

Training Outline for the Examination of Impression Evidence

- 1.0 Purpose** – This document provides an outline for training in the examination of impression evidence, including footwear impressions, tire track impressions, miscellaneous impression evidence, and the requisite competency testing. Most of the information contained herein can be directly attributed to the IAI Recommended Course of Study for Forensic Footwear and Tire Track Examiners (2006). Additional information, assignments, and evaluations have been added to specifically address topics of interest to footwear and tire track examiners in Latent Evidence at the North Carolina State Crime Laboratory (NCSCSL).
- 1.1** The training program will be coordinated by the Impressions Evidence Training Coordinator (TC).
- 1.2** The TC will be responsible for the overall training, which will incorporate all of the listed topics. Additionally, the TC shall be responsible for assigning a training/observation rotation amongst other qualified Impression Evidence analysts within the Latent Evidence Section at the Raleigh Laboratory, Triad Regional Laboratory, and the Western Regional Laboratory,
- 1.3** The TC will be responsible for the issuance of all exams. Successful completion of all module exams will be a score of 85% or higher. Successful completion of the final exam is 85% or higher, and successful completion of the competency test is 100%. All other assignments, including the mandatory oral round table, shall be assessed as pass/fail at the discretion of the TC.
- 2.0 Scope** – This training outline shall be followed by all trainees in the examination of impression evidence, regardless of experience level.
- 3.0 Trainee Instructions** – The trainee shall maintain a digital notebook of all reading notes, written assignments, and study questions. Maintaining a hard copy and/or digital copy of all practical exercises is also a requirement. All notes, assignments, and study questions for each module shall be completed and submitted to the TC prior to the dissemination of the module exam. Each module will have an assigned due date. Trainee shall complete each module within the prescribed time frame and communicate with the TC any concerns or issues. Each trainee shall successfully complete all written and practical tests and exercises; a series of training cases; an oral round table; and a final comprehensive examination and competency test.

The trainee shall meet with the TC twice a month and at the end of each module to evaluate progress and to address any questions that the trainee may have. During each meeting the trainee shall provide the TC a written progress assessment. This assessment shall include assignments completed and a status update for any unfinished module work. At such time the TC has the option of assigning additional written exercises if she/he feels as though the trainee requires additional work. All written assignments shall be conducted independently. If multiple trainees are progressing through the training program at the same time, then any practical exercises may be completed as a group.

Beginning at Module V the trainee shall be assigned to a case-working Impression Evidence analyst for a two week period on a rotating basis. These rotations will take place at all three of the NCSCSL laboratory facilities. During these rotations the trainee shall observe impression evidence casework being conducted. At the end of each rotation the assigned Impression Evidence analyst shall complete an evaluation form that describes the trainee's participation and document his/her feedback about the trainee's comprehension of the current training module. The form shall be submitted to the TC within three days of completion of

the rotation. An Impression Evidence Checklist shall be maintained by the TC to track the trainee's overall progress.

Training rotations that take place outside of the trainee's assigned laboratory location will not require that the trainee spend the entirety of the rotation at the additional lab locations. The trainee shall schedule a block of time to be present in the other lab locations that is not less than 2 full days, not including travel, during each rotation. It is at the discretion of the Impressions Evidence Analyst to which they are assigned as to if additional working time is needed.

4.0 Module I – History and Introduction

4.1 Objectives: Through completion of this module, the trainee shall have developed and demonstrated the theoretical knowledge and/or practical skills in:

- 4.1.1** The historical perspective concerning footwear and tire track evidence.
- 4.1.2** The value of footwear and tire track evidence at the crime scene and in criminal investigations.
- 4.1.3** General knowledge of the types of impressions encountered and the methods available for their detection, recovery, and comparison.

4.2 Required Reading – Written notes shall be turned in to the TC at the end of the module.

Footwear:

- 4.2.1** Abbott, J. R. *Footwear Evidence*; Charles C. Thomas: Springfield Illinois, 1964 (Chapter 1, Chapter 2 [p. 16-23], Chapter 3.
- 4.2.2** Bodziak, W. J. *Footwear Impression Evidence*; CRC Press; Boca Raton, FL (Preface, Chapter 1 pgs 1-17))
- 4.2.3** Cassidy, M. J. *Footwear Identification*; Canadian Government Printing Centre, Quebec, Canada 1980; (p. vii and 109-125)
- 4.2.4** Hilderbrand, D. S. *Footwear, The Missed Evidence* (Chapter 2, , ,).

