OSAC 2023-N-0003
Standard for Diagramming Scenes

Crime Scene Investigation and Reconstruction Subcommittee
Scene Scientific Area Committee (SAC)
Organization of Scientific Area Committees (OSAC) for Forensic Science

OSAC Proposed Standard

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Prepared by
Crime Scene Investigation and Reconstruction Subcommittee
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Disclaimer:

This OSAC Proposed Standard was written by the Crime Scene Investigation and Reconstruction Subcommittee of the Organization of Scientific Area Committees (OSAC) for Forensic Science following a process that includes an open comment period. This Proposed Standard will be submitted to a standard developing organization and is subject to change.

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Version No.	Issue Date	Section	Reason
2.0	July, 2024	--	Added to the OSAC Registry and publicly announced.
2.1	May 22, 2025	7.2.4	Corrected text to replace a 3 with a 4 (See Figures 1-4 for manual measurement examples.)
		8.4	Removed text (See examples in figures 4-7.) from paragraph. Additional figures were not provided.

Foreword

This document delineates standards and recommendations for the diagramming of a scene and physical evidence during scene investigations. The approach outlined is recommended as good professional practice even though the facts and issues of each situation require specific considerations and may involve matters not expressly dealt with herein. Not every portion of this document may apply to every incident or investigation. It is up to the individual capturing the data to apply the appropriate recommended procedures in this guide to a particular incident or investigation. In addition, it is recognized that time, and resource limitations or existing policies may limit the degree to which the recommendations in this document will be applied in a given investigation. The responsibility of the individual preparing the diagram for evidence preservation and the scope of that responsibility varies based on such factors as the jurisdiction, the status of the individual as a public official and private sector investigator, indication of criminal conduct, and applicable laws and regulations.

This document should be utilized in conjunction with local regulations and any requirements set forth by entities examining collected evidence to inform or augment policies relating to collecting and preserving physical evidence.

This document has been drafted by the Crime Scene Investigation and Reconstruction Subcommittee of the Organization of Scientific Area Committees (OSAC) for Forensic Science through a consensus process.

This standard provides guidance on some safety issues but is not exhaustive. It is the responsibility of the appropriate agency to develop a full health and safety plan. All hyperlinks and web addresses shown in this document are current as of the publication date of this standard.

Keywords: *diagram; sketch; map; measurement; baseline; triangulation*

Table of Contents

Standard for Diagramming Scenes

1 Scope

This document includes minimum requirements for the diagramming of a scene and physical evidence. This document covers scene measurement and diagramming methods, as well as the translation of scene work to output. If compliance with this standard is claimed, justification for any deviation from this standard must be documented. Validation, verification, and calibration of measurement equipment and the calculation of measurement uncertainty is beyond the scope of this document.

2 Normative References

The following reference is indispensable for the application of the Standard. For dated references the latest edition of the referenced document (including any amendments) applies for undated references.

OSAC 2023-N-0002, *Standard for Scene Documentation Procedures*

3 Terms and Definitions

3.1
azimuth
A reference direction that is measured as a clockwise angle from the north. (Boots, 2010)

3.2
baseline (AKA rectangular coordinate method)
Method used to measure items of evidence when there are numerous objects in the scene. This is accomplished by laying a tape measure down so that it crosses the entire room or area to be measured. This first tape measure becomes the baseline for all other measurements in the scene. Measurements are then made perpendicular from this tape by laying another tape measure at a 90-degree angle to the first tape and measuring out to the evidence. (NFSTC, 2013)

3.3
diagram
Two-dimensional representations of features found at the scene that are derived from measurements or visual data collected by hand, electronically, or a combination of both.

