

Methodical Approach to Processing the Crime Scene

CHAPTER 6

It is a capital mistake to theorize before one has data. Insensibly one begins to twist facts to suit theories, instead of theories to suit facts.

Sir Arthur Conan Doyle (1859–1930)
Sherlock Holmes, in *A Scandal in Bohemia*

▶ ▶ LEARNING OBJECTIVES

- Understand the basic components of crime scene documentation.
- Identify the three photographic ranges in crime scene photography.
- Understand the concept of “fair and accurate” standard of evidence photography.
- Identify the various types and perspectives of crime scene sketches.
- Differentiate between sketching and mapping.
- Identify the necessary components of a final sketch.
- Identify the various methods of crime scene mapping and know which is best for different crime scenes.
- List the crime scene search patterns and when/where they are most effective.

▶ ▶ KEY TERMS

Close-Up Photographs
Crime Scene Sketch
Final Sketch
Legend
Mapping
Mid-range photographs
Overall photographs
Photo Log
Photo Placard
Rough Sketch
Swath

■ Methodical Approach to Crime Scene Processing

Crime scenes are complex and confusing creatures. The first step in crime scene processing is to establish a plan. In Shakespeare’s 1600 play, *Hamlet*, Polonius says, “Though this be madness, yet there is method in it” (Act 2, Scene 2). All steps of crime scene response should be calculated and methodical to ensure the most positive result. It is for this reason that investigative personnel should take the information garnered from their walk-thru and develop a systematic plan for proceeding with the processing efforts. A systematic plan will ensure that nothing is overlooked and no pertinent evidence is lost in the course of the subsequent investigation.

As stated in Chapter 1, all crime scenes are different but there are guidelines that exist in all cases that serve as a framework for the processing efforts. The general crime scene processing structure is as follows:

- Initial Scene Assessment
- Search for and Recognition of Physical Evidence
- Documentation of Physical Evidence
- Collection of Physical Evidence
- Packaging and Preservation of Physical Evidence
- Crime Scene Reconstruction

These are guidelines for the overview of efforts involved with the processing of a crime scene. However, often these tasks are not separate from one another but may overlap. This will be addressed as the chapter unfolds. In any case, investigative and processing efforts should start in the least intrusive and destructive manners and progress to the most intrusive and destructive. Processing the scene this way will ensure evidence integrity for as long as possible. Chapters 4 and 5 covered the first responder's duties at the crime scene and the initial assessment stages. This chapter concentrates on the processing activities following that initial assessment. The first phase is documentation.

■ Documenting the Crime Scene

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. As Sherlock Holmes explains in *The Five*

Orange Pips, “The observer who has thoroughly understood one link in a series of incidents, should be able accurately to state all the other ones, both before and after” (Doyle, 1892, p. 81).

Each of these methods is an integral part of crime scene documentation. None is a substitute for another. While some of the methods might appear to be redundant, this serves to corroborate the other methods, ensures that nothing is overlooked, and all areas are accounted for. Notes and reports are not sufficient by themselves because they do not accurately portray the scene in detail the way photographs can. However, photographs are not sufficient by themselves, as they often need more explanation, which is the purpose of reports and notes. Sometimes notes are dictated into a tape or digital recording device, yet at some point are transcribed into a written format for court purposes. Here, therefore, notes and reports are defined as being both audio and written. While photographs are a good tool for documenting the visual aspect of a scene, nothing brings the scene to life as much as videotaping. However, video cannot be used in the same manner as photographs from a forensic analysis standpoint when documenting physical evidence.

Because each type of record has its place in documentation efforts, all must be considered and utilized when available and appropriate.

■ Crime Scene Photography

Entire texts have been written solely on this topic. Photographers are urged to seek out books and courses that will help them to continually refine their skills. This introduction comprises a succinct but thorough overview of the purpose and skills involved in crime scene photography.

The purpose of crime scene photography is to capture adequate images for the best possible documentation and reproduction of the reality present at the moment in time when the scene was photographed. Whether a person is using digital or film imaging equipment, accuracy is the key (Weiss, 2009). When attempting to shoot precisely, one must remember that photography is a mechanical means of retaining vision. When properly taken, a photograph is one of the only ways to capture an instant of time. However, the camera was never intended to replace vision, because it certainly cannot (Weiss, 2009). Crime scene photography is visual storytelling, and as such, the photographs should be a fair and accurate representation of the scene about which the story is being told.

Photographs are almost universally accepted by the courts and allowed into evidence irrespective of their image quality so long as the

images contained within them are not inflammatory or prejudicial in nature (Weiss, 2009). Although it used to be necessary for a person to also be able to testify as to how a photo was developed or processed, now this is rarely the case, as the images themselves are not the evidence but rather what they represent.

Photographers often may attempt to create photographs of objects or scenes “as seen” by someone else. Undoubtedly this is an impossible undertaking, as no one can accurately document an item or moment as someone else saw it. Instead, it is an appropriate step to document the image or scene from the perspective of the viewer in approximately the same position, although not at the same moment in time (Weiss, 2009).

VIEW FROM AN EXPERT

Fair and Accurate

Photographic images of evidence have been presented in court for over a century. The admissibility of the images is decided by the judge. The judge may use the credibility and competency of the witness presenting the images, plus other important factors, as parameters for the decision. Opposition counsel has the right to challenge the images and to try to demonstrate that they are not, in fact, accurate representations of the evidence.

Photographs are usually allowed into court regardless of their quality. The actual photographer is rarely asked to testify about image accuracy, because the photographs are not considered as evidence but simply representations of the physical evidence.

Photographic images, whether captured on film or digital sensors, may be questioned regarding their degree of accuracy as representations of the imaged subject. In the courtroom, photographs must provide the best possible illustration of a very specific reality. In order to promote an industry-acceptable degree of quality and credibility in evidentiary photographs, professional organizations, including the Evidence Photographers International Council (EPIC), have published standards for evidence photographs.