Tire Tracks:

- 4.2.5** Bodziak, W. J. *Tire Tread and Tire Track Evidence: Recovery and Forensic Examination* CRC Press, Boca Raton, FL (Chapter 1).
- 4.2.6** Hamm, E. D. *Track Identification; An Historical Overview. Journal of Forensic Identification.* 1989 (p. 39 and 6).
- 4.2.7** McDonald, P. *Tire Imprint Evidence*; CRC Press, Boca Raton, FL Chapter 1 .
- 4.2.8** Nause, L. A. *Tire Impressions as Evidence.* RCMP Gazette.

4.3 Optional Reading

4.3.1 Optional reading list may be located in the IAI Recommended Course of Study Manual.

4.4 Practical and Written Exercises

4.4.1 Research and find references to past footwear or tire track court cases/decisions. Cite and summarize at minimum three different cases.

4.4.2 Explain, in writing, the value of footwear and tire track impressions at the crime scene and in a criminal investigation.

4.4.3 Define the two types of footwear and tire track impressions that may be found at a crime scene and give an example of each. List several methods by which they may be recovered.

4.5 Study Questions

4.5.1 Complete the Footwear and Tire Track Study Questions assigned for Module I.

4.6 Evaluation

4.6.1 Review of reading notes, practical/written exercises, and study questions by the Impression Evidence Technical Leader.

5.0 Module II – Terminology

5.1 Objectives: Through completion of this module, the trainee shall have developed and demonstrated the theoretical knowledge and/or practical skills in:

5.1.1 The concepts of and the terms used in describing “class” and “individual/accidental” characteristics associated with various types of comparative examinations.

5.1.2 How these concepts and terms are applied to the different types of impressions encountered in footwear and tire track evidence examinations.

5.1.3 Appropriately using the terminology (both written and verbal forms) related to the examination of footwear and tire impressions.

5.2 Reading Assignments - Written notes shall be turned in to the TC at the end of the module.

5.2.1 Bodziak, W. J. *Footwear Impression Evidence*; CRC Press: Boca Raton, FL. Chapter 10 (pgs 329-346).

5.2.2 Cassidy, M. J. *Footwear Identification* Chapter 5.

5.2.3 McDonald, P. *Tire Imprint Evidence*. Chapter 2 and Glossary (p. 213-217).

5.3 Optional Reading

- 5.3.1 Optional reading list may be located in the IAI Recommended Course of Study Manual.

5.4 Practical and Written Exercises

- 5.4.1 Find examples of two class and two individual characteristics on a pair of shoes. Identify these areas on a photograph of the outsoles.
- 5.4.2 Find examples of two class and two individual characteristics on a tire. Identify these areas on a photograph of the tire.
- 5.4.3 Examine two shoes of the same general design, but of different sizes (at least three sizes different). Focus on the outsole design details and describe, in writing, the differences that you notice.
- 5.4.4 Compare some of the terms used by your agency with those in the books and articles that were read in this module. Explain, in one or two paragraphs, any similarities or differences.
- 5.4.5 Find two articles about footwear and/or tire impressions which were published in a journal within the past three years. Summarize each article, including source information.
- 5.4.6 Begin working on terminology worksheet (to be turned in after the completion of Module IV).

5.5 Study Questions

- 5.5.1 Complete the Footwear and Tire Track Study Questions assigned for Module II.

5.6 Evaluation

- 5.6.1 Review of reading notes, practical/written exercises, and study questions by the Impression Evidence Technical Leader.
- 5.6.2 Successfully complete a written examination to evaluate proficiency with Modules I and II.

6.0 Module III – Footwear Manufacturing -

- 6.1 **Objectives:** Through completion of this module, the trainee shall have developed and demonstrated the theoretical knowledge and/or practical skills to:
 - 6.1.1 Become familiar with the basic footwear outsole manufacturing methods.
 - 6.1.2 Understand the different types of outsole construction methods and the potential importance it could have to the identification process.

