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Documenting the Crime Scene

Written by Aric W. Dutelle

This is an excerpt from the new book by Aric W. Dutelle, An Introduction to Crime Scene Investigation
(Editor's Note—The excerpt focuses on documenting a scene with crime-scene sketching and mapping techniques.)

DOCUMENTATION EFFORTS at the crime scene begin the moment that an officer gets a call and continue until the case is closed. This is often the most time-

consuming but also the most important step in crime scene investigation. It is the purpose of crime scene documentation to record and preserve the location and relationship of discovered evidence as well as the condition of the crime scene as it was when the documenter was observing it. For the purposes of this text, there are four primary methods of documentation that are involved in CSI. These are:

1) Reports and note-taking
(sometimes audio)
2) Photographs
3) Videography
4) Crime scene sketching
and mapping

The end purpose of documentation should be the successful notation of all observations made within the scene of the crime, which will ensure the individual engaged in the documentation efforts will best be able to recall the events in the future. Importantly, this information may be presented in court.

Sketching and Mapping the Scene

Sketching—A *crime scene sketch* is a permanent record of the size and distance relationship of the crime scene and the physical evidence within it. The sketch serves to clarify the special information present within the photo-graphs and video documentation, because the other methods do not allow the viewer to easily gauge distances and dimensions. A sketch is the most simplistic manner in which to present crime scene layout and measurements. Often photographer/camera positions may be noted within a sketch also.

Why is a sketch important to crime scene documentation?

- It accurately portrays the physical facts.
- It relates to the sequence of events at the scene.
- It establishes the precise location and relationship of objects and evidence at the scene.
- It helps to create a mental picture of the scene for those not present.
- It is a permanent record of the scene.
- It usually is admissible in court.
- It assists in interviewing and interrogating.
- It assists in preparing the written investigative report.
- It assists in presenting the case in court. Well-prepared sketches and drawings help judges, juries, witnesses, and others to visualize the crime scene.

When should sketches be made?

- Sketch all serious crimes and accident scenes after photographs have been taken and before anything is moved.
- Sketch the entire scene, the objects, and the evidence.

Two types of sketches are produced with regards to crime scene documentation: rough sketches, and final/finished sketches. *Rough sketches* (Figure A) are developed while on-scene, typically during the crime scene assessment/preliminary scene evaluation phase to assist with development of a strategic plan for processing. The sketch is not done to scale, can be drawn with any implement (crayon, chalk, pencil, pen, etc.), and is very rough artistically. As work progresses at the crime scene, the sketch will include not only the crude crime scene layout, but also will be used to record measurements of items and structures,

Figure A—An example of a rough sketch. *Courtesy of Sarah Bedish*

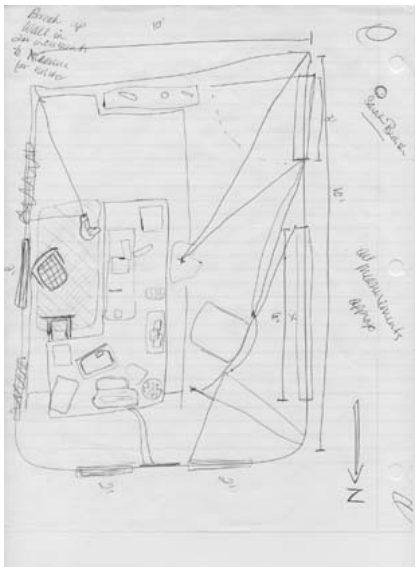
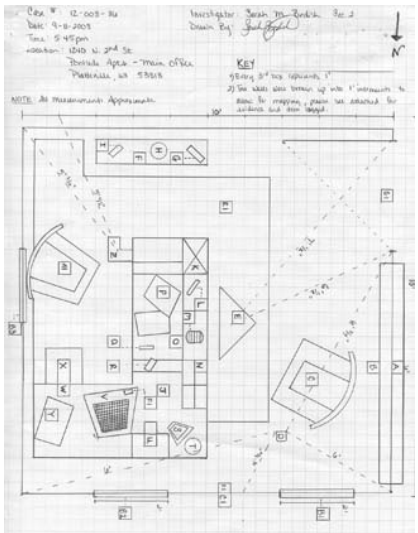


Figure B—An example of a final sketch. *Courtesy of Sarah Bedish*



and distances between items.