A *standard* is an established norm or requirement. It is a formal, peer-accepted document that establishes uniform engineering or technical criteria, methods, processes and practices. All standards for evidence photographs define *admissibility* essentially as a matter of a “fair and accurate representation of the subject portrayed.”

How are photographers and the court to interpret *fair and accurate*? *Fair* is a relative term. The judge is tasked with making the determination of what is fair, and often this call will be based on the credibility of the witness. Even

poor photographic quality will not necessarily cause an image to be inadmissible if the judge believes the image is fair and relevant to the proceedings. It should be noted that there is not a standard definition or set of parameters for the term “*accurate*” Judge John Panos, a state-court judge in DeKalb County, Georgia, stated, “I would like to see a standard definition of ‘accurate’ made and published. This can then be referred to as the standard of the industry.” Why is this definition necessary? The broad definition of accurate includes some of the subtler and more technical aspects of photography, including, perspective, angle of view, and dimensionality. It is conceivable that any photographic image could be questioned.

Terms such as color management, dynamic range, resolution, perspective, angle of view, or dimensionality may not be fully understood by the professional photographer or the attorney, let alone the juror. How many people can properly explain the difference between vision and perception, and articulate how this correlates to the accuracy of a photographic representation? It cannot be taken for granted that anyone in the courtroom understands photography on that level.

Photographers may attempt to create photographs of objects or scenes “as seen” by someone at the moment in question. Of all the purposes or goals that apply to photography, probably the most impossible is to create an image of anything exactly as another person would have seen it. It is, however, possible and much easier to make images and then use those images to help explain how it looked to you.

So in the real world, the definition of fair and accurate might be what the image is intended to show. In most cases, in order for an image to be a fair and accurate representation, it should show the questioned area or object in its most natural state. For example, if an attorney wishes to show the approximate physical or general area of involvement, then the judge may not be too strict in interpreting the term fair and accurate. In this case, a photograph of the scene would suffice for the purpose of identifying a location. On the other hand, if the primary purpose of the image is to illustrate exact details of a scene or object, such as the measured distance between two objects or the details of a latent print, then determining whether the image is fair and accurate will require much closer scrutiny.

If an attorney wants to show the exact distance between a crosswalk and a traffic signal, photographic experience and expertise becomes very important. If that photo, submitted as evidence was created by someone lacking a high level of experience and expertise, a judge may not allow a witness to testify that, based on the photograph, the distance between the crosswalk and the traffic signal is 25 feet.

Fair and accurate may amount to different things at different trials. It will always be a measure of the competence and credibility of the person presenting the photographs, rather than the sophistication of the camera and equipment used to create the images.

Sanford Weiss, EPIC Crime Scene Photographer
Author, *Forensic Photography: The Importance of Accuracy*

Photographic Ranges and Perspectives

In keeping with the storytelling theme, the first photos taken at a scene should not be of gore or an item of physical evidence. Instead, they should be of the overall crime scene. It should set the stage for the beginning of the story. As such, there are three important ranges of photographs that are taken at the scene of a crime: overall photographs, midrange/evidence-establishing photographs, and close-up/comparison/examination photographs.

Also, it is important to remember to take a photograph of a photo placard as the first photo taken at the crime scene. A **photo placard** is a handwritten or agency-developed sheet (**Figure 6.1**) that lists pertinent case information for the photographs to follow. Taking a photo of this as the first photo on a roll of film or as the first digital photo of a case will ensure that personnel are familiar with which photographs pertain to which case, and the name of the photographer. Only one case should be photographed on a roll of film; however, with today's digital media, often several (if not many) cases are photographed on a single digital media card prior to downloading onto a computer. Photographing a photo placard will serve as a separator between the cases, so that case photos will not become commingled.

Overall Photographs (Figure 6.2)

Overall photographs are exposed with a wide angle lens or in such a fashion that allows the viewer to see a large area in the scene at eye-level. Their function is to document the condition and layout of the scene as found. They help eliminate issues of subsequent contamination (e.g.,

Cityville Police Department
Case #: _____
Date: _____
Location: _____
Photographer Name: _____
Photographer ID: _____
Roll # (if applicable) _____

Figure 6.1 Example of a Photo Placard.



Figure 6.2 Example of an Overall Photograph.

tracked blood, movement of items). Typically these are shot from the four corners of the crime scene. If indoors, usually they are taken from the corners of the room, shooting towards the center. If outdoors, they are often shot from the direction of a cardinal heading (North, South, East, and West). These four photographs most likely will capture the entire scene. If not, then additional photographs from an appropriate vantage point can be taken. These overall photographs set the scene and should include street signs and addresses if possible. Also, it may be necessary to not only take overall photos facing the building or scene in question, but also overall photos facing away from the scene to show the surrounding area.

Midrange/Evidence-Establishing Photographs (Figure 6.3)

The function of **midrange photographs** is to frame the item of evidence with an easily recognized landmark. This visually establishes the position of the evidence in the scene, with its relationship to the item's surroundings. These types of photographs are the most overlooked in crime scene work. They are taken of the evidence prior to movement or manipulation and should never include a scale of reference in the photo. The evidence-establishing photograph is not intended to show details, but simply to frame the item with a known landmark in the scene. The close-up and the evidence-establishing photograph go hand-in-hand.



Figure 6.3 Example of a Midrange Photograph.

Close-Up/Comparison/Examination Photographs (Figure 6.4)

The function of **close-up photographs** (also called *comparison*, *examination*, or *macro* photographs) is to allow the viewer to see all evident detail on the item of evidence. This photo should be close and fill the frame with the evidence itself. They are taken with and without a scale. It is extremely important that photographs of this type are first taken without a scale of reference, and then with a scale of reference. The first photo shows the scene prior to contamination or manipulation by the photographer or crime scene personnel. The second includes a scale of reference with which the viewer is able to gauge size of the item presented within the photograph. This scale will allow for a 1:1 ratio reproduction of the photograph (i.e., 1 inch equals 1 inch). Failure to photograph the close-up without a scale prior to incorporating a scale in the photo could result in the photo being inadmissible because of the allegation of scene tampering.