- 6.1.3 Understand how manufactured design features of footwear outsoles are used to compare class characteristics in comparative examinations.
- 6.1.4 Understand how manufacturing techniques can contribute in the decision making process of the examination.
- 6.1.5 Become knowledgeable of the terminology used in describing various aspects of footwear as they relate to the manufacturing process.
- 6.2 **Reading Assignments** - Written notes shall be turned in to the TC at the end of the module.
 - 6.2.1 **Footwear Manufacturing** –
 - 6.2.1.1 Bodziak, W. J. *Footwear Impression Evidence*; CRC Press: Boca Raton, FL. Chapters 6 and 7.
 - 6.2.1.2 Music, D.; Bodziak, W. J. *Evaluation of the Air Bubbles Present in Polyurethane Shoe Outsoles as Applicable in Footwear Impression Comparisons*. **JFS**, 1988, 33(5): 1185-1197.
 - 6.2.1.3 Hilderbrand, D. S. *Footwear The Missed Evidence*; Chapter 4.
 - 6.2.1.4 Keijzer, J. *Identification Value of Imperfections in Shoe with Polyurethane Soles in Comparative Shoeprint Examination*. **JFI** 40(4) 1990.
 - 6.2.1.5 RF Welding and Compression Molding for Shoes
<http://sneakerfactory.net>
 - 6.2.2 **Optional Reading** - Optional reading list may be located in the IAI Recommended Course of Study Manual.
- 6.3 **Practical and Written Exercises**
 - 6.3.1 **Footwear** –
 - 6.3.1.1 View SWGTREAD Manufacturing Videos
<http://www.swgtread.org/videos/manufacturing>
 - 6.3.1.2 Locate and photograph a compression molded shoe, a direct attach injection molded shoe, and a die cut shoe. Record, in writing, your observations about the manufacturing processes used to construct each shoe. Diagram these observations for one of the designs.
 - 6.3.1.3 Write an essay on the different ways outsoles can be cut/molded and how knowledge of the manufacturing process may assist in your examination.
 - 6.3.1.4 Write an essay on the various ways molds are made for footwear manufacture. Discuss what significance a footwear mold, or how a footwear mold is made,

may have in a footwear impression examination. Include the process of adding texture to a mold and its significance.

6.3.1.5 Write an essay on various materials used to manufacture outsoles and how knowledge of this may assist in your examination. Consider the significance of air bubbles in Polyurethane outsoles in this discussion.

6.3.1.6 Write an essay on the ways in which the outsole may be stitched, glued, or directly attached to the upper of the shoe. Be sure to comment on any possible variables which may occur with each of these processes.

6.4 Study Questions – Complete the Footwear and Tire Track Study Questions assigned for Module III.

6.5 Evaluation

6.5.1 Review of reading notes, practical/written exercises, terminology worksheet, and study questions by the Impression Evidence Technical Leader.

6.5.2 Oral evaluation by the Impression Evidence TC to determine comprehension of module material.

6.5.3 Successfully complete a written examination to evaluate proficiency with Module III.

7.0 Module IV Tire Manufacturing

7.1 Objectives: Through completion of this module, the trainee shall have developed and demonstrated the theoretical knowledge and/or practical skills to:

7.1.1 Become familiar with the basic tire manufacturing methods.

7.1.2 Understand how manufactured design features of tires are used to compare class characteristics in comparative examinations.

7.1.3 Understand how manufacturing techniques can contribute in the decision making process of the examination.

7.1.4 Become knowledgeable of the terminology used in describing various aspects of tires as they relate to the manufacturing process.

7.2 Reading Assignments - Written notes shall be turned in to the TC at the end of the module.

7.2.1.1 Bodziak, W. J. *Tire Tread and Tire Track Evidence*. Chapters 5 and 6.

7.2.1.2 Nause, L. A. *Forensic Tire Impression Identification*. Chapters 8, 9, 10, 11, and 12.

7.3 Optional Reading - Optional reading list may be located in the IAI Recommended Course of Study Manual.

7.4 Practical and Written Exercises –

- 7.4.1.1 Copy all identifying data from the sidewalls of at least six different brand tires. List the sources available to aid in deciphering this information. Use these sources to decipher the Department of Transportation Number, size, and manufacturing source information from the tires that you examined.
- 7.4.1.2 Write an essay on the purpose of “noise treatment” on a tire and how this would be used in an examination.
- 7.4.1.3 Write an essay on the different types of tires and how they differ (Radial, Bias, and Bias Belted)
- 7.4.1.4 Write an essay on the two different types of tire molds and how the manufacturing process differs between them.
- 7.4.1.5 View “Michelin Tire/How a tire is made”

www.youtube.com/watch?v=K474RYse9P8

7.5 Study Questions – Complete the Footwear and Tire Track Study Questions assigned for Module IV.

7.6 Evaluation

- 7.6.1 Review of reading notes, practical/written exercises, terminology worksheet, and study questions by the Impression Evidence Technical Leader.
- 7.6.2 Oral evaluation by the Impression Evidence TC to determine comprehension of module material.
- 7.6.3 Successfully complete a written examination to evaluate proficiency with Module IV.

