yes →

8058
Eliminate based on class characteristics (such as outsole pattern or tread design)?
No → GO TO 8100 - Comparison (1 of 2)
Yes → 8060 Document Exclusion Rationale and Image PAP

8062
Do I have additional known item(s) to assess?
No → GO TO 7000 - Reference Search
Yes →

8046
Intercomparison PAP (e.g. intelligence etc.)
→ GO TO 9000 -Verification and Reporting

Selection of Knowns

Factors for selecting known image for analysis/evaluation may include factors such as :

- Case information?
- Based on other circumstances?
- Evidence Type?
- Investigative priority (probitivity)?
- Case Type priority?
- LIMS number?

Image Assessment

Assess the following aspects of the image
Perspective?
Focus
Resolution
Appropriate Scale Present? (Scale Type e.g. L Scale v others))
Need for Correction? (e.g. perspective and potential correction in photoshop)
Camera Settings
Filter(s) Used (if any)
Lighting
-Was an image stabilizer used?
-Gross photography tools (e.g. Was a Copy Stand or Tripod used)
Are All Photos Present?
Exam Grade v Midrange v Overall Photos
Formatting:
- Usable v Unusable/Unrecognizable
- TIF, JPEG, RAW
Identifiers: Present v Absent (e.g. L, R, a, b, c, 1, 2, 3, and any agency specific labels PAP)
Distortion - does ruler appear distorted
Presence of Peripheral Impressions
Has there been any processing prior to photos? (e.g. Barriers or Highlighters: Wax, Spray)
Depth of Field (e.g. curved surface, proximity of camera to impression)
Contrast
Camera position (e.g. Is plane parallel to substrate?)

Return to Overview

8100 - Comparison (1 of 2)

FROM 8016/8048/8058

8102 Full analysis on Known?
- Yes → 8104
- No → 8110

8104 Annotate features of interest (See Features of Interest) on Known using an overlay, superimposition, or layer tool utilizing a digital interface:
- Outsole/tread design;
- Outsole/tread design elements;
- Areas of wear;
- Randomly acquired characteristics (RACs)
- Any other features such as noise treatment (size of the elements), left v right (if footwear), and possible mold features.

8106 Assess the value of the features (e.g. relative weight, rarity)

8108 Do I have additional known item(s) to analyze?
- Yes → RETURN TO 8050 - Image Examination/ Digital Processing
- No → 8128

8110 Process images to improve clarity, detail, contrast etc?
- Yes → 8112
- No → 8114

8112 Assess and determine proper orientation of impression (See Alerts and Considerations)

8114 Is the impression oriented correctly (i.e. the image does not need to be rotated/inverted and does not appear depressed/ concave)?
- Yes → 8118
- No → 8116

8116 Orient image as needed

8118 Use experience, training, and knowledge to perform image processing (including but not limited to):
- Levels with highlighting; invert b/w; contrast; masks; gradient maps; HDR toning; hue saturation, color balance; channel mixer; shadows/highlights; crop; dodge and burn
- These techniques may be documented in a single layer or multiple layers.

8120 Start comparison now?
- Yes → 8128
- No → 8122

8122 Annotate features of interest (See Features of Interest) on questioned impression using an overlay, superimposition, or layer tool utilizing a digital interface:
- Outsole/tread design;
- Outsole/tread design elements;
- Areas of wear;
- Randomly acquired characteristics (RACs)
- Any other features such as noise treatment (size of the elements), left v right (if footwear), and possible mold features.

8124 Assess the value of the features in correspondence (e.g. relative weight, rarity)

8126 Analyze additional questioned impressions?
- Yes → RETURN TO 8032 - Image Examination/ Digital Processing
- No → 8128

8128 Select image(s) or item(s) for comparison (known or questioned)

8130 Eliminate based on class characteristics (such as outsole pattern or tread design)?
- Yes → 8134
- No → 8132

8134 Document Exclusion Rationale and Image PAP

8136 Do I have additional item(s) to analyze?
- Yes → RETURN TO 8032 - Image Examination/ Digital Processing
- No → 8138

8132 Annotate features of interest - or any additional features not previously marked - (See Features of Interest) on questioned impression using an overlay, superimposition, or layer tool utilizing a digital interface:
- Outsole/tread design;
- Outsole/tread design elements;
- Areas of wear;
- Randomly acquired characteristics (RACs)
- Any other features such as noise treatment (size of the elements), left v right (if footwear), and possible mold features.