The preceding photographic ranges are used anytime there is an item of evidence that is important and will have a bearing on the investigation. While there might be a variety of perspectives photographed, any photograph taken at a crime scene will fall under one of the preceding ranges. For instance, photographs taken from

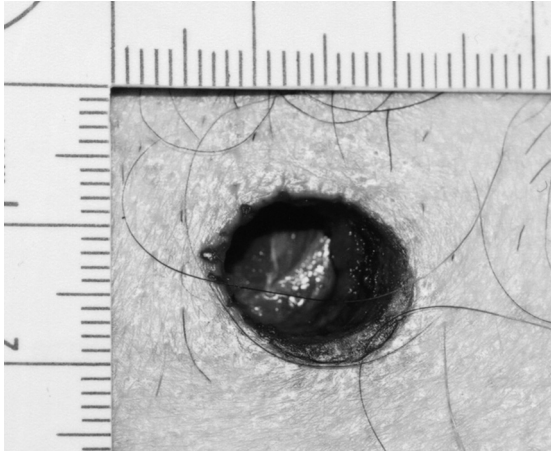


Figure 6.4 Example of a Close-Up/Comparison/Examination Photograph.

the reported position of a witness would fall into the overall range category. Those taken to show the address of a residence would fall into the midrange category if they showed more than simply the numbers/letters and included the façade of the house or entry to the home. However, if it was only of the letters/numbers this photograph would fall into the close-up range.

Photo Log

Regardless of the perspective or range taken, each photograph taken at a crime scene should be documented on a **photo log**. A photo log is a permanent record of all information pertaining to documentation by photographs. Department policy often dictates what is found within a photo log; however, if no policy exists, the following suggestions are offered (**Figure 6.5**). Information that should be included in a photo log includes:

- Title and information block consisting of: Date/Time/Case Number/Agency Name
- Photo equipment used
- Numerical ordering of each photo taken
- Brief description of each photo taken
- Direction facing for each photo taken

- Approximate distance from subject matter in each photo taken
- Shutter speed, aperture setting, and ISO for each photo. If photographed with conventional photography, then pertinent photographic information should be included for each. If photographs are taken in a digital format, documenting such information is not as imperative, because it will be digitally recorded when each photo is taken as part of the digital file for each photo.

Photograph List Case #

Code Section and Description			Month	Day	Year	Page of	
Location of Incident				City		Time	
Victim's Name			DOB		CDL		
Photographer/ID #			Scribe/ID #				
Camera, Lenses, and Flash Used							
Total Number of Rolls		Processing Log ID #			Film Type(s)		

#	Description of Photo	Polar Filter (Y or N)	Tripod (Y or N)	Lens Used (if zoom, length set on)	Flash (yes/no & normal, bounce, or off camera)	Direction Facing	F-Stop	SS	Distance from subject
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

Figure 6.5 Example of a Photo Log.

Order of Taking Photographs

While this manner of documentation is listed near the beginning, obviously taking overall photos is much less intrusive to a crime scene than taking close-up photos (due to movement of items and the addition of scales of reference). It therefore is important that you realize that although these are listed together, not all ranges of photographs are taken together or at the same time during a scene investigation. After the initial scene survey has been conducted, but before a detailed search or examination is undertaken, the crime scene should be photographed. However, usually this only includes the overall photographs, but if items of evidence have been located, then mid-ranges can be taken from a safe position. Close-ups are not typically taken until a thorough search of the scene has been conducted, unless the item is of a transient nature.

As the reader can see, crime scene processing must be very methodical and follow specific guidelines.

Guidelines for Crime Scene Photography

The following strategies have proven useful in crime scene investigations.

- Always use a photo placard on the first shot of each roll to demonstrate administrative data (see Figure 6.1).
- Always use a crime scene photo log (see Figure 6.5).
- Document the entire scene in situ as soon as possible using overall photographs.
- Photograph all fragile evidence as soon as possible.
- In the documentation stage, photograph all known evidence using evidence establishing and evidence close-up photos.
- As items are discovered in later stages, return and document them fully, including additional overall photographs if needed.
- Create photographs that fully demonstrate the results of additional examinations (e.g., latent prints, bloodstain pattern analysis, trajectory analysis).
- Try not to include the photographer or other people in the photographs, if possible.
- Shoot all close-up photographs with the use of a tripod.
- Close-up photos should be taken with and without a scale of reference.
- Be sure that the scale is on the same plane as the item of evidence being photographed.

- The subject matter should be parallel to the film plane/camera to eliminate distortion caused by skewed angle photographs.
- If in doubt, photograph it!

Videography

As a result of digital media gaining widespread acceptance within U.S. Courts, in the last few years videography has become a routine method of documenting major crime scenes. While this is an obvious and useful method of providing visual documentation of the conditions and items encountered at the crime scene, it must be remembered that doing so is not a substitute for still photography. Each has its merit.

Video is taken to record the scene in as close to its original condition as possible, as this is an easy method to employ and is relatively quick in its application. Oftentimes, video is shot while conducting the initial walk-thru as a way of recording the layout and conditions of the scene. This documentation is useful to supervisors and investigative personnel in determining logistic and equipment needs as well as reducing official visitors by giving them the opportunity to look at the crime scene without actually entering into it themselves. It also enables investigative personnel to later “enter” the scene as often as necessary through viewing the video without the need for a search warrant. This is especially useful if the crime scene is no longer available to personnel.