8.0 Module V Introduction to Detection and Collection

8.1 Objectives: Through completion of this module, the trainee shall have developed and demonstrated the theoretical knowledge and/or practical skills to:

- 8.1.1 Understand the importance of properly searching for footwear and tire impression evidence.
- 8.1.2 Become aware of specialized techniques for the recovery and enhancement of footwear and tire impression evidence.

8.2 Reading Assignments - Written notes shall be turned in to the TC at the end of the module.

8.2.1 Footwear –

8.2.1.1 Bodziak, W.J. *Footwear Impression Evidence*. Chapter 1 (pgs 17-24).

8.2.1.2 Hilderbrand, D. S. *Footwear The Missed Evidence*. Chapter 5.

8.2.2 Tires –

8.2.2.1 McDonald, P. *Tire Imprint Evidence*. Chapter 6 (p. 37-45).

8.2.2.2 Bodziak, W. J. *Tire Tread and Tire Track Evidence*. Chapter 3 (p. 45-52).

8.3 **Optional Reading** - Optional reading list may be located in the IAI Recommended Course of Study Manual.

8.4 **Written and Practical Exercises**

8.4.1 Prepare written instructions that would assist crime scene personnel in the awareness of impression evidence. These instructions should include various ways that impression evidence is deposited, the places that they would most frequently be located, and suggestions as to where “hidden” or latent impression may be found.

8.4.2 Write an essay as to why footwear and tire track impression evidence is often overlooked at a crime scene.

8.5 **Study Questions**- Complete the Footwear and Tire Track Study Questions assigned for Module V.

8.6 **Evaluation**

8.6.1 Review of reading notes, practical/written exercises and study questions by the Impression Evidence Technical Leader.

8.6.2 Oral evaluation by the Impression Evidence TC to determine comprehension of module material.

9.0 **Module VI – Photography of Footwear and Tire Track Impressions**

9.1 **Objectives:** Through completion of this module, the trainee shall have developed and demonstrated the theoretical knowledge and/or practical skills to:

9.1.1 Understand the importance and correct procedures for photographic documentation of two and three dimensional impression evidence at crime scenes, including the use of scales, various lighting techniques, filters, and contrast techniques.

9.1.2 Understand the considerations and applications of digital photography of impression evidence.

9.1.3 Photograph footwear impressions in the laboratory setting for use in comparisons.

9.2 **Reading Assignments:** Written notes shall be turned in to the TC at the completion of the module.

- 9.2.1 Bodziak, W. J. *Footwear Impression Evidence*. Chapter 2.
- 9.2.2 Bodziak, W. J. *Tire Tread and Tire Track Evidence*. Chapter 3 (p. 52-58).
- 9.2.3 Hamm, E. D. **The Value of Shadow in Footwear and Tire Track Evidence Recovered by Photographic Techniques**. *JFI* 1988 38(3).
- 9.2.4 Hilderbrand, D. S. *Footwear The Missed Evidence*. Chapter 8.
- 9.2.5 Nause, L. *Forensic Tire Impression Identification*. Chapter 2 (p. 25-27, 30-33), Chapter 3 (p. 39-44).
- 9.3 **Optional Reading:** Optional reading list may be located in the IAI Recommended Course of Study Manual.
- 9.4 **Written and Practical Exercises**
 - 9.4.1 Produce general crime scene documentation and examination quality photographs of both two and three dimensional footwear and tire impressions.
 - 9.4.2 Prepare a depressed shoe and a depressed tire impression. Photograph them using various light directions and heights. Compare the results of different shadowing effects.
 - 9.4.3 Prepare a footwear impression on glass and photograph it for maximum clarity of detail.
 - 9.4.4 Photograph a blood impression on a multi-colored surface in color and in black and white. Compare the differences.
 - 9.4.5 Write an essay on the proper use of photographic equipment, light sources, tripods, and scales when photographing impression evidence. Include how these different items aid in the documentation of detail within an impression.
 - 9.4.6 Write an essay on the various methods used to obtain comparison quality photographs as opposed to general crime scene documentation photographs and how they affect the footwear/tire track examination.
- 9.5 **Study Questions** - Complete the Footwear and Tire Track Study Questions assigned for Module VI.
- 9.6 **Evaluation**
 - 9.6.1 Review of reading notes, practical/written exercises, and study questions by the Impression Evidence Technical Leader.
 - 9.6.2 Oral evaluation by the Impression Evidence TC to determine comprehension of module material.