GO TO 8200 - Comparison (2 of 2)

8138 Do I have additional item(s) to compare?
- Yes → RETURN TO 8128
- No → 8140

8140 Do I have additional evidence to process?
- Yes → GO TO 2062 - Item Characterization
- No → GO TO 9000 - Verification and Reporting/ Proceed PAP

Alerts and Considerations:
- Scale turned around
- Ruler appears distorted/incorrect
- Knowledge of type lift type used
- Knowledge of known processing regarding lift

*May also need to rely on other information from crime scene, tangential info, or directional labels for orientation

Features of Interest
- Outsole design
- Design elements
  - size and shape
  - logos
  - text
- Wear
  - general - heel wear, scuffing
  - specific- specific to the person- unusual
- RACs
  - mold feature
  - schallamach- advanced wear of rubber
  - cuts
  - knicks
  - scratches
  - stone hold
  - embedded items (nail, gum etc)

Return to Overview

8200 - Comparison (2 of 2)

FROM 8132

8202 Perform comparison with test impression and/or outsole or tire using side by side and/or overlaying

8204 Assess features and their level of correspondence

8206 Document the features of interest (see Features of Interest), their correspondence and any non-correspondence (including limiting factors).

8208 Consult prior to conclusion?
- Yes → 8210 Consult with another examiner
- No

8212 Is there correspondence between the **features** in the impression and the **design** of the known outsole/ tread?
- No → 8214 Exclusion/Source exclusion → GO TO 8260
- Yes → 8216 Does the **physical size of the shapes** in the impression correspond to the **physical size of the design elements** in the known outsole/tread?
  - Yes → GO TO 8228
  - No → 8218 Am I confident that the impression is natural size (i.e. 1:1)?
    - Yes → 8220 Exclusion/Source exclusion → GO TO 8260
    - No → 8222 Are there significant limitations associated with the impression or known (e.g. limited quality and/or quantity)
      - Yes → 8224 Lacks sufficient detail/Inconclusive
      - No → 8226 Limited association of class characteristics/Inconclusive

8228 Does the **appearance of wear** in the impression correspond to the **general wear** in the known outsole/tread?
- Yes → 8242 Do the known item and the questioned impression have **one or more corresponding randomly acquired characteristics** (RACs) with no meaningful differences?
  - Yes → 8244 Is there sufficient quality, quantity, and complexity of the RACs in agreement such that an examiner would not expect to see the same combination of characteristics repeated in a different footwear/tire?
    - Yes → 8250 Identification/Source identification
    - No → 8248 High degree of association/Inclusion based on class and RACs
  - No → 8246 Association of class characteristics/Inclusion based on class characteristics
- No → 8230 Are there visual indications that the footwear/tire that made the impression is more worn than the known?
  - Yes → 8232 Exclusion/Source exclusion → GO TO 8260
  - No → 8234 Can the difference in wear be accounted for? (e.g. time difference between impression deposition and known item collection)
    - Yes → (back to 8242)
    - No → 8236 Is the degree of the wear difference sufficient for an exclusion?
      - Yes → 8238 Exclusion/Source exclusion
      - No → 8240 Indications of non-association/ Support for exclusion

8260 - Evidence Loop

8262 Is there more evidence to examine?
- Y → GO TO 2062 - Item Characterization
- N → GO TO 9000 - Verification and Reporting

LEGEND*

- **Identification/Source Identification** - Known made Questioned
- **High degree of association/Inclusion based on class and RACs** - Known probably made Questioned
- **Association of class characteristics/Inclusion based on class characteristics** - Known could have made Questioned
- **Lacks sufficient detail - a comparison was conducted/ Inclonclusive- No determination due to limitations preventing inclusion or exclusion of Known creating the Questioned**
- **Limited association of class characteristics/Inconclusive**
- **Indications of non-association/ Support for exclusion-** Known probably did not make the Questioned
- **Exclusion/Source exclusion** - Known did not make Questioned

*Due to variability in conclusion scales as represented by the working group, both SWGTREAD and Uniform Language for Testimony and Reporting (ULTR) conclusions are represented on this Process Map.