3.4
polar coordinate
method appropriate for an outdoor scene in which only a single fixed or reference point is present. This method measures the distance and direction (angle) of an object from a known reference point. The angle can be measured with either a large protractor or an optical device such as a transit or a compass. The protractor technique with a 360-degree protractor is useful for underwater scenes. (NFSTC, 2013)

3.5
triangulation
Method that utilizes two fixed permanent objects within the scene. Measurements are taken from each fixed point to each piece of evidence. (NFSTC, 2013)

3.6
photogrammetry
The art, science, and technology of obtaining reliable information about physical objects and the environment through recording, measuring, and interpreting images and patterns of electromagnetic radiant energy and other phenomena. (ASPRS, 2014, 597)

3.7
terrestrial LiDAR scanning
A method for surveying tasks that acquires complex geometric data where each point is determined by the position (X, Y, Z) and the intensity (i) of the returning signal, also known as terrestrial laser scanning (RTI International, 2016). This method differs from a total station in its ability to automatically capture a large number of points in a predefined window. (FTCoE, 2022)

3.8
total station
A surveying instrument that uses a theodolite with an electronic distance meter to read slope distances from the instrument to a particular point. (RTI International, 2016)

3.9
mobile mapping
The collection of highly precise point cloud data provided by laser scanning systems on moving platforms with an integrated navigation solution. (Puente et al., 2013)

3.10
global navigation satellite system (GNSS)/global positioning system (GPS)

A general term describing any satellite constellation that provides positioning, navigation, and timing services on a global or regional basis. (GPS.GOV)

3.11
reference measurement standard
A measurement standard designated for the calibration or validation of other measurement standards for quantities of a given kind in a given organization or at a given location. (JCGM 200:2012; modified).

4 Significance and Use

4.1 Diagramming is intended to provide a graphic representation of the scene and evidence in such a fashion as to allow another individual (i.e., technical expert) to interpret the particulars of the incident.

4.2 Diagramming is suggested for documenting conditions and data of a scene and evidence that may change or be lost with further scene investigation.

4.3 OSAC 2023-N-0002, *Standard for Scene Documentation Procedures* shall be used in conjunction with this document because OSAC 2023-N-0002 provides the principles upon which additional specific requirements, such as this document, will be based.

5 Considerations

5.1 The diagramming and mapping may be prepared by any person(s) in a formal capacity. Persons investigating in a formal capacity include but may not be limited to international, federal, state, and local officials, employers, owners, insurance personnel, and other technical experts.

5.2 When multiple methods are available, the method that maximizes the accuracy and reduces error should be chosen. Considerations for method selection should be documented (i.e., environmental factors, equipment availability, personnel availability, investigative circumstances).

6 Documentation and Custody

6.1 The minimum requirements for documentation can be found in Standard for Scene Documentation Procedures.

6.2 All output/deliverables and supporting data shall be preserved according to agency evidence handling requirements.

7 Measurement Methods

7.1 General Considerations

7.1.1 Agency policy shall define the level to which measurements must be recorded (e.g., to the nearest ¼") to include the process of rounding.

7.1.2 The handling procedures for measuring devices can significantly affect the resulting value (e.g., sag in measuring tape, not perpendicular). Measurement methods shall specify the manner in which measuring devices are used to ensure measurements meet agency requirements.