Videography is a useful method for documenting a crime scene. It can provide a perspective that is more easily understood and perceived by the viewer than those offered by notes, sketches, or still photographs. However, it must be remembered that this is a supplemental method and not a replacement for still photography or other documentation methods.

Guidelines for Videotaping a Crime Scene

While some of these points are similar to those for photography, a few key points are important to remember when shooting a moving data stream.

- Begin with introductory placard that states case number, date, time, location, and other pertinent case and chain of custody information.
- This video should be a storytelling event. Start with a general view of the area surrounding the crime scene. Following this should be an overview of the crime scene itself. It is suggested to take overalls from the cardinal compass directions (North, South, East, West) for orientation purposes.

- Turn off the audio on the video recorder unless you intend to narrate.
- Do not move the camera too quickly by panning (moving side-to-side), or zooming (moving in for a close-up view) as this results in abrupt motion and bad focus.
- Unless in sunlight, always use a video strobe. Never use a flashlight to illuminate the scene.
- Do not use the zoom unless it is necessary because of an inability to get physically closer to the subject matter, or if it is unsafe to do so. The human eye cannot zoom. If the video is to be a fair and accurate representation of how the videographer observed the scene, no zoom should be used.
- Video never should be edited or altered in any manner following the initial taping. The original copy should be kept as evidence, and duplicate copies should be made for viewing purposes.

■ Documentation/Reports

There is an adage in police work that “if it’s not written down, it didn’t happen.” To a large extent, this is true. It is important that each step of the process and every action taken be documented extensively by using notes, photographs, sketches, and reports. The written notes begin with the first responder and continue throughout the investigative process. At each step, those individuals involved in the process are responsible for documenting all observations that they made, and all actions they performed. This includes documentation of efforts that resulted in negative findings as well. An example of a negative finding is a search for latent fingerprints that yielded nothing.

Each department typically has its own format and requirements for various levels of documentation within the investigative process. At the very basic level, written documentation consists of:

- Notification information
- Arrival information
- Scene description
- Victim description
- Crime scene team

Essentially there are two types of written documentation. The first are notes. *Notes* are brief, often in a bulletpoint format, documentation of efforts, observations, and actions. Notes are taken at the time of the incident and are informal. The second type of written documentation is a report.

Reports can be either fill-in-the-blank forms that are utilized to record pertinent information relating to a case or they can be of narratives. These are formal and are typically unique to a particular department and specific to a certain type of scene or case. Narrative reports are formally written, usually in the first person, active voice, and past tense. They document all actions taken by the report's author, and all observations he or she made.

■ 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 photographs 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 6.6) are developed while on-scene, typically during the crime scene assessment/preliminary scene evaluation phase to assist with

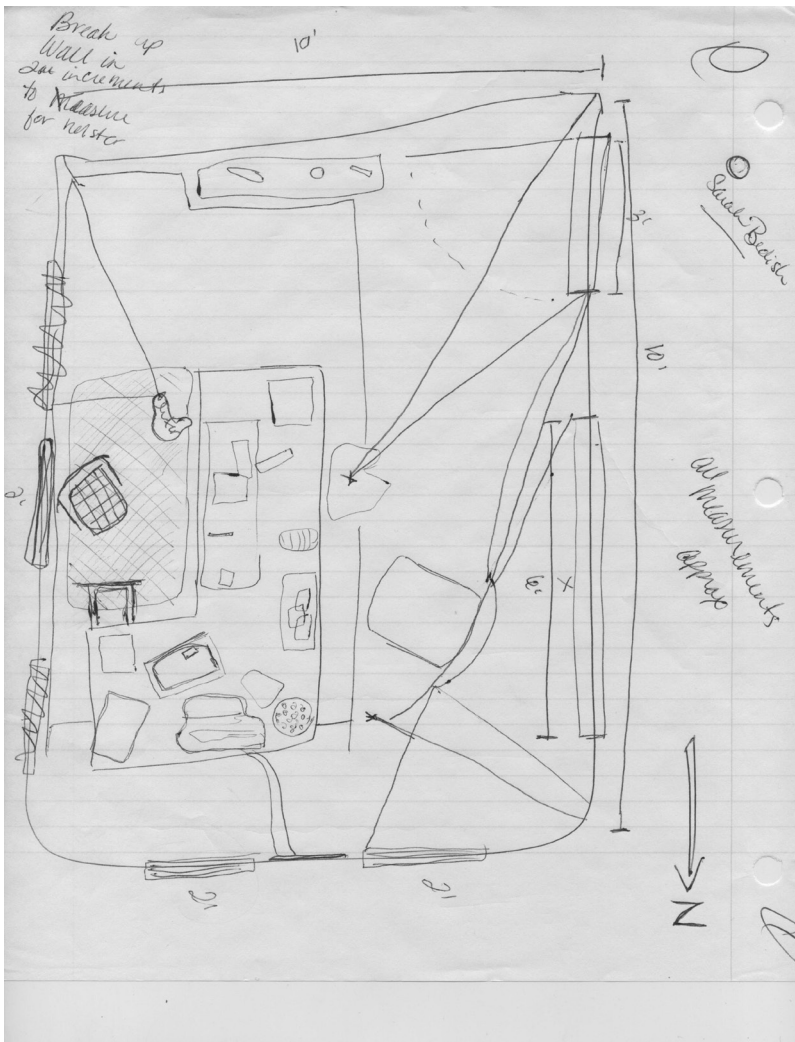


Figure 6.6 Example of a Rough Sketch.

Source: Courtesy of Sarah Bedish, University of Wisconsin–Platteville.

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, and distances between items.

A **final sketch** (Figures 6.7 and 6.8) is a finished rendition of the rough sketch. They are usually prepared for courtroom presentation

Four different crime scene perspectives can be represented within a sketch: (a) the bird's eye or overhead view (**Figure 6.9**), (b) the elevation or side view (**Figure 6.10**), and (c) the three-dimensional (3D) view (**Figure 6.11**). 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; **Figure 6.12**).