- 9.6.3 Successfully complete a written examination to evaluate proficiency with Modules V and VI.

10.0 Module VII - Chemical and Physical Enhancement of Impression Evidence

- 10.1 **Objectives:** Through completion of this module, the trainee shall become knowledgeable of and gain experience with different methods for the stabilization, enhancement, and development of impression evidence to include:
 - 10.1.1 Blood Print Processing (Amido Black, Leuco Crystal Violet, Coomassie Blue).
 - 10.1.2 Visualization of trace blood impressions (Luminol).
 - 10.1.3 Application of non-blood development techniques (powders, potassium thiocyanate, physical developer, etc.).
 - 10.1.4 Why stabilization of blood impressions is necessary.
- 10.2 **Reading Assignments:** Written notes shall be turned in to the TC at the completion of the module.
 - 10.2.1 Bodziak, W. J. *Footwear Impression Evidence*. Chapter 5.
 - 10.2.2 Cassidy, M. J. *Footwear Identification*. Chapters 2 and 3.
 - 10.2.3 Hilderbrand, D. S. *Footwear, The Missed Evidence*. Chapter 9.
- 10.3 **Optional Reading:** Optional reading list may be located in the IAI Recommended Course of Study Manual.
- 10.4 **Written and Practical Exercises**
 - 10.4.1 Prepare several blood impressions (footwear and/or tire) and enhance them using Amido Black, Coomassie Blue, and Lueco Crystal Violet.
 - 10.4.2 Prepare a blood impression and treat it with Merbromin.
 - 10.4.3 Prepare several footwear impressions and enhance them with Fingerprint Powder, Cyanoacrylate Ester, Rhodamine 6G.
 - 10.4.4 Write an essay detailing how footwear and/or tire track impressions can be enhanced by using the following methods: dusting with fingerprint powder and chemical enhancement. Include information about the substrates and conditions under which each would work).
 - 10.4.5 List and discuss the most commonly used chemical methods for enhancing footwear and/or tire track impressions and under what conditions they are to be used.

10.4.6 Write an essay on how the application of an ALS (alternate light source) can assist in the detection/enhancement of impressions.

10.5 Study Questions - Complete the Footwear and Tire Track Study Questions assigned for Module VII.

10.6 Evaluation

10.6.1 Review of reading notes, practical/written exercises, and study questions by the Impression Evidence Technical Leader.

10.6.2 Oral evaluation by the Impression Evidence TC to determine comprehension of module material.

11.0 Module VIII – Lifting and Casting Impression Evidence

11.1 Objectives: Through completion of this module, the trainee shall have developed and demonstrated the theoretical knowledge and/or practical skills to:

11.1.1 Understand the various lifting and casting methods of recovering and preserving impression evidence at the crime scene and in the laboratory.

11.1.2 Know how to electrostatically recover impression evidence using the PathFinder (ESDA).

11.1.3 Know how to prepare and cast both footwear and tire track impressions using dental stone.

11.1.4 Understand why dental stone is recommended for the casting of impression evidence.

11.2 Reading Assignments - Written notes shall be turned in to the TC at the completion of the module.

11.2.1 Bodziak, W. J. *Footwear Impression Evidence*. Chapters 3 and 4.

11.2.2 Bodziak, W. J. *Tire Tread and Tire Track Evidence*. Chapter 3 (p. 67-88)

11.2.3 Cassidy, M. J. *Footwear Identification*. Chapters 2 and 3.

11.2.4 Hilderbrand, D. S. *Footwear The Missed Evidence*. Chapter 10.

11.3 Optional Reading: Optional reading list may be located in the IAI Recommended Course of Study Manual.

11.4 Written and Practical Exercises

11.4.1 Produce dental stone casts of the following three dimensional impressions:

- Footwear impression in soil/mud.
- Footwear impression in sand.

- Tire track impression in soil/mud.
- Tire track impression in sand.
- Footwear/tire track impression in snow (if possible at the time of training).

11.4.2 Using the PathFinder, attempt to lift impressions of dry origin on various surfaces, including paper, tile floor, carpeted floor, a door, and a metal surface. Make notes of your observations and results. Include documentation photographs of your results.

11.4.3 Using gel lifters and regular palmprint tape, make lifts of dry residue and wet residue impressions on both porous and non-porous items. Attempt to lift the impressions with white, black, and transparent gel lifters.