A *final sketch* (Figure B) is a finished rendition of the rough sketch. They are usually prepared for courtroom presentation and often will not show all measurements and distances originally recorded on the rough sketch. Only significant items and structures are typically present within a final sketch. A final sketch is produced in either ink or on a computer, in a manner that is not able to be modified (i.e., not in pencil!). The sketch should be clutter-free and should accurately depict all pertinent items of evidence, typically through the use of an accompanying legend. A *legend* is a note of explanation, outside of the sketch area, which relates to a specific item, symbol, or information contained within the graphical representation of a sketch. A final sketch should include:

- Title (What does the sketch represent? For example, Sketch of Bank ABC Robbery).
- Legend (What do symbols within the sketch mean?).
- Case Information. (i.e., date, time, place, case number).
- Initials/Name (person who drew the sketch).
- Indication of a direction (e.g., North).
- Scale (e.g.: 1" = 1').
- Measurement table (If measurements are not represented within the confines of the sketch, an accompanying measurement table should be included to explain the distances and measurements associated with it.).
- There should be a notation following the scale or measurement table stating: "All Measurements are Approximate." This will ensure that the sketch's author does not get into a credibility argument in court that a measurement is documented as the listed measurement, but could in fact be greater or lesser due to rounding errors or other factors.

Four different crime scene perspectives can be represented within a sketch: (a) the bird's eye or overhead view, (b) the elevation or side view, and (c) the three-dimensional (3D) view. Sometimes personnel choose to incorporate several perspectives within a sketch (e.g., using both elevation and overhead sketches to draw an exploded or cross-sectional view of a scene).

An overhead or bird's eye view is the most common form of crime scene sketching. It is prepared with the perspective being as though the author was looking down upon the scene from above. This type shows the floor layout but cannot represent heights of items or show associated evidence on walls. In order to show such information, a person must sketch an elevation or side view sketch to show evidence located on a building façade, interior wall, or any item of which height is an

important aspect (e.g., death involving a hanging). A 3D crime scene perspective is created with the aid of computers, and has its primary function as being crime scene activity reconstruction, to help explain what happened and in what order.

Crime Scene Mapping—Mapping is the term associated with crime scene measurements. Sometimes a person may sketch but not map, meaning that he or she draws a sketch of an area but does not apply measurements to the sketch produced and items represented. Rarely, however, will one map without sketching (i.e., record measurements with no graphical representation for what the measurements represent). Sometimes this step is referred to as measuring. There are a variety of methods for mapping a crime scene, depending upon whether the crime scene is an interior or exterior scene. As this is an introductory text, only the most basic and most often used methods are covered here. The basic types of mapping methods utilized for crime scene sketching and mapping are: (a) baseline, (b) rectangular coordinates, (c) triangulation, and (d) polar/grid coordinates.

- **Baseline Mapping**—This is the most basic—and least accurate—form of crime scene mapping. For this method, a baseline is developed or identified from which to conduct measurements. This can be an existing area, such as the edge of a roadway, a wall, fence, etc., or it can be developed by personnel, such as by placing a string or tape measure through the scene and conducting measurements from there. In the case of the latter, the line should be run between two known fixed points, such as trees or other identifiable points, so that the points could be found in the future and the scene reconstructed if necessary. Once the baseline is established, measurements are taken from the baseline at an approximate 90 degree angle from the baseline to a point on the identified item or area of the crime scene. Typically, most measurements are made either to center mass of the item or to the nearest point of the item to the baseline. Because it is impossible to ensure that the measurement was taken at 90 degrees, the possibility exists that the measurement will be longer if the measurement was over 90 degrees from the baseline, or if it was less than 90 degrees from the baseline. For this reason, this method is not as accurate as some of the other methods; however, it is quick and extremely easy to use.