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

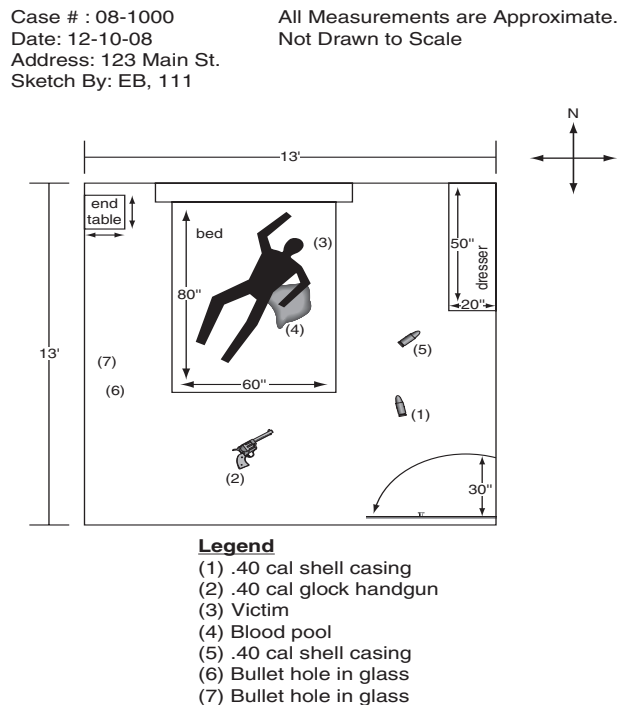


Figure 6.9 Example of an Overhead/Bird's Eye View Sketch.

Source: Courtesy of Ellie Bruchez, University of Wisconsin-Platteville.

West Wall
 Case # : 08-1000
 Date: 12-10-08
 Address: 123 Main St.
 Sketch By: EB, 111

Legend

- (A) Bullet hole in glass
- (B) Bullet hole in glass

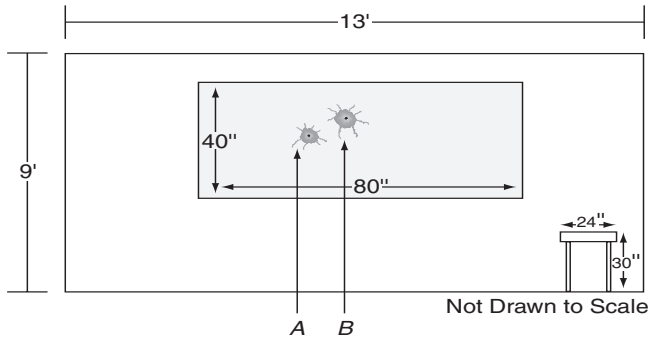
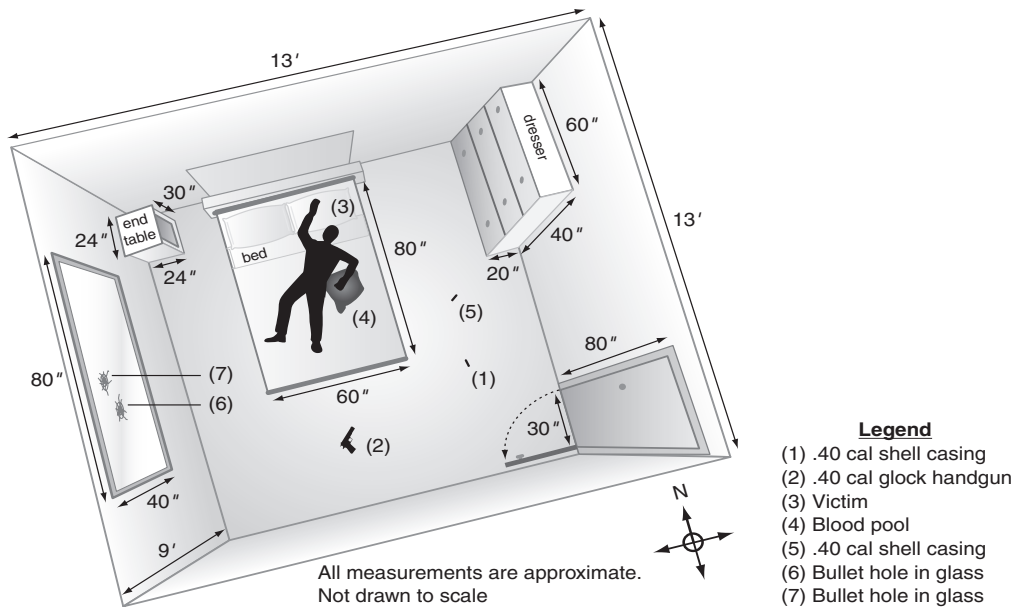


Figure 6.10 Example of an Elevation/Side View Sketch.

Source: Courtesy of Ellie Bruchez, University of Wisconsin-Platteville.



Legend

- (1) .40 cal shell casing
- (2) .40 cal glock handgun
- (3) Victim
- (4) Blood pool
- (5) .40 cal shell casing
- (6) Bullet hole in glass
- (7) Bullet hole in glass

Figure 6.11 Example of a Three-Dimensional Crime Scene Sketch.