Features of Interest

- Outsole design
- Design elements
  - size and shape
  - logos
  - text
- Wear
  - general - heel wear, scuffing
  - specific- specific to the person- unusual
- RACs
  - mold feature
  - schallamach- advanced wear of rubber
  - cuts
  - knicks
  - scratches
  - stone hold
  - embedded items (nail, gum etc)

Return to Overview

9000 - Verification and Reporting

FROM 4054/4250/4360/4374/4480/4492/4524/4544/4754/4770/5090/5320/6066/7016/8044/8046/8140/8262

9002 Am I awaiting the submission of additional evidence (e.g. a known submission)?
- Yes → 9006 Hold while awaiting additional item(s) and proceed PAP → RETURN TO 8034 - Image Examination/ Digital Analysis
- No

9004 Report on examinations conducted so far?
- Yes → 9008 **Input:** Completed Examinations
- No

9010 Will conclusion(s) be verified prior to creating the report?
- Yes
- No → 9012 Create draft report (PAP):
  - Agency info
  - Date and signature
  - List of items
  - Images/image references
    - Table of images
    - Contact sheets
  - Methodology
  - Conclusion(s)
  - Limitations
  - Glossary of terms
  - Disclaimers
  - Additional item/image requests

9014 Will my conclusion(s) be verified?
- Yes
- No → GO TO 9044

9016 Determine which opinions will be verified

9018 Conduct blind verification?
- Yes → 9022 Share images with features annotated?
- No → 9020 Share all information to verified (e.g. features, case notes etc.)

9022 Share images with features annotated?
- Yes → 9026 Send information, images etc. to verifier
- No → 9024 Provide next examiner with non-annotated impression images, casts if taken and images, actual shoes or tires and test impressions

9028 VERIFICATION

9030 Are the conclusions in agreement?
- Yes → 9034 Sign material for acknowledgment PAP
- No → 9032 Conflict Resolution PAP (See Considerations for Conflict Resolution)

9036 Issue verbal report?
- Yes → 9038 Issue verbal/oral report
- No

9040 Create written report?
- Yes → 9042 Create draft report (PAP):
  - Agency info
  - Date and signature
  - List of items
  - Images/image references
    - Table of images
    - Contact sheets
  - Methodology
  - Conclusion(s)
  - Limitations
  - Glossary of terms
  - Disclaimers
  - Additional item/image requests
- No

9044 Archive images

9046 Will there be a technical review?
- Yes
- No

9060 - Evidence Loop

9062 Is there more evidence to examine?
- Y → GO TO 2062 - Item Characterization
- N → STOP

9048 TECHNICAL REVIEW

9050 ADMIN REVIEW

9052 Disposition of evidence items (PAP)

9054 Release report to customer

Considerations for Conflict Resolution

- Communication between examiner and verifier
- Bring in other examiners (eg. Supervisor, Q/A, Tech lead etc)
- Consultation
- Supervisory input
- Changed conclusion

Considerations for Verification

- Does Examiner provide all examination documentation (e.g. layers, markups etc.) to Verifying examiner?
- Does Examiner provide conclusion of comparison to Verifying examiner?
- Will case be completely reworked by another examiner or via additional/different methods?