7.2 Manual Methods

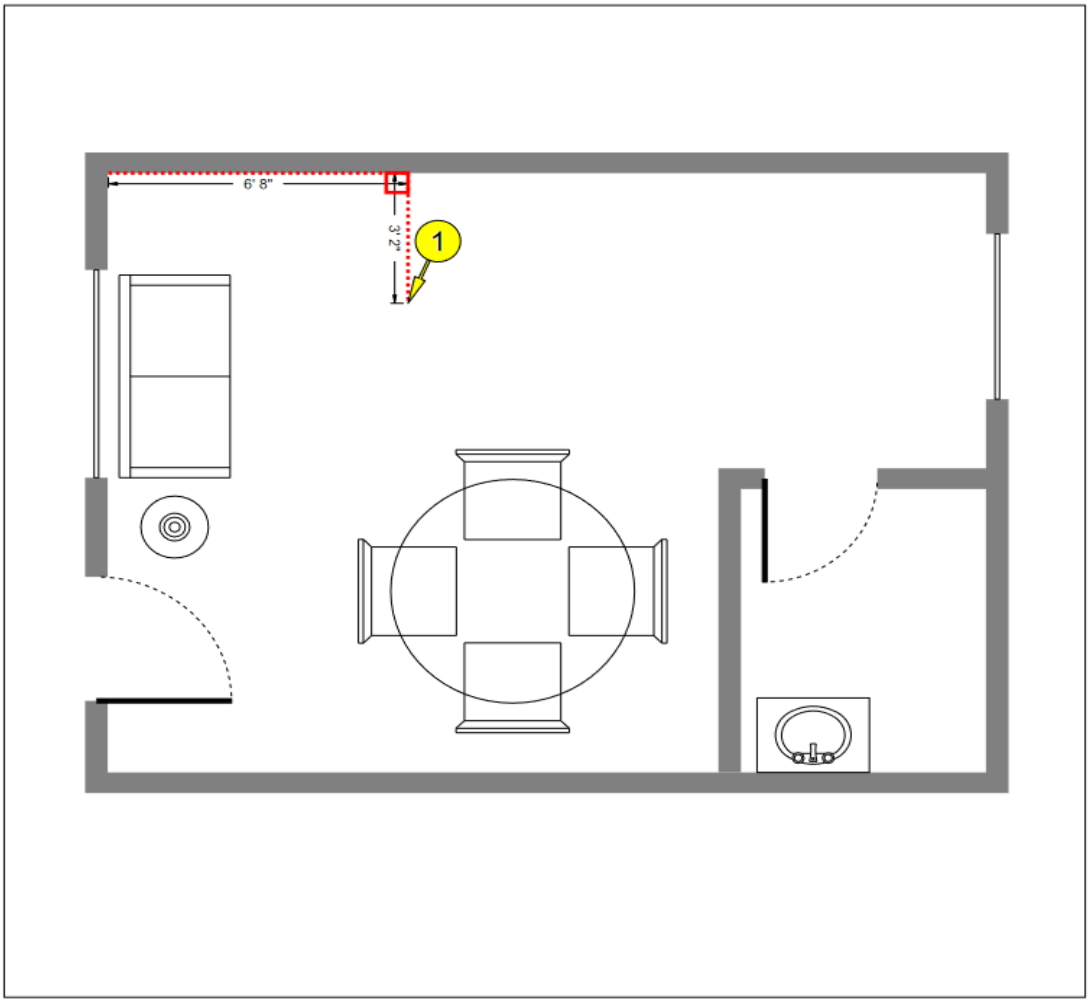
7.2.1 Manual distance measurements are measurements recorded by hand using tape measures (e.g., roll-a-wheels, laser handheld distance measuring devices).