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

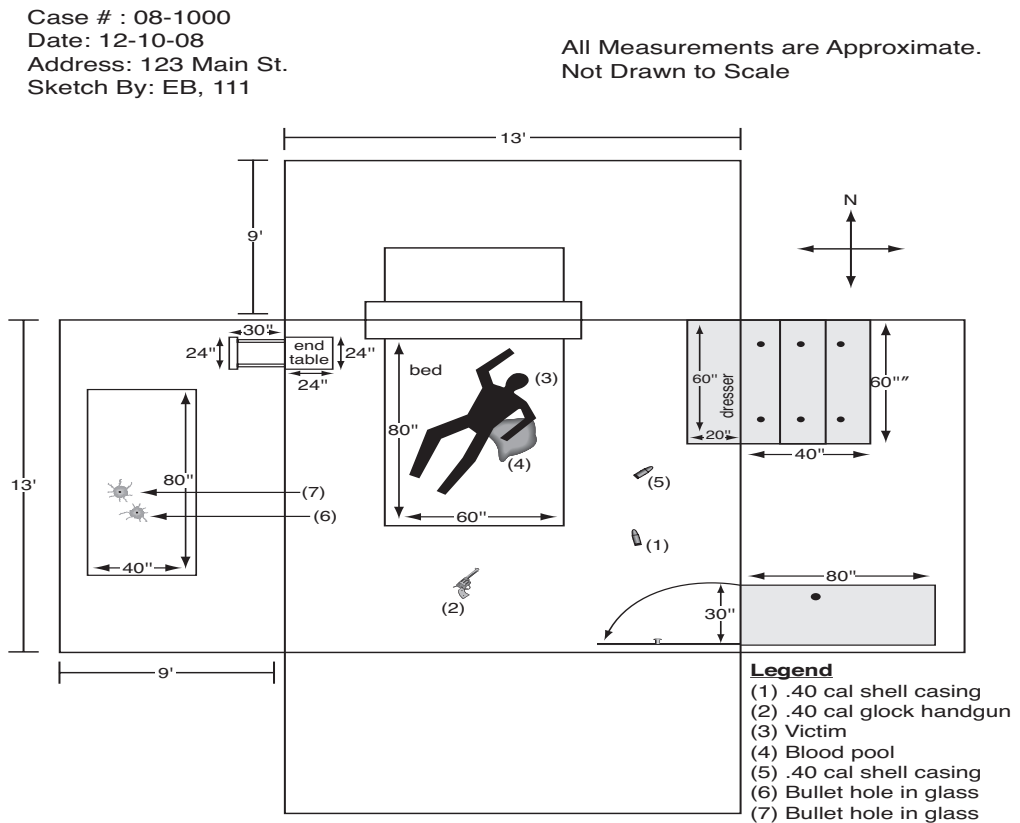


Figure 6.12 Example of an Exploded/Cross-Sectional Sketch.

Source: Courtesy of Ellie Bruchez, University of Wisconsin-Platteville.

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 (**Figure 6.13**). 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.

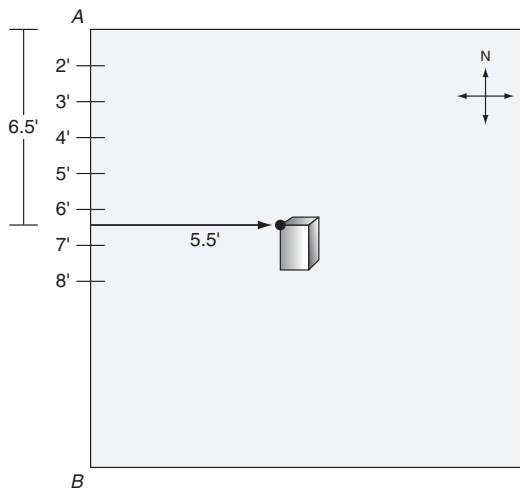


Figure 6.13 Example of a Baseline Map.

Source: Courtesy of Ellie Bruchez, University of Wisconsin–Platteville.

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 (**Figure 6.14**).

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, 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

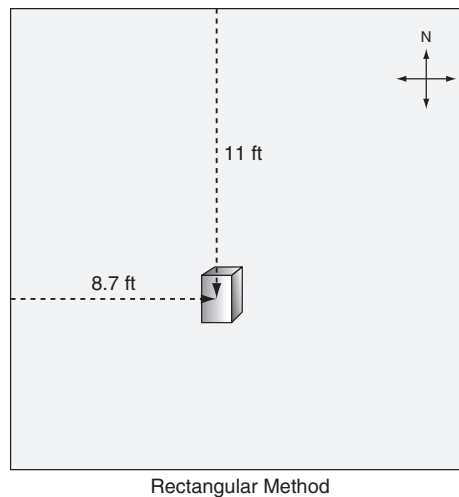


Figure 6.14 Example of a Rectangular Coordinate Map.

Source: Courtesy of Ellie Bruchez, University of Wisconsin–Platteville.

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 (**Figure 6.15**).

Polar/Grid Coordinate Mapping

Utilizing polar coordinates is the third 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; (**Figure 6.16**).

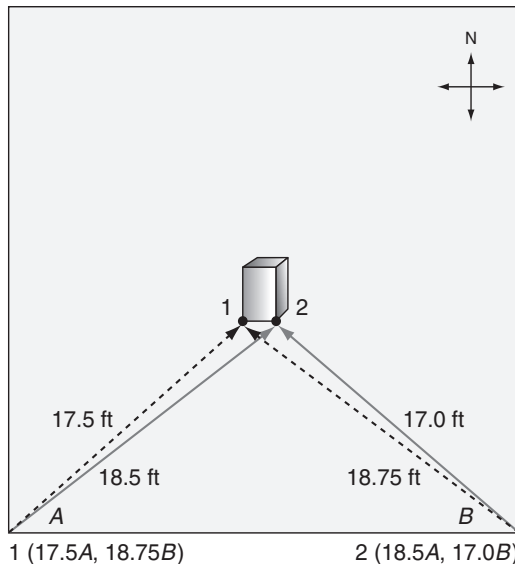


Figure 6.15 Example of a Triangulation Map.

Source: Courtesy of Ellie Bruchez, University of Wisconsin–Platteville.