11.4.4 Make wet-origin impressions on a smooth waxed or smooth polished surface and powder those impressions. Attempt to lift the powdered impressions using:

- Transparent lifting tape on a white lift card/copy paper.
- Commercial clear adhesive footwear lifters.
- Clear, white, and black gel lifters.
- Accutrans.

Document your results.

11.4.5 Discuss in writing the application of the ESDA to enhance the indentations of a footwear impression on paper.

11.4.6 Describe the appropriate sequence of techniques that should be used to collect (1) a dry-origin impression, (2) a wet origin impression, (3) a footwear impression discovered on a countertop and the origin (wet or dry) is unknown.

11.4.7 Write an essay on why using a dental stone with a psi of 9,000 is superior to using plaster of paris or other softer gypsum materials when casting impression evidence.

11.4.8 Explain in writing the proper way to clean a dental stone cast.

11.4.9 Explain in writing how an examiner can best determine whether a cast is dental stone or plaster of paris.

11.4.10 Write an essay on the differences between gelatin and adhesive lifting materials, and the pros and cons of their use.

11.4.11 Write an essay on the various methods of locating footwear impressions at the crime scene including ambient lighting, oblique lighting, and electrostatic lifting. Include information that would increase the awareness of crime scene personnel to the presence of footwear impressions, the various ways they occur, the various places they are most frequently found, and the clues to where “latent” footwear impressions may be located.

11.5 Study Questions - Complete the Footwear and Tire Track Study Questions assigned for Module VIII.

11.6 Evaluation

- 11.6.1 Review of reading notes, practical/written exercises, and study questions by the Impression Evidence Technical Leader.
- 11.6.2 Oral evaluation by the Impression Evidence TC to determine comprehension of module material.
- 11.6.3 Successfully complete a written examination to evaluate proficiency with Modules VII and VIII.

12.0 Module IX – Impression Comparisons and Decision Making

12.1 Objectives: Through completion of this module, the trainee shall have developed and demonstrated the theoretical knowledge and/or practical skills to:

- 12.1.1 Know how to prepare questioned impressions and known shoes for comparative examinations.
- 12.1.2 Understand the importance and need for comparative standards.
- 12.1.3 Be familiar with several different methods of preparing comparative standards, including transparent two dimensional impressions, opaque two dimensional impressions, and three dimensional methods.
- 12.1.4 Understand the different methods of conducting comparative examinations to include side-by-side and superimposition (overlay) exams.
- 12.1.5 Detect and articulate the different characteristics involved in the identification of a questioned impression to a known object.
- 12.1.6 Know how different factors can affect the recording of detail in questioned and known impressions.
- 12.1.7 Understand the relative importance of class, individual, and wear characteristics in the identification process.
- 12.1.8 Understand and articulate the conclusions made from the comparison process.

12.2 Reading Assignments - Written notes shall be turned in to the TC at the completion of the module.

- 12.2.1 Bodziak, W. J. *Footwear Impression Evidence*. Chapters 8, 9, 10 (pgs 347-353), and 11.
- 12.2.2 Bodziak, W.J. *Tire Tread and Tire Track Evidence*. Chapters 8, 9, and 10.
- 12.2.3 Hamm, E. D. **The Individuality of Class Characteristics in Converse All-Star Footwear**. *JFI* 1989, 39 (5), 277-292.

