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Standard for Scene Diagramming



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Standard for Scene Diagramming

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Foreword

This standard establishes minimum requirements for the diagramming of scenes and physical evidence during scene investigations, including the application of both manual and electronic measurement and diagramming methodologies. It is intended to support accurate and consistent documentation and to provide structured guidance for the selection and application of diagramming approaches appropriate to scene conditions, evidentiary value, documentation needs, and intended use. Application of this standard involves professional judgment in the context of the specific investigation.

This standard addresses diagram views and view selection, essential diagram elements, symbology, annotations, the application of scale, measurement methodologies, and requirements related to diagram content, presentation, quality, and deliverables.

This standard is intended to be utilized in conjunction with applicable laws, local regulations, agency policies, and any requirements set forth by entities examining collected evidence to inform or augment policies relating to the documentation, collection, and preservation of physical evidence. This standard does not provide detailed procedures regarding the operation, validation, verification, or calibration of measurement instruments, as those topics fall outside the scope of this document.

The American Academy of Forensic Sciences established the Academy Standards Board (ASB) in 2015 with a vision of safeguarding Justice, Integrity and Fairness through Consensus Based American National Standards. To that end, the ASB develops consensus based forensic standards within a framework accredited by the American National Standards Institute (ANSI) and provides training to support those standards. ASB values integrity, scientific rigor, openness, due process, collaboration, excellence, diversity and inclusion. ASB is dedicated to developing and making freely accessible the highest quality documentary forensic science consensus Standards, Guidelines, Best Practices, and Technical Reports in a wide range of forensic science disciplines as a service to forensic practitioners and the legal system.

This document was revised, prepared, and finalized as a standard by the Crime Scene Investigation Consensus Body of the AAFS Standards Board. The draft of this standard was developed by the Crime Scene Investigation Subcommittee of the Organization of Scientific Area Committees (OSAC) for Forensic Science.

Questions, comments, and suggestions for the improvement of this document can be sent to AAFS-ASB Secretariat, asb@aaafs.org or 410 N 21st Street, Colorado Springs, CO 80904.

All hyperlinks and web addresses shown in this document are current as of the publication date of this standard.

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Keywords: *diagram; diagram views; measurement methods; scene documentation*

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Standard for Scene Diagramming

1 Scope

This document provides the minimum requirements for when scene diagramming is used, including manual and electronic measurement, and diagramming methods. Methods of validation, verification, and calibration of measurement equipment are not included in this document.

2 Normative References

The following normative reference is indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies. See Annex D, (informative) Bibliography, for other references.

ASB Standard 220, *Standard for Scene Documentation* (*not yet published, contact asb@aafs.org for a draft*)

ASTM International, E1188-11:2017, *Collection and Preservation of Information and Physical Items by a Technical Investigator*. In: Book of Standards Volume: 14.02. DOI: 10.1520/E1188-11R17

ASTM International, E620-18, *Standard Practice for Reporting Opinions of Scientific or Technical Experts*. In: Book of Standards Volume: 14.02. DOI: 10.1520/E0620-18

ASTM International, E678-07, *Standard Practice for Evaluation of Scientific or Technical Data*. Standard Withdrawn 2022.

3 Terms and Definitions

For purposes of this document, the following definitions apply.

3.1 accuracy (measurement)

The closeness of agreement between a measured value and the true value, accepted reference value, or known value of the quantity being measured (e.g., measurements are within $\pm\frac{1}{4}$ inch or ± 5 mm of the true value).

NOTE Accuracy concerns closeness to a target value, not consistency across repeated measurements.

3.2 azimuth

A reference direction that is measured as a clockwise angle from true or magnetic north. [Boots, 2010; modified]

3.3 baseline

A measurement method in which a straight reference line (the baseline) is established from designated reference point (RP). All items of interest are documented by recording the distance along the baseline from the RP, and a perpendicular (90-degree) measurement from the baseline to the item. (see Figures C.1 and C.1.2).

3.4**detail view**

A diagram of an object or area within a larger scene drawing, used to provide additional detail of that object or area, while indicating its location within the overall scene. See Figure A.1.

