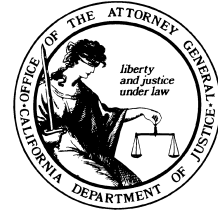




CALIFORNIA DEPARTMENT OF JUSTICE
BUREAU OF FORENSIC SERVICES
PHYSICAL EVIDENCE BULLETIN



DOCUMENTATION OF SHOE AND TIRE IMPRESSION EVIDENCE

A suspect may be associated to a crime scene by impressions/imprints left behind by the suspect's shoes and/or vehicle tires. A comparison of the crime scene impression/imprint can result in an identification of a shoe or tire. Impression/imprints can be found in soil, snow, on counters, tile floors, doors and paper. The evidentiary value of a comparison usually depends upon the quality of the impression or imprint and the manner in which it is recorded.

Photography

As with all evidence, overall photographs should be taken using a standard format lens showing the impressions/imprint in relation to the other features of the scene.

Photography is the most valuable way of collecting impression evidence for later comparison. It is critical that distortions are minimized by adhering to the following:

- Impression photography requires the use of a tripod and detachable strobe.
- The photo must include a scale or tape measure and identifying information (case number, item number, north arrow and date). These items must not be within or interfere with the impression. It is important that the scale be placed at the same depth as the impression.
- **The camera must be mounted on the tripod directly over the pattern with the film plain parallel to the pattern.** If the impression is on an incline, the camera must be adjusted so the back of the camera is at the same angle as the impression. If in a lighted environment, create a shadow over the pattern. Using the detachable strobe, light the pattern at a 45⁰ angle or less from a minimum of four different directions. The less depth to the impression, the more acute the light angle should be. The impression, scale and identification information should fill the frame. The tripod may need to be inverted so that the legs do not interfere with the photograph.
- A tire impression should have the entire length of the tire's circumference (approximately 8 feet) photographed if available. A **flat** tape measure is placed alongside the entire length photographed. Overlap the frames by as much as 20%. No more than 2 feet of impression should appear in each frame.

Submit all photographs regardless of their apparent quality, 35mm or larger color film is adequate.

Instant or auto-focus cameras produce photographs that are not suitable for comparisons.

After the initial photography, carefully remove any vegetation or stones which may have fallen into the impression **after** it was made. Any debris that was pressed into the soil with the impression should not be disturbed. Photograph again.

Casting

After photography, casting may be performed to document the impression three-dimensionally. The decision to cast is affected by the soil conditions. Coarse soils do not lend themselves well to casting. Impressions in fine humus soil and even snow are excellent candidates for casting. The recommended casting materials are Dental Stone, Traxtone or Diecast. These proprietary products are superior to plaster in the amount of detail retained, ease of preparation, short setting time and no need for borders or reinforcements. Most companies supplying fingerprint identification supplies also carry casting materials.

The Dental Stone is mixed in the proportion of 1 lb./6 oz. of water and Diecast 1 lb./5 oz. of water. It is handy to preweigh one pound portions into large ziplock bags. Traxtone is prepackaged and takes 7 oz. of water to mix in its one gallon ziplock bag. Add the water and mix thoroughly until the consistency of a thick milkshake is achieved. Pour the mixture from a height no greater than 3 inches as not to disturb details in the impression. The cast should be approximately 3/4 inch thick to prevent easy breaking. The material requires 20-30 minutes to set. Mark the back side of the cast with identifying information. Do not remove any soil adhering to the cast after recovery. Place each cast in a sturdy box for transportation. Spray impressions in snow with Snow Print Wax before pouring mixture. This product is also available from companies that carry fingerprint identification supplies.

Hard surface imprints

Hard surface or two-dimensional imprints may be found on doors, counters, tile floors, paper, cement, windowsills, etc. They generally include two types: 1) voids in the pattern created by the surface material, e.g. dust, adhering to and being removed by the shoe/tire and 2) the deposition of material from the shoe/tire, such as blood, dirt, oil, etc. Again, photography is the most valuable way to document the imprint (see photography section). If possible, submit the entire item bearing the imprint document. If that is not practical, the imprint may be lifted using a commercially available print lifter. An electrostatic dustprint lifter or gel print lifter may be employed. Avoid using makeshift print lifting materials such as cellophane or tape.

Enhancements

Laboratory personnel may provide chemical enhancement techniques for imprints in blood. Photographs should be taken prior to any enhancement attempts.

Dusting any type of residue imprint with latent finger print powder is not generally recommended. However, it may be worth trying as a last resort.

Alternate light sources such as UV and laser may enhance visualization and photography, especially with imprint evidence.

Test Impressions

Suspect's shoes or tires should be collected as soon after the incident as possible to minimize the amount of change to the tread or sole through additional wear.

Test impressions from shoes will be made at the laboratory at the time of comparison. If shoes are to be examined for soil, glass, fibers, etc., each shoe should be individually packaged to avoid contamination.

It is recommended that the sole patterns of family members, law enforcement employees and other

personnel present at the scene be documented for elimination purposes. Companies that carry fingerprint identification supplies also provide products that can produce actual size (1:1) test impressions. Photography is also appropriate if a ruler is included in the photograph.

Tires should remain mounted on the suspect vehicle such that position, wear and load duplicate the conditions at the time the evidence impression was produced. The vehicle may be trailered to the laboratory for obtaining tire test imprints.

A trained investigator may obtain the tire test imprints in the following manner:

1. Use a smooth, clean flat surface such as concrete, of appropriate length.
2. Drafting film with a width of at least one foot is affixed to cardboard. Drafting film is a transparent plastic which may be purchased at any drafting supply company. Prepare several lengths sufficient to document the entire circumference of the tire (approximately 8 feet).
3. Mark the **sidewall** of the tire into sections. The sections are defined by the location of the wear bars. Label each section (A, B, C, etc.).
4. Using a gloved hand, cover the tread with a **thin** film of Vaseline. Too little Vaseline will result in incomplete documentation. Too much Vaseline will result in filling in of fine details of the tread pattern.
5. Line up the drafting film attached to the cardboard in front of Vaseline-covered tread. Slowly roll the tire either forward or backward making an imprint on the film. As you roll, mark the cardboard with the corresponding sidewall sections and direction of roll.
6. Label each board with the position in which the tire was mounted on the vehicle (right front, left rear, etc.).
7. Develop the Vaseline "print" with black magnetic powder.
8. Spray the entire test impression with lacquer to help prevent smudging.
9. Roll the other three tires similarly.

Vehicle track width and wheelbase

Crime scene measurements of the vehicle track width and/or wheelbase may be searched against a database to provide a list of vehicles which may have left the tire impression. Imprints requests to search the database using the measurements obtained may be made directly to the California Department of Justice Riverside Criminalistics Laboratory at (909) 782-4170 or through your local laboratory.

The track width of a vehicle is the distance between the center of the tire mounted on one side of the vehicle to the center of the tire mounted on the opposite side of the vehicle. The distance is most easily measured as the distance between the outside edge of the left tire impression and the inside edge of the right tire impression (see diagrams). The front and rear track width measurements may be different.

The wheelbase of a vehicle is the distance between the center of the front axle and the center of the rear axle. The distance is most easily measured as the distance between the leading edge of the front tire impression and the leading edge of the rear tire impression (see diagrams).

MEASURING TRACK WIDTH AND WHEELBASE