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- 12.2.4** Keijzer, J. **Identification Value of Imperfections in Shoes with Polyurethane Soles in Comparative Shoeprint Examination.** *JFI*: 1990 40 (4).
- 12.2.5** Nause, L. A. *Forensic Tire Impression Evidence*. Chapter 6.
- 12.2.6** Hammer, L., Duffy, K., Fraser. **A Study of the Variability in Footwear Impression Comparison Conclusions.** *Journal of Forensic Identification* 63.2 (2013: 205-218)
- 12.2.7** Wilson, H. **Comparison of the Individual Characteristics in the Outsoles of Thirty-Nine Pairs of Adidas Supernova Classic Shoes.** *Journal of Forensic Identification* 62.3 (2012:194-203)
- 12.2.8** Bodziak, W., Hammer, L. **Determining the Significance of Outsole Wear Characteristics during the Forensic Examination of Footwear Impression Evidence.** *Journal of Forensic Identification* 62.3 (2012:254-276).
- 12.3** **Optional Reading:** Optional reading list may be located in the IAI Recommended Course of Study Manual.
- 12.4** **Written and Practical Exercises**
- 12.4.1** Make test impressions of known shoes using powder and adhesive lifters and an inkless pad. Describe the process used for each and your observations/results.
- 12.4.2** Make test impressions of a tire. Become familiar with the specific materials and methods available, specifically printer's ink on acetate and Vaseline on chart board developed with magnetic powder.
- 12.4.3** Make two and three dimensional footwear impressions/tire impressions and attempt to distort them. Consider the question: is it hard to significantly distort an impression without leaving a noticeable trace? Record your observations and results.
- 12.4.4** Evaluate the following types of comparative standards and when they might be useful in a comparison:
- Transparent.
 - Three dimensional (biofoam, cast).
- 12.4.5** Explain the various class characteristics and identifying characteristics considered during an examination of tires.
- 12.4.6** Compare and contrast the terms "inconsistencies," "variations," and "explainable differences" as they apply to impression evidence. Include how and why these conditions occur during sequential footwear impressions of both known and unknown varieties.
- 12.4.7** Define the term "distortion" as it applies to impression evidence and include the different ways in which a footwear or tire impression may be distorted. Explain how distortion could influence your examination.
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- 12.4.8** Explain in writing the various class characteristics and identifying characteristics considered during an examination of footwear. Include features such as random damage, air bubbles, and the degree and position of wear characteristics and how these features could weigh toward an identification or elimination.
 - 12.4.9** Compare and contrast the various shoe sizing systems used in the world. Determine and note several reasons why shoe sizes may vary amongst manufacturers, shoe styles, and shoe types.
 - 12.4.10** Discuss in writing whether a shoe size can be accurately determined based upon the dimensions of a footwear impression and what precautions should be taken in this regard. Determine if a partial shoe impression could be sized in cases where the manufacturer is known and give an example.
 - 12.4.11** Define the following areas of a shoe examination and what significance they have in the examination: physical size and shape, design, any manufacturing variables or irregularities, wear characteristics, and random identifying characteristics.
 - 12.4.12** Explain why a comparison of a questioned footwear impression and a known shoe is not just a simple visual examination that could be conducted by a layperson.
 - 12.4.13** List what photographs or impressions you may wish to prepare and retain in case work. Take into consideration their importance to illustrate future testimony and to demonstrate the basis for your conclusions.
 - 12.4.14** Detail the reasons for making test impressions. Explain why accuracy is essential and why multiple impressions may be needed.
 - 12.4.15** Discuss when and why you should attempt to reproduce or duplicate the questioned impression and whether duplication is the goal of comparative examinations.
 - 12.4.16** Define, compare, and contrast general wear and wear condition. Discuss when general wear becomes an individual characteristic sufficient for identification.
 - 12.4.17** Begin independently working footwear and tire track training/practice cases. All cases are to be completed prior to the impression evidence round table.
 - 12.5 Study Questions** - Complete the Footwear and Tire Track Study Questions assigned for Module IX.
 - 12.6 Evaluation**
 - 12.6.1** Review of reading notes, practical/written exercises, and study questions by the Impression Evidence Technical Leader.
 - 12.6.2** Oral evaluation by the Impression Evidence TC to determine comprehension of module material.
 - 12.6.3** Successfully complete a written examination to evaluate proficiency with Module IX.
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13.0 Module X – Special Applications In Footwear and Tire Track Examinations

13.1 Objectives: Through completion of this module, the trainee shall have developed and demonstrated the theoretical knowledge and/or practical skills to:

13.1.1 Understand the general principles and techniques associated with the comparison of an item of footwear with the foot of the wearer (barefoot morphology comparisons) and to understand when the comparison may be appropriate.

13.1.2 Understand the significance of a barefoot impression comparison using the morphological size and shape features created by the weight bearing areas of the human foot in combination with other features of the foot such as flexion creases, damage and deformities of the foot, etc.

(Note: The inclusion of barefoot morphology in this segment is for the purpose of introducing this type of evidence and to enable to evaluation of the potential value of such evidence. It is not intended to make the participant proficient in the course of study).

13.1.3 Become aware of several avenues for searching for possible sources of shoe impression evidence.

13.1.4 Understand the limitations of shoe size estimations from crime scene impressions and to understand the limitations of estimating height and weight of an individual from shoe size.

13.1.5 Become familiar with the measurements that can be obtained from a suspect vehicle to include track width, turning diameter, and wheel base. Understand how these measurements can be utilized when questioned tire track impressions are located at a crime scene.