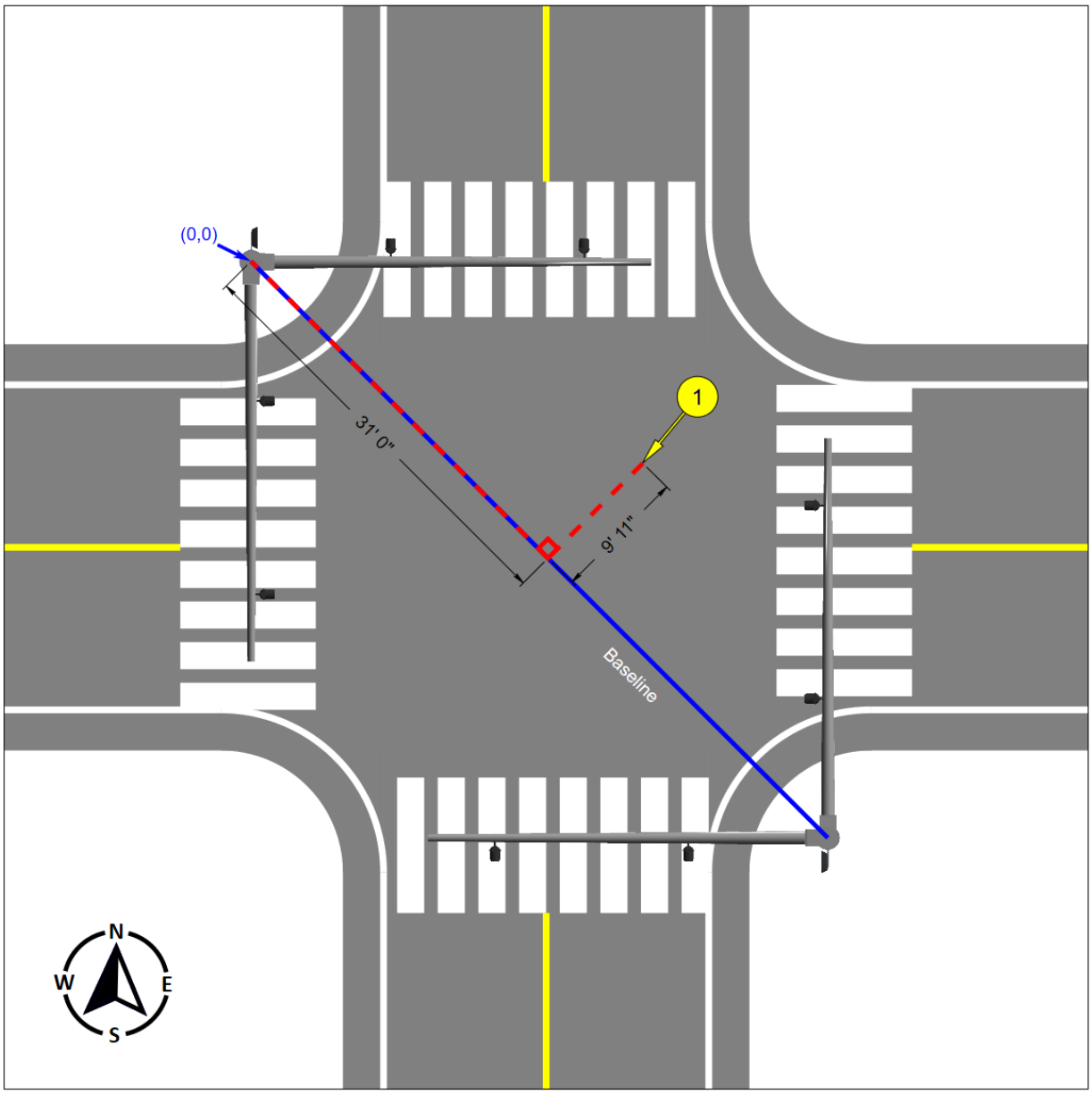
7.2.2 Manual angle measurements indicate the degree of angles and can be recorded with a measurement tool (e.g., transit, compass, azimuth wheel, inclinometer).