3.5**diagram**

A two-dimensional depiction of a scene including its components, derived from physical measurements or visual data recorded manually, electronically, or through a combination of both, that communicates spatial relationships and may exist in rough or final form.

NOTE The use of other terms such as drawing, final diagram, rough diagram, and sketch are used in different ways depending on forensic service provider (FSP) policy and may be used interchangeably with the term diagram. See 3.7 **final diagram** and 3.19 **rough diagram**.

3.6**elevation view**

A two-dimensional, orthographic, vertical representation of the scene that depicts spatial relationships of relevant features along a vertical plane. See Figure A.2.

3.7**exploded view**

A two-dimensional representation that combines orthographic views (plan, elevation, etc.) to be represented in a single drawing by folding the walls outward, enabling items located on walls and ceilings (e.g., bullet holes, bloodstains, windows) to be shown in relation to items on the floor while preserving their spatial relationships. See Figure A.3.

3.8**final diagram**

A completed, verified representation of a scene and its components, prepared in a form suitable for evidentiary, analytical, or official use, and optimized for clarity, accuracy, and independent interpretation.

NOTE Typically, final diagrams are computer generated.

3.9**Global Navigation Satellite System****GNSS**

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

3.10**Global Positioning System****GPS**

A U.S.-owned utility that provides users with positioning, navigation, and timing (PNT) services. [GPS.GOV]

3.11**mobile mapping**

The process of recording highly accurate point cloud data using a laser scanning system mounted on a moving platform which integrates navigation solutions to document extensive or complex

79 areas.

80 [Puente et al., 2013; modified]

81 **3.12**

82 **orthographic projection**

83 A two-dimensional representation of a three-dimensional object as viewed perpendicularly from
84 one side—such as a plan or elevation—without perspective distortion.

85 **3.13**

86 **photogrammetry**

87 The art, science, and technology of obtaining reliable information about physical objects and the
88 environment through recording, measuring, and interpreting images and patterns of
89 electromagnetic radiant energy and other phenomena.
90 [ASPRS, 2014, 597]

91 **3.14**

92 **perspective view**

93 A three-dimensional representation of a scene or object that visually conveys spatial relationships
94 and depth as observed from a defined vantage point. The depiction illustrates objects and
95 structures with converging lines and scale variation consistent with how they would appear to the
96 human eye. See Figure A.4.

97 **3.15**

98 **plan view**

99 A two-dimensional, orthographic, top-down representation of a scene that conveys the spatial
100 relationships of features along the horizontal plane. See Figure A.5

101 **3.16**

102 **polar coordinate**

103 A measurement method in which a single fixed reference line and reference point is established.
104 Each item of interest is located by recording the straight-line distance from the reference point to
105 the item and the direction to the item, which is expressed as an angle measured from a designated
106 reference line. See Figure C.2.

107 **3.17**

108 **precision (measurement)**

109 Closeness of agreement among repeated measurements of the same feature or dimension, made
110 with the same measuring instrument under the same or similar conditions.

111 NOTE 1 Precision does not require the measurements to be correct, only consistent.

112 NOTE 2 Measurement precision may be expressed, for example, as measurements being within ¼ inch or 0.5
113 cm of each other.

114 **3.18**

115 **rectangular coordinate**

116 A measurement method in which two fixed reference lines are established at a 90-degree angle to
117 one another, thereby defining X and Y axes. All items of interest are then located by recording the
118 perpendicular distance from the first reference line (X axis) and the perpendicular distance from
119 the second reference line (Y axis). See Figure C.3.

3.19**reference point****RP**

A fixed, identifiable location (e.g., RP1, RP2) used to anchor measurements and establish positional reference within a diagram.

3.20**rough diagram**

A diagramming format utilized to convey an initial representation of a scene and its components, created contemporaneous to recording measurements, locations, and relationships necessary to support later refinement and production of a final diagram, if one is completed.

NOTE Typically, rough diagrams are hand-drawn in the field and do not have a finished appearance.

3.21**scale**

The proportional relationship between a measurement on a diagram and the corresponding actual measurement.