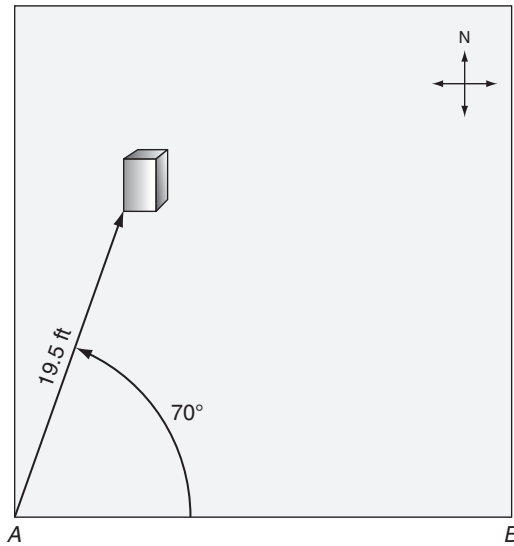


Figure 6.16 Example of a Polar/Grid Coordinate Map.

Source: Courtesy of Ellie Bruchez, University of Wisconsin–Platteville.

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 (Garmin, 2009). 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 (Garmin, 2009).

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.

■ Searching the Crime Scene

A variety of factors can affect a search method and these will determine the best, most accurate way to approach the scene.

Environment

Environmental conditions such as wind, rain, snow, heat, cold, etc., will have an impact on the method chosen due to how it affects the scene and the personnel involved.

Object Being Searched For

Obviously, a larger item will not entail the same level of searching detail as would a smaller item (e.g., a handgun versus a bullet).

Number of Available Personnel

Some search methods are designed to incorporate a greater number of searchers in order to be most effective. If such personnel are not available, a method that utilizes fewer personnel needs to be considered.

Terrain

Obstructions (trees, buildings), ground cover (asphalt, grass), and grade (steep, flat) will all impact the type of method employed, as they will have a bearing on the ability of searchers to perform the task, and the ability to properly locate the necessary items of evidence.

Exigency

In cases of lost children, search for a loaded handgun (public safety issue), and other events, often there is the need for exigency that trumps the more detailed search patterns that would be preferable. Therefore, a quick and efficient method should be chosen, making use of the maximum number of resources available in the quickest manner possible.

Swath Size

A **swath** is the effective area that a searcher can cover while conducting a search. Swath is affected by all of the aforementioned matters and is itself a consideration in the determination of a proper search method to employ. If looking for a firearm, a larger swath would be possible in a parking lot than in high grass for instance. Also, a search conducted at night or in low light would have an impacted swath due to the ability of a flashlight to illuminate the area of responsibility.

Types of Crime Scene Search Patterns

Depending on the aforementioned factors, a variety of crime scene search patterns exist that can be employed at a crime scene. Regardless of the search pattern chosen, the crime scene investigator must be sure that the search is conducted in a systematic and thorough manner. This will ensure that all evidence is properly located, documented, and collected.

Lane/Strip Search

This type of search pattern breaks the scene up into manageable lanes in which the searcher(s) proceed back and forth, in a slightly overlapping fashion. This is similar to mowing one's lawn. This method is typically conducted by only one person (**Figure 6.17**).

Line Search

This method is incorporated when there is a large number of personnel available, often volunteers. In this method, searchers assemble in a line

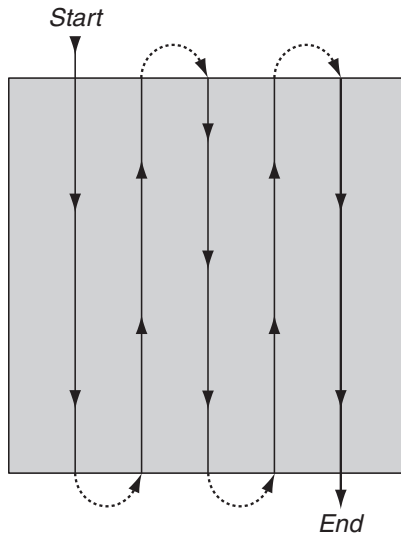


Figure 6.17 Example of a Lane/Strip Search.

Source: Courtesy of Ellie Bruchez, University of Wisconsin–Platteville.

that runs along a chosen edge of the crime scene. Searchers stand side by side and spread apart, incorporating a manageable swath distance between each person. A search coordinator should place her or himself in the middle of this line to make certain that everyone walks forward in as straight as possible a line. If one end begins to lag, then the other end is requested to slow up. At no point should anyone be encouraged to search faster! Keeping all searchers in a straight line reduces the possibility of missing an area and thus not discovering potential evidence. This method is the most commonly employed type during an exigent search for an item or person, especially when a large number of people are available (**Figure 6.18**).

Grid Search

This sometimes is referred to as a *double strip* or *double lane* method. In this method, a lane is searched in one direction, similar to the line search method. However, at the lane's terminate, a 90-degree direction change is made and another lane is searched. This can either occur through the use of two searchers (one responsible for one direction, and the other for the perpendicular direction), or else it can utilize a large number of searchers incorporating the line method as described earlier, and then turning 90-degrees and performing a second line search perpendicular to the original lane. While quite time-consuming, this method allows the same area to be searched two separate times,

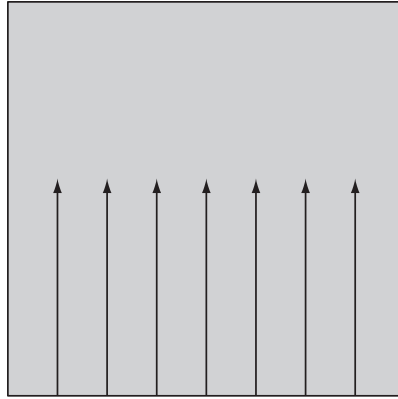


Figure 6.18 Example of a Line Search.