7.2.3 Measurement units can consist of metric or imperial units, but only one should be used for any single diagram.

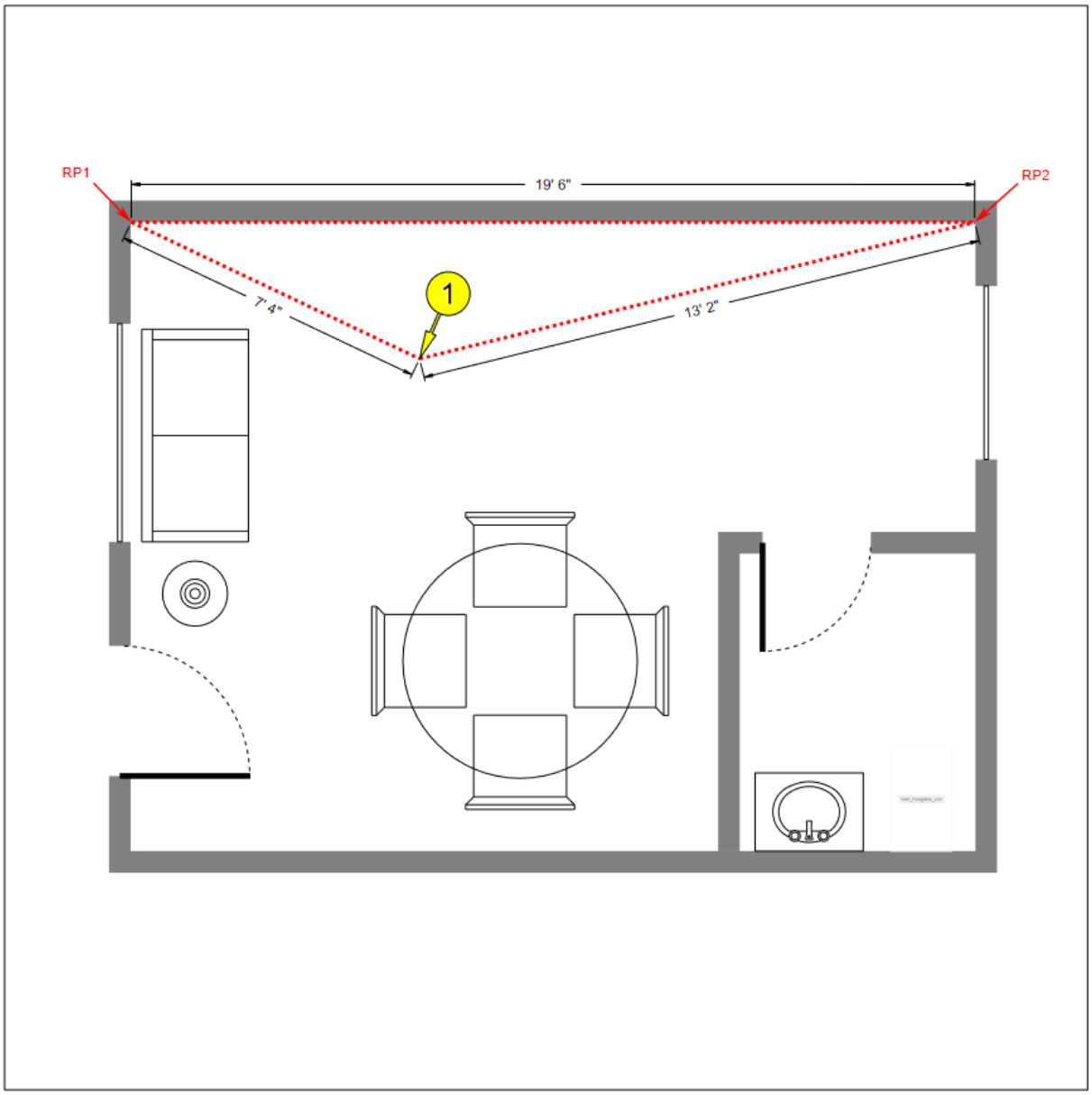
7.2.4 Manual measurements can be recorded using any number of available measurement methods. See Figures 1-4 for manual measurement examples.