- **Rectangular Coordinate Mapping**—The rectangular coordinate mapping method is a slightly more accurate variation of the baseline method because it utilizes two such baselines instead of one. Two measurements are taken to a point on an item or location at the scene. One from each identified baseline. Some personnel choose to measure to two or more points on an item, using multiple rectangular measurements as a way of increasing accuracy, while others simply choose to measure to an arbitrarily-identified center mass of the object in question or point to which the measurements are being taken. As with the baseline method, it cannot be determined that such measurements are taken precisely at 90 degree angles from the baseline, so there exists a greater possibility of errors than with some of the other methods. However, due to this method having two measurements, it has much greater accuracy than with the single line baseline method. This method is especially useful in confined spaces and smaller interior scenes.
- **Triangulation Mapping**—This is the most accurate method that does not make use of advanced technology. While it is quite a bit more laborious and time-consuming, it is sufficiently more accurate than the aforementioned methods of mapping to be worth the effort. The accuracy for this method comes in its foundation: two fixed points. From these two fixed points, measurements are taken to specified points on an item or within the crime scene. There is no need to worry about whether or not measurements have been made at a right angle because the points derive from a known fixed point, such as the corner of a room, or edge of a door frame. From these fixed points, a minimum of two measurements are made to each identified point. If the object is of a fixed or constant shape (e.g., a firearm or item of furniture), then the object is measured to two points, from the two fixed points, for a total of four measurements. If the object is of a variable shape or size (e.g., a puddle of water, pool of blood, or pile of clothes), then the object is measured to an approximate center of mass.
- **Polar/Grid Coordinate Mapping**—Utilizing polar coordinates is the fourth method of crime scene mapping used to document evidence location at a crime scene. Like those previously mentioned, this is a two-dimensional system that indicates the location of an object by providing the angle and distance from the fixed or known point. Obviously, in order to conduct measurements by this method a transit or compass is necessary to measure the angles and polar directions. This method is best utilized in large outdoor scenes with very few landmarks (e.g., a plane crash in forest or large field).

- **Advanced Mapping Techniques**—Some departments may have the ability to make better utilization of modern technology, such as global positioning systems (GPS) and Total Stations, which are mapping systems that can take measurements in polar coordinates and then convert the measurements into grid coordinates. The benefit of this technology is that they both are able to provide precise electronic distance measurements and are extremely useful in mapping large-scale scenes and events.

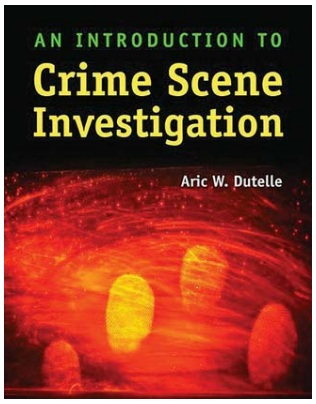
A Total Station is an electronic surveying instrument that has an integrated computer and can measure angles in the horizontal and vertical planes, utilizing a laser rangefinder instead of the more archaic method of a manual tape measure. This is especially useful because changes in elevation are very difficult to both measure and depict on a crime scene sketch. The Total Station is capable of recording evidence positions in three dimensions, thus simplifying this otherwise complicated situation.

GPS is a satellite-based navigation system comprising a network of 24 satellites that have been placed in the Earth's orbit by the U.S. Department of Defense. GPS was originally used by and intended for the military; however, in the 1980s the government made the technology available for civilian use. The benefit of GPS is that it works in any weather condition, anywhere in the world, 24 hours a day. There are no subscription fees or setup charges to utilize GPS. These satellites complete two very precise orbits of the Earth a day, during which they transmit signal information. It is these signals that GPS receivers gather and then use triangulation to calculate the user's location. A GPS receiver must be locked on to the position signal of at least three satellites in order to calculate a two-dimensional position (latitude and longitude) as well as track movements of an object. If the GPS receiver is able to lock onto four or more satellites, the receiver can determine the user's three-dimensional location (latitude, longitude, and altitude), along with object movement. The more satellites that the GPS is locked onto, the greater the accuracy of the position. Once the user's position has been determined, an additional service is that calculation of movement can provide GPS users the ability to record information such as speed, bearing, track, trip distance, distance to destination, sunrise, sunset, time, and many more possibilities.

How accurate is GPS? In most cases, commercially available GPS receivers are accurate to approximately 12 meters, with higher end units capable of accuracy in the 3- to 5-meter range. This is sufficiently accurate for large scenes that have no known/fixed landmarks. A GPS reading is typically used to "mark" a known point and then measurements are made from that location, thereby ensuring that any measurements taken will all be "off" by the same amount because they all originate from the same location.

As with all other crime scene measurements, all measurements are approximate, and are never documented as or testified to as being 100% accurate. Crime scene mapping is about doing the best possible documentation with the resources available, realizing that rounding and other factors inhibit the ability to be completely accurate.

About the Author



Aric Dutelle is a professor of forensic investigation at the University of Wisconsin-Platteville. His new text, An Introduction to Crime Scene Investigation*, was released by Jones and Bartlett Publishers in January 2010. Written to be a single-source reference for the investigative process as it relates to crime-scene processing methods and procedures, this introductory text takes readers through the day-to-day aspects of crime-scene processing, and describes in detail the crime-scene investigator responsibilities. To learn more about the book, go to the Jones and Bartlett website:* **www.jbpub.com**

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