Glossary of Terms and Definitions

3-D qualities– Three-dimensional characteristics of a footwear or tire track impression.
Background interference– Aberrations in the substrate which the footwear or tire track impressions is present which can cause light or focusing distortions during impression visualization or photography.
Backlighting– Application of light behind a footwear or tire track impression specifically on glass so that the light passes through the impression and into the aperture of the camera.
Barriers– Spray used specifically on footwear or tire track impressions made in soft substrates which hardens on the surface of the impression so that subsequent casting will not damage impression.
Blind search– Conduction a search for footwear or tire-track impressions which are not readily visible to a naked eye by using lighting and or lifting techniques.
Chain of Custody (CoC)– Chronological record of the handling and storage of an item from its point of collection to its final return or disposal.
Chemically or physically processed– Addition of a variety of chemicals or reagents to improve visualization of footwear and tire track impression.
Color contrast– The difference in luminance or color that makes an object distinguishable from other objects within the same field of view.
(Trial) Continuance– The suspension or postponement of a trial or court proceeding.
Contrast– How well black can be distinguished from white at a given resolution.
Copy stand– The stand consists of a platform onto which the item is placed where the camera can be mounted above and parallel to it, usually with an adjustable height.This may or may not include lighting.
Correction– Attempts in image analysis tools to correct or remedy image distortion artifacts.
Depth of Field– The distance that is in focus (sharp) when capturing an image based upon the camera and lens, and their settings.
Distortion– An unclear or inaccurate representation of the footwear or tire in an impression due to interference in the impression-making process or its subsequent retrieval.
Electrostatic Dust Lift– An instrument that utilizes an electrostatic charge as a means of transferring dry origin impressions from a substrate to a film.
Exam grade(photos)– A photograph taken following a specific protocol for the purpose of conducting a forensic comparative examination.
Gel Lift– Gelatin applied to a pliable backing that can be used to lift impressions
Highlighters– Sprays, paints or waxes used to increase contrast of footwear and tire track impressions particularly in snow.
Identifiers– Details use to establish or recognize the identity of; ascertain as a certain item of evidence.
Impressions– The product of direct physical contact of an item, such as a footwear or tire, resulting in the transfer and retention of characteristics of that item.
Investigative lead– Updated information regarding a case which can assist in the investigation.
JPEG– Image compression and storage format specified by the Joint Photographic Experts Group. It is discrete cosine transform-based.
Laboratory Information Management System (LIMS)– Is a type of software designed to improve lab productivity and efficiency, by keeping track of data associated with samples, experiments, laboratory workflows, and instruments.
Layers– One image is stacked on top of another image and can annotated so that the base image is not affected.
Layer tool– Tool used in image processing software such as Photoshop to apply a layer to an image.
Lighting– Application of light to an item of evidence to observer visually of record photographically.
Limitation– A shortcoming or defect.
Memorandum for record (MFR)– Memo covering information that would otherwise not be recorded in writing.

Glossary of Terms and Definitions

Midrange (photos)– Establishes the location of evidence and what relationship that evidence has to the scene
Natural size– Life-size reproduction. * An image magnification of 1X i.e. the image is the same size as the object.
Noise reduction–*Noise treatment*- The mixed arrangement of tread blocks sizes used by the tire industry to reduce noise generated by tires.
Outsole/tread design elements– A general category of footwear outsole patterns (i.e. herringbone pattern, lugged outsole pattern, wave pattern, plain soles, etc.).
Overall (photos)– Photographs which capture the global aspects of the crime scene to show exactly where the scene was and to show all boundaries of the scene.
Peripheral impressions– Footwear or tire track impression which appear next to the impressions in question.
Perspective– In image analysis, camera-to-subject geometry, including both camera-to-subject distance and orientation of the camera relative to the subject.
Plane– An imaginary line, flat area or field which lies perpendicular to the optical axis. The “Optical Axis” passes through the centre of the lens and the image sensor.
Quality– An inherent or distinguishing characteristic; a property.
Quantity– Physical properties subject to measurement, such as length, time, weight, and concentration.
Randomly Acquired Characteristics (RACs)– A feature on a footwear outsole or tire tread resulting from random events including, but not limited to: cuts, scratches, tears, holes, stone holds, abrasions and the acquisition of debris. The position, orientation, size and shape of these characteristics contribute to the uniqueness of a footwear outsole or tire tread. Randomly acquired characteristics are essential for an identification of a particular item of footwear or tire as the source of an impression.
RAW– A family of file formats, often specific to different models of digital imagery equipment, that are not yet processed for storage in a 'printable' image format such as JPEG or TIFF. The file extension '.raw' is only one such format.
Reference record– Know footwear or tire track impressions record and stored in a reference library or database.
Scale/Scale type–A ruler marked with a range of calibrated scales (ratios) for drawing and measuring
Schallamach– Microscopic patterns that develop as ridges on rubber material as a result of repeated abrasive forces. These patterns are very similar in their size and appearance to skin friction ridges and are highly individual. They continue to change rapidly as affected by continued abrasion. Schallamach patterns are randomly acquired characteristics. The term gets its name from a researcher of the same name.
Sidewall –The side of an automotive tire between the tread shoulder and the rim bead which contains information specific to the make, model and manufacturing specific to that tire.
Stabilizer– Devises used to remove movement during image capture which include copy stands and tripods.
Subdesignations– Application of unique identifiers to items of evidence.
Substrate– Surface upon which a footwear or tire track impression is deposited.
TIFF– Tagged Image File Format
Tripod–A three-legged stand for supporting a camera or other apparatus.