7.2.4.1 Baseline

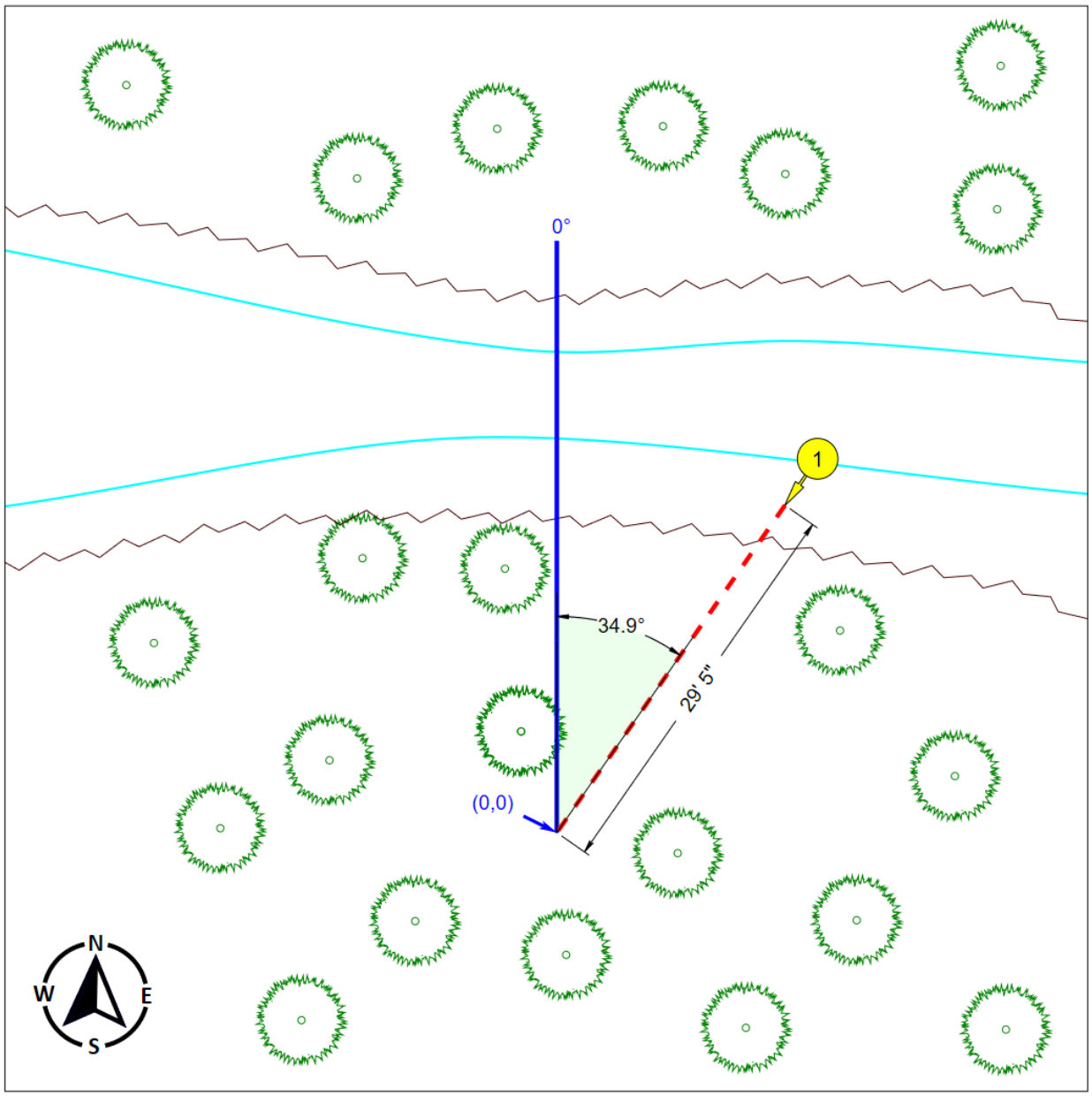



(0,0)
31' 0"
1
9' 11"
Baseline
N
W
E
S

7.2.4.2 Triangulation



7.2.4.3 Polar Coordinate



7.3 Electronic Methods

7.3.1 The following list includes but is not limited to available electronic diagramming methods. Specific information and requirements on the use of these methods are outside the scope of this document.

7.3.1.1 Terrestrial LiDAR Scanning

7.3.1.2 Mobile Mapping

7.3.1.3 Photogrammetry

7.3.1.3.1 Aerial

7.3.1.3.2 Terrestrial

7.3.1.3.3 Close-Range

7.3.1.4 Global Navigation Satellite System (GNSS)/Global Positioning System (GPS)

7.3.1.5 Total Station

7.3.1.6 Blended Methods

8 Output/Deliverables

8.1 Typically any of the above methods can be converted into any of these below types of deliverables. What output is created is likely to be driven by local protocols or policy.

8.2 Data may be processed through intermediate or proprietary software to reach the below output types. All data handling should adhere to local protocols for evidence handling and protection from data loss. The integrity of data procedures should be established.

8.3 For any output, the scene investigator shall, at a minimum, convey the following:

8.3.1 Measurement type (metric or standard)

8.3.2 Legend

8.3.3 Key

8.3.4 Orientation of the scene to indicate directions (e.g., include a direction arrow, compass rose, or written description of direction).

8.4 Diagrams can be presented in various perspective formats based on the investigator's needs. Diagram view options include bird’s eye/plan, elevation, exploded, and perspective.

8.5 Scale 2-D Diagrams

8.5.1 Computer Generated

8.5.2 Hand-Drawn

8.6 Computer-based output

8.6.1 2-D imagery or depictions of scenes

8.6.2 3-D imagery or depictions of scenes

8.6.3 Software-specific rendering of 2-D and 3-D environments

8.7 3-D Printed Materials

8.7.1 Physical printed items from 3-D printers

Annex A
(informative)

Bibliography

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