NOTE A scale may be shown using a ratio (e.g., 1:50), verbal statement (e.g., 1" = 2'), or scale indicator.

3.22**scale indicator**

A graphic element included in diagrams, typically a labeled line or bar, that indicates scale and allows printed or digitally exported diagrams to remain measurable regardless of reproduction size.

3.23**terrestrial LiDAR scanner****TLS**

An instrument used for 3D mapping tasks that acquires complex geometric data from a static position, typically mounted on a tripod, where each point is determined by the position (x, y, z) and the intensity (i) of the returning signal. (RTI International, 2016; modified)

NOTE This is also referred to as "terrestrial laser scanner."

3.24**total station**

A surveying instrument that integrates a theodolite (instrument used to measure both horizontal and vertical angles) with an electronic distance meter to read slope distances from the instrument to a particular point.

[RTI International, 2016; modified]

3.25**triangulation**

A measurement method in which two fixed reference points are established within the scene. Each item of interest is located by recording the straight-line distance from each reference point to the item, as well as the distance between the two reference points. See Figure C.4.

4 Requirements

4.1 General Principles

4.1.1 Diagrams shall serve as graphic representations of the spatial configuration of physical environments and associated evidence relationships, enabling independent interpretation by qualified practitioners.

4.1.2 When an individual is responsible for preparing a diagram, the applicable requirements of this standard shall be applied.

4.1.3 When implemented, diagrams shall be used to document spatial information and contextual relationships that may otherwise degrade, change, or be lost through subsequent scene activity or the passage of time.

4.1.4 Diagramming methods and approaches shall be selected and applied to promote accuracy and clarity while minimizing the risk of measurement or documentation inaccuracies.

4.2 Diagram Views and Selection

The decision to prepare a diagram, and the views selected, shall be based on the needs and scope of the investigation, forensic service provider (FSP) policy, and the needs and scope of the investigation or reconstruction.

NOTE Refer to Appendices A and B for examples and guidance on view selection.

4.3 Diagramming Scale, Content, Presentation, and Quality Requirements

4.3.1 Except where a scaled diagram is required by this standard, diagrams may be drawn to scale or not to scale, using manual, computer-generated, or hybrid methods.

4.3.2 Hand-drawn diagrams should be created using permanent ink except when conditions exist which may alter or destroy the legibility of the diagram (e.g., rain causing ink to run).

4.3.2.1 Any non-permanent drawing medium shall be made permanent per FSP policy once conditions become suitable and stable (i.e., making a photocopy to create permanence).

4.3.3 When the accuracy of proportional geometry is evidentiary, analytical, or used to interpret spatial relationships visually rather than from written measurements, a diagram shall be drawn to scale, or measurements recorded such that a scaled diagram can be created.

4.3.4 Diagrams having dimensional measurements shall include those measurements necessary to independently reconstruct key spatial relationships while maintaining clarity and legibility.

4.3.4.1 When clarity or legibility cannot be maintained, additional diagrams should be used (e.g., adding a separate bloodstain pattern diagram when inclusion of blood stains would obscure a plan view diagram).

4.3.5 Evidence identifiers used within diagrams shall be unique for each item of interest, consistent across all views and with associated case records or notes.

4.3.6 If layering, or an equivalent method of grouping elements is used, it shall be organized by scene components (e.g., architecture, furnishings, evidence, measurements, annotations) in a logical manner, allowing base architecture, furnishings, evidence markers, measurements, and labels to be selectively displayed or exported.

4.3.7 All diagrams shall be checked to verify the presence and accuracy of all required elements, cross-view consistency, and overall legibility prior to finalization.

4.3.8 When multiple views are presented on a single sheet, they shall be arranged logically to support cross-reference and interpretation.

4.3.8.1 Related views should be aligned and share a consistent orientation unless physical or layout constraints prevent doing so.

4.3.9 For scaled diagrams, the selected scale shall be appropriate for the smallest features requiring accurate depiction while maintaining readability.