Source: Courtesy of Ellie Bruchez, University of Wisconsin–Platteville.

and at different angles. This redundancy will reduce searcher boredom, and will change the lighting and obstruction conditions present, thus increasing the ability of the searcher to locate evidence (**Figure 6.19**).

Zone Search

This method is typically utilized in an area that is already broken up into defined or manageable zones (e.g., a house or car). It is typically used indoors, but may be used outdoors if the areas are broken down into defined zones. Zones can be searched independently and later re-searched by different search personnel to ensure that no evidence has been overlooked. This method also can be used as a way to break up a larger crime scene, so the search coordinator then can choose from any of the search methods to cover a zone area (**Figure 6.20**).

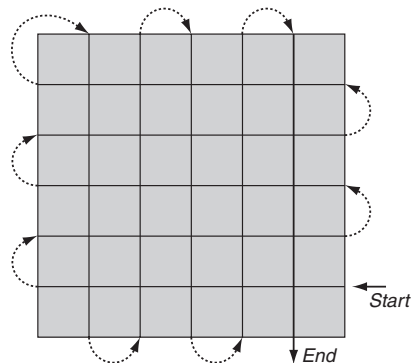


Figure 6.19 Example of a Grid Search.

Source: Courtesy of Ellie Bruchez, University of Wisconsin–Platteville.

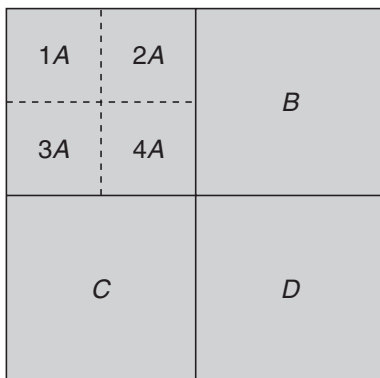


Figure 6.20 Example of a Zone/Quadrant Search.

Source: Courtesy of Ellie Bruchez, University of Wisconsin–Platteville.

Circle/Spiral Search

This is a very specialized search pattern method that is seldom utilized; however, it does have its usefulness and merit. In this method, searchers can either start at a defined outer boundary and circle or spiral in towards the defined critical point, or else they can begin at the critical point and circle or spiral outward towards the crime scene perimeter. Physical obstructions and barriers within the scene will present problems with this method. This method is typically employed in bomb or explosive scenes with a defined seat of explosion. It may be used in underwater or open water searches where there was a last known location for an item, vessel, or victim. If using a circling rather than a spiraling pattern, to ensure thoroughness, it is suggested that a central point and an effective swath width be determined. Once this is done, searchers should move out in concentric circles, often through the use of a lanyard affixed to a point at the center of the scene (especially true for underwater searches). The searcher proceeds to search in a 360-degree manner, around the central point, and once they reach the end of their circuit, they let out the lanyard a pre-determined amount, incorporating manageable swath width, and then proceed to conduct another 360-degree circuit of the scene. It is suggested that this new circuit be in the opposite direction of the previous circuit to both reduce the possibility of entanglement, and also to reduce the searcher's vertigo issues from walking in a continuous circle (**Figure 6.21**).

Important things to remember when conducting a search are:

- Do not touch, handle, or move evidence.
- Mark or designate found items without altering them.
- Found evidence must be documented before any evidence can be moved or collected.

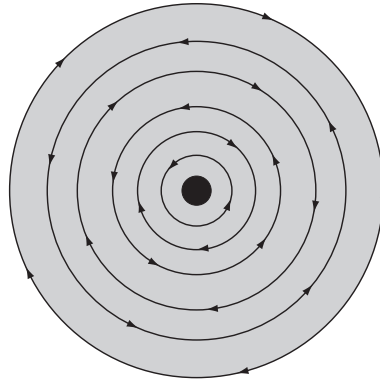


Figure 6.21 Example of a Circle/Spiral Search.

Source: Courtesy of Ellie Bruchez, University of Wisconsin–Platteville.

■ Collecting, Packaging, and Preserving Physical Evidence

After intensive crime scene search and documentation, collection and preservation of evidence should begin. The remainder of this text will be devoted to the different manners of collection and preservation specific to the type of evidence presented. At this point in the process, the following strategies should be done to ensure the most thorough and accurate investigation:

- One person should be designated as the evidence collector/custodian (this ensures that nothing is missed).
- Document, collect, package, mark, seal, and preserve.
- Transient, fragile, or easily lost evidence should be collected first.
- Paper is the preferred packaging.
- Package items separately.
- Containers should be properly marked.
- Containers should be properly sealed.
- Seals should be marked with initials and date/time.

■ Chapter Summary

Scientific crime scene investigation is the best methodology to ensure that an investigation is properly conducted and that justice is served. Use of this methodology will prevent the abrupt end of an incomplete investigation and allow for the best use of the physical evidence found at crime scenes. The general rule relating to crime scene documenta-

tion is “if it isn’t written down, it didn’t happen.” This is important to remember when conducting the various steps of crime scene documentation. It reminds the individual to be as thorough and precise as possible to correctly retain and be able to recall the events, items, and locations involved with a crime scene.

■ Review Questions

1. _____ is a note of explanation, outside of the sketch area, that helps to relate or give information on a specific item or area within a sketch.
2. _____ is a drawing or graphical representation that forms a permanent record of the size and distance relationship of the crime scene.
3. _____ is the term associated with crime scene measurements.
4. In order to ensure all photographs, information contained within them, and equipment that was used to capture them are properly documented, a CSI should make use of a _____.
5. What factors can affect the choice of search method at a crime scene?
6. What is the difference between a strip/lane search pattern and a line search pattern?
7. When conducting a search of a crime scene, _____ refers to the effective area that a searcher can cover.
8. Regardless of the search pattern chosen, the crime scene investigator must be sure that the search is conducted in a _____ and _____ manner.

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