13.2 Reading Assignments - Written notes shall be turned in to the TC at the completion of the module.

13.2.1 Barefoot Morphology –

13.2.1.1 Bodziak, W.J. *Footwear Impression Evidence*. Chapter 13.

13.2.1.2 Kennedy, R. B. **A Large Scale Statistical Analysis of Barefoot Impressions.** *JFS*, Sept 2005, 50(5), 1071-1080.

13.2.1.3 Kennedy, R. B. **Uniqueness of Bare Feet and Its Use as a Possible Means of Identification.** *FSI*, 1996 82, 81-87.

13.2.1.4 Massey, S. L. **Persistence of Creases of the Foot and their Value for Forensic Identification Purposes.** *JFI*, 2004, 54(3), 296-315.

13.2.2 Footwear –

13.2.2.1 Bodziak, W.J. *Footwear Impression Evidence*. Chapter 6.

13.2.2.2 Cassidy, M. J. *Footwear Identification*. (p. 137-146).

13.2.3 Tire/Vehicle Identification –

13.2.3.1 Bodziak, W.J. *Tire Tread and Tire Track Evidence*. Chapters 2 and 12.

13.3 Optional Reading - Optional reading list may be located in the IAI Recommended Course of Study Manual.

13.4 Written and Practical Exercises

13.4.1 Use a car or a truck to make some turns in sand or on a surface that will record “track width,” “turning diameter,” and “wheel base” measurements. Measure these dimensions and compare the data you collect with the reference material available on that type of vehicle. Prepare a written report on this exercise. Discuss in the report how the measurements differ on a softer versus a harder medium.

13.4.2 Prepare barefoot test impressions in both two dimensional and three dimensional mediums to simulate impressions which might be found at a crime scene. Practice photographing these impressions and applying the same techniques you would use to photograph outsole impressions found in similar conditions.

13.4.3 Research available footwear design searching services such as SICAR and internet retail websites. Report on the information that is available and how this may be useful in casework.

13.4.4 Conduct a search for a possible footwear source of an unknown impression using SICAR and internet searches.

13.4.5 Create several footwear impressions using known individuals. Using the charts in Bodziak’s book, estimate the height of those individuals from the size of the shoe impressions. Compare your data to the actual height of the individuals. Discuss the results and the limits of these associations.

13.5 Evaluation

13.5.1 Review of reading notes, practical/written exercises, and study questions by the Impression Evidence Technical Leader.

14.0 Module XI– Case Note Preparation, Report Writing, and Courtroom Testimony

14.1 Objectives: Through completion of this module, the trainee shall have developed and demonstrated the theoretical knowledge and/or practical skills to:

14.1.1 Successfully apply the techniques and principles learned in the IAI recommended Course of Study for Footwear and Tire Track Examiners to casework.

14.1.2 Properly document footwear and tire track impression examinations through the use of notes and photographs.

14.1.3 Understand the purpose of proper report writing terminology in footwear and tire impression evidence examinations.

14.1.4 Report the various levels of opinions encountered in the decision/opinion statements.

14.2 Reading Assignments-

14.2.1 Bodziak, W.J. *Footwear Impression Evidence*. Chapters 12 and 14.

14.2.2 Bodziak, W. J. *Tire Tread and Tire Track Evidence*. Chapter 11.

14.2.3 Hilderbrand, D.S. *Footwear The Missed Evidence*. Chapter 12.

14.2.4 NCSCL Latent Technical Procedure: Impression Evidence Examinations

14.3 Optional Reading: None.

14.4 Practical and Written Exercises

14.4.1 Complete all training cases, including notes, reports, and proper documentation.

14.4.2 Complete footwear and tire track qualifying questions for court.

14.4.3 Explain ACE-V as it applies to footwear and tire track evidence.

14.4.4 Explain the types of results that are routinely used by the NCSCL, including the wording used in reports:

- Could have made.
- Elimination.
- Identification.

14.5 Evaluation

14.5.1 Successfully complete a written examination to evaluate proficiency with Modules X and XI.

15.0 Final Evaluation

15.1 Round Table

15.2 Final Exam

15.3 Final Competency Test

16.0 Records

- The IAI Recommended Course of Study for Forensic Footwear and Tire Tread Examiners
- Terminology Worksheet
- Module Study Questions
- Module Exams
- Training checklist

17.0 Attachments – N/A

Revision History		
Effective Date	Version Number	Reason
07/01/2016	1	Original ISO Document
02/01/2019	2	Edited document to add additional trainee requirements.