4.3.9.1 Each scaled view shall include a corresponding scale indicator or explicit scale notation.

4.3.9.2 Each scale shall remain consistent within that view.

4.3.9.3 Where multiple scaled views, insets, or detail representations appear in a single diagram, each shall identify its own scale (e.g., a plan view of a room at 1:50 with a detail inset of a bloodstain pattern at 1:10, each labeled with its applicable scale).

4.3.9.4 Only one unit system (i.e., metric or U.S. customary) shall be used within a diagram.

4.3.9.5 When printed or exported, the diagram shall be checked to verify that each scale indicator reflects the intended scale within acceptable tolerances established by FSP policy.

4.3.10 For non-scaled final diagrams, when practical, the relative size and spacing of physical features of the scene shall be represented in realistic proportion so the diagram is not visually misleading.

4.3.10.1 Whenever not practical (e.g., space constraints, legibility, etc.) the final diagram should include additional views sufficient to convey those relationships.

4.3.10.2 For non-scaled diagrams, a clear notation of “Not to Scale” shall be included on the diagram.

4.3.11 Rough diagrams shall be optimized for clarity and meet the following quality and content criteria:

a) legible text, symbols, dimensions, if recorded, and line work;

b) a legend or key used to identify and explain symbols, line styles, and abbreviations;

- c) an orientation indicator, such as a north arrow or compass rose, used to indicate diagram orientation;
 - d) case identifier or other unique identifier, preparer's name, agency, date, and page number or total pages, as applicable;
 - e) location;
 - f) datum, if relevant, used for reference; and
 - g) when applicable, baseline endpoints, reference points (RPs), instrument positions (IPs), control or backsight points, or any other measurement anchors used to the extent that they are necessary to support independent interpretation or reconstruction.
- 4.3.12** Final diagrams shall be optimized for clarity, meet all rough diagram requirements, and the following additional quality and content criteria:
- legible text, symbols, and line work at the intended print or export scale without the need for magnification;
 - minimum text height and line weights that ensure readability at the designated output size;
 - visual elements such as bounding structures (e.g., walls), architectural features (e.g., windows and doors), furniture and fixtures, items of interest, measurement dimensions, and text or annotations that are distinguishable from one another through the use of different line types, weights, or styles; and
 - supplementary measurements, if included, in additional views or on separate layers or copies.

5 Measurement Methodologies

5.1 General Measurement Considerations

5.1.1 FSP policy shall define the required measurement precision of tools used for measuring, the required measurement accuracy, and for allowable rounding protocols.

5.1.2 If measurements are required, they shall be recorded in accordance with established accuracy and precision requirements and with sufficient detail to document the spatial relationships relevant to the investigation.

5.2 Manual Measurement Tools and Methods

5.2.1 Manual measurements shall be recorded using tools such as tape measures, roll-a-wheels, or handheld laser distance meters.

NOTE Angular measurements may be obtained using instruments such as compasses, transits, azimuth wheels, or inclinometers. The minimum accuracy of each tool depends upon its application and intended use.

5.2.2 The final product shall meet the minimum admissibility requirements of a fair and accurate scene representation

5.2.3 Diagrams may incorporate any of the following manual measurement methods:

- a) baseline;
- b) polar coordinate;
- c) rectangular coordinate;
- d) triangulation.

Refer to Figures C1 through C4 of Appendix C for examples illustrating how established measurement methods are incorporated into diagrams.

5.3 Advanced Measurement Technologies and Methods

Advanced electronic measurement technologies and associated methods may include the following:

- a) terrestrial LiDAR scanning;
- b) mobile mapping;
- c) photogrammetry:
 - 1) aerial,
 - 2) close-range, and
 - 3) terrestrial;
- g) Global Navigation Satellite System (GNSS)/Global Positioning System (GPS); or
- h) total station.

6 Output and Deliverables

6.1 All output and deliverables derived from diagramming shall be handled in accordance with established evidence handling procedures to ensure data integrity and prevent loss, including procedures consistent with ASTM E1188-11:2017, ASTM E620-18, ASTM E678-07, and ASB Standard 220 (*not yet published*).

6.2 Data may be processed using intermediate or proprietary software to reach the selected output types.

6.3 Permissible deliverable formats include:

- a) two-dimensional imagery or representations;
- b) three-dimensional renderings or digital models; and
- c) physical 3D printed materials produced from recorded spatial data.

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Annex A **(informative)**

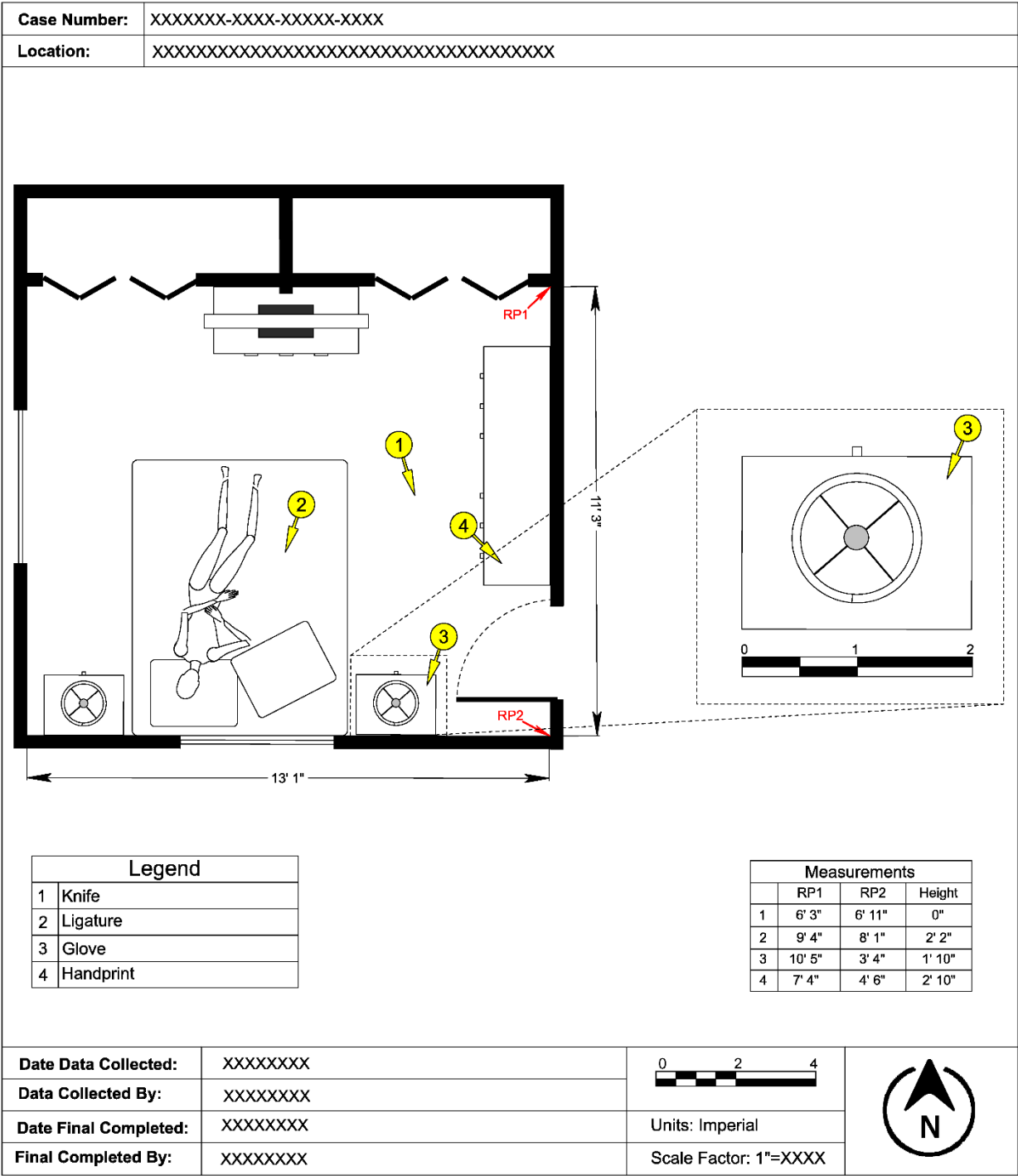
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Diagram View Types

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NOTE The diagrams presented in this Annex are used as examples of the view type only, and not as an example of all elements required in the production of a diagram.

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Figure A.1—Detail view

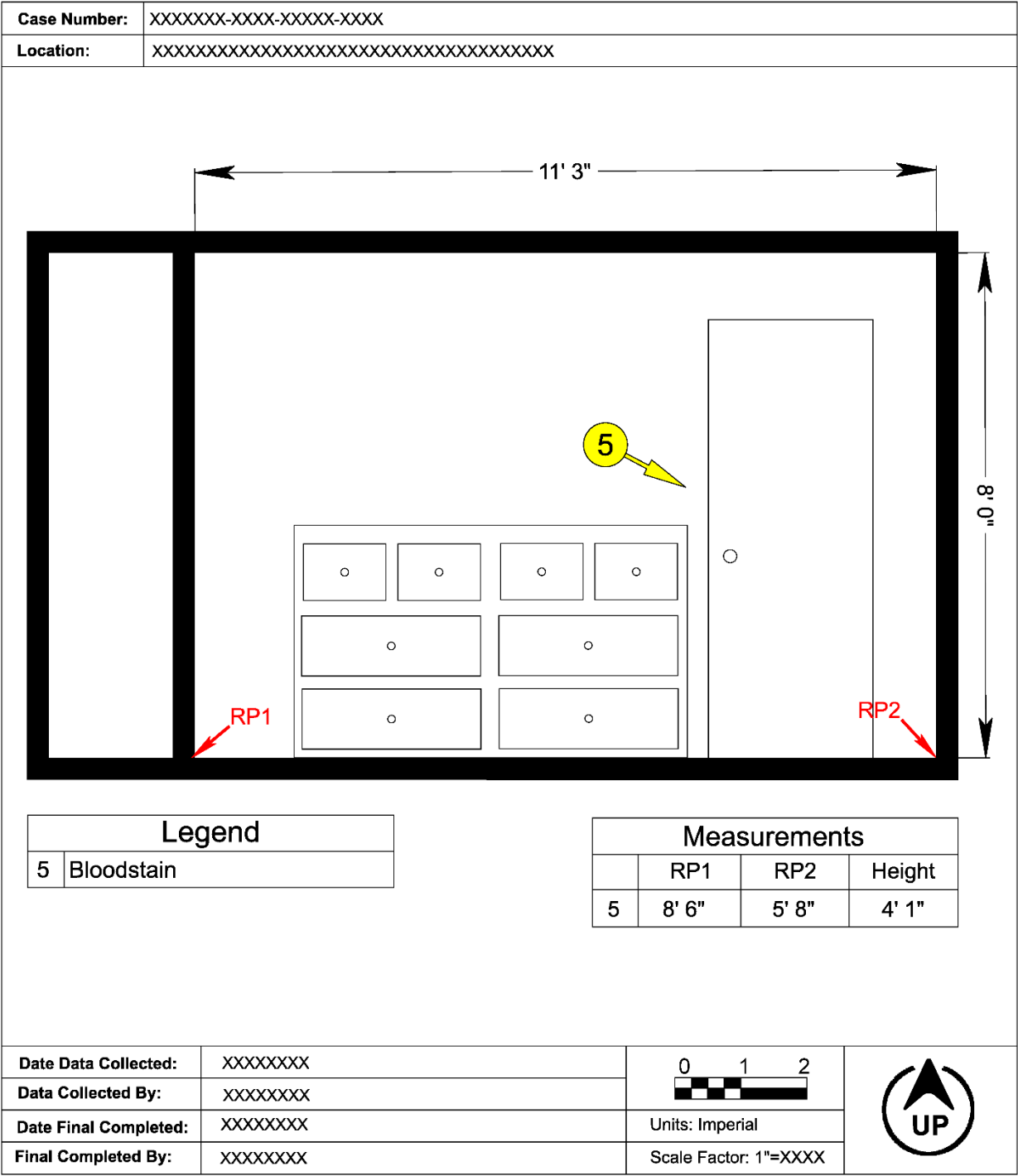
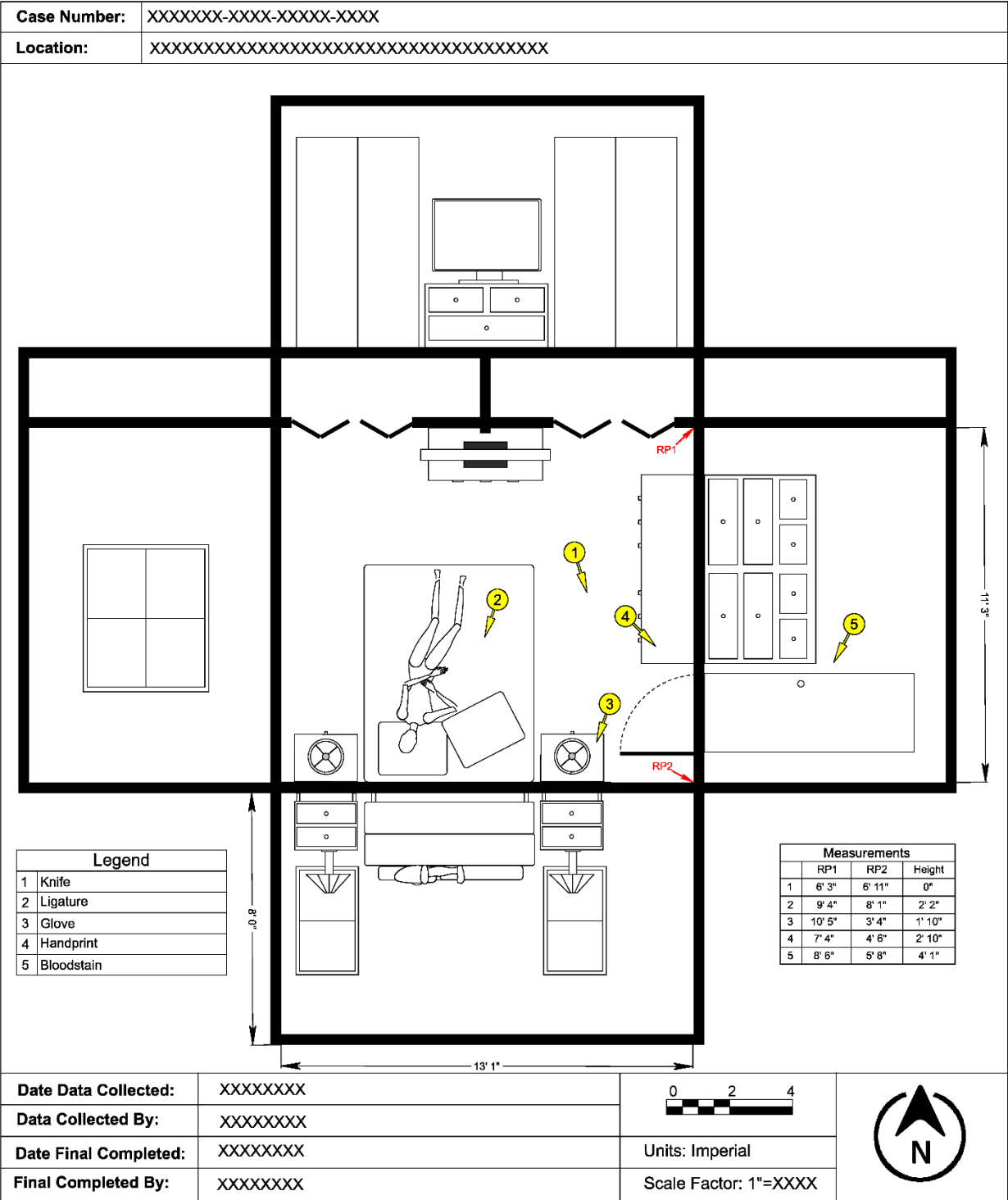


Figure A.2 — Elevation view



