10.18 Measuring

10.18.1 Purpose

Measurements are an important part of documenting most scenes. All measurements are approximate records of distance and location but will be as accurate as possible. This procedure provides general guidelines for the collection of measurements.

10.18.2 Equipment & Reagents

NIST traceable measuring tape
Metal measuring tape
Fiberglass measuring tape
Measuring wheel
Laser measuring device
Azimuth circle
Scales & rulers
Vehicle odometer

10.18.3 Procedure

10.18.3.1 For indoor scenes:

10.18.3.1.1 Individual dimensions should be made for involved rooms (rooms that contain evidence, subjects/victims/other, or any other pertinent items). This is usually done by beginning at one point in the room and taking measurements in an unbroken progression until returning to the original point (wall to window, left side of the widow to the right side of the window, window to door, etc.)

10.18.3.1.2 Overall dimensions should be made in uninvolved rooms (length & width).

10.18.3.2 At least two measurements shall be made on the same plane and to the center of the evidence. Multiple measurements may need to be made for irregularly shaped or larger evidence.

10.18.3.3 If the height of the evidence is not “0”, an additional measurement should be made of that location (z-axis).

10.18.3.4 Measuring Devices
The measurement device shall be chosen at the discretion of the VCRT member. The following are common measuring devices used at scenes processed by the VCRT:

10.18.3.4.1 Metal & Fiberglass Measuring Tape
The "0" end of the device is placed at a fixed point and extended to the evidence location(s) or vice versa.

10.18.3.4.2 Measuring Wheel
The odometer of the wheel is set to "0" and then rolled in a straight line the distance of the measurement needed. The measuring wheel should only be used for non-quality affecting measurements (e.g., the length of a sidewalk or house not being used as reference points, distance from one scene to another, etc.).

10.18.3.4.3 Azimuth Circle
The azimuth circle is placed in the center of the evidence location(s) and is then fixed to the ground with "0" pointed in the north direction, usually with metal stakes. The "0" end of a measuring device is placed in the center of the azimuth circle and extended to the evidence location(s).

10.18.3.4.4 Scales & Rulers
Scales and rulers may be placed in videos or photographs to document the size of items of evidence. These should be used in at least one close-up photo of each piece of evidence at a scene.

10.18.3.4.5 Laser Measuring Device
A hand-held laser measuring device (e.g., Hilti PD-42, Hilti PD-E, etc.) is placed at a fixed point and a measurement is made to the evidence location(s) or vice versa. The device(s) shall be checked at the beginning of use at each scene by following the procedure below:

10.18.3.4.5.1 A distance, usually 3'-15', shall be measured with the NIST traceable steel tape measure.

10.18.3.4.5.2 The same distance shall be measured with the hand-held laser measuring device(s) to be used.

10.18.3.4.5.3 Both of these measurements shall be recorded.

10.18.3.4.5.4 If the measurement of the hand-held laser measuring device being used is within 1/8” of the NIST traceable steel tape measure, then the accuracy of that device is confirmed (“pass”).

10.18.3.4.5.5 If the measurement is greater than 1/8”, this procedure shall be repeated and both measurements shall be recorded.

10.18.3.4.5.6 If the measurement is greater than 1/8” again, then the accuracy of the laser measuring device is not confirmed (“fail”) and that device shall be taken out of service until measurement accuracy can be confirmed or a repair or replacement can be made.

10.18.3.5 Methods of Collection

Measurements may be taken in the following ways based on the availability of fixed points and at VCRT members’ discretion.

10.18.3.5.1 Triangulation

Two reference points are defined within the scene. Measurements are then recorded from each reference point to the evidence location(s) as well as a third measurement between the two reference points.

10.18.3.5.2 Rectangular Coordinate

The location of evidence is defined by the distance to two reference points positioned at right angles to each other. Measurements are recorded from the evidence to the horizontal axis (x-axis) and the vertical axis (y-axis). For measurements with a height greater than “0”, this can be recorded as a z-axis.

10.18.3.5.3 Baseline

Two reference points are defined within the scene and connected with a tape measure (baseline). Measurements are then recorded from the evidence to the location on the tape measure (x-axis) and the perpendicular distance (y-axis). For measurements with a height greater than “0”, this can be recorded as a z-axis.

10.18.3.5.4 Azimuth Circle

A reference point is defined as the center of the azimuth circle and a reference direction to a north compass heading. Measurements are recorded from the center of the azimuth circle to the straight-line angle of the evidence location(s) (e.g., 87’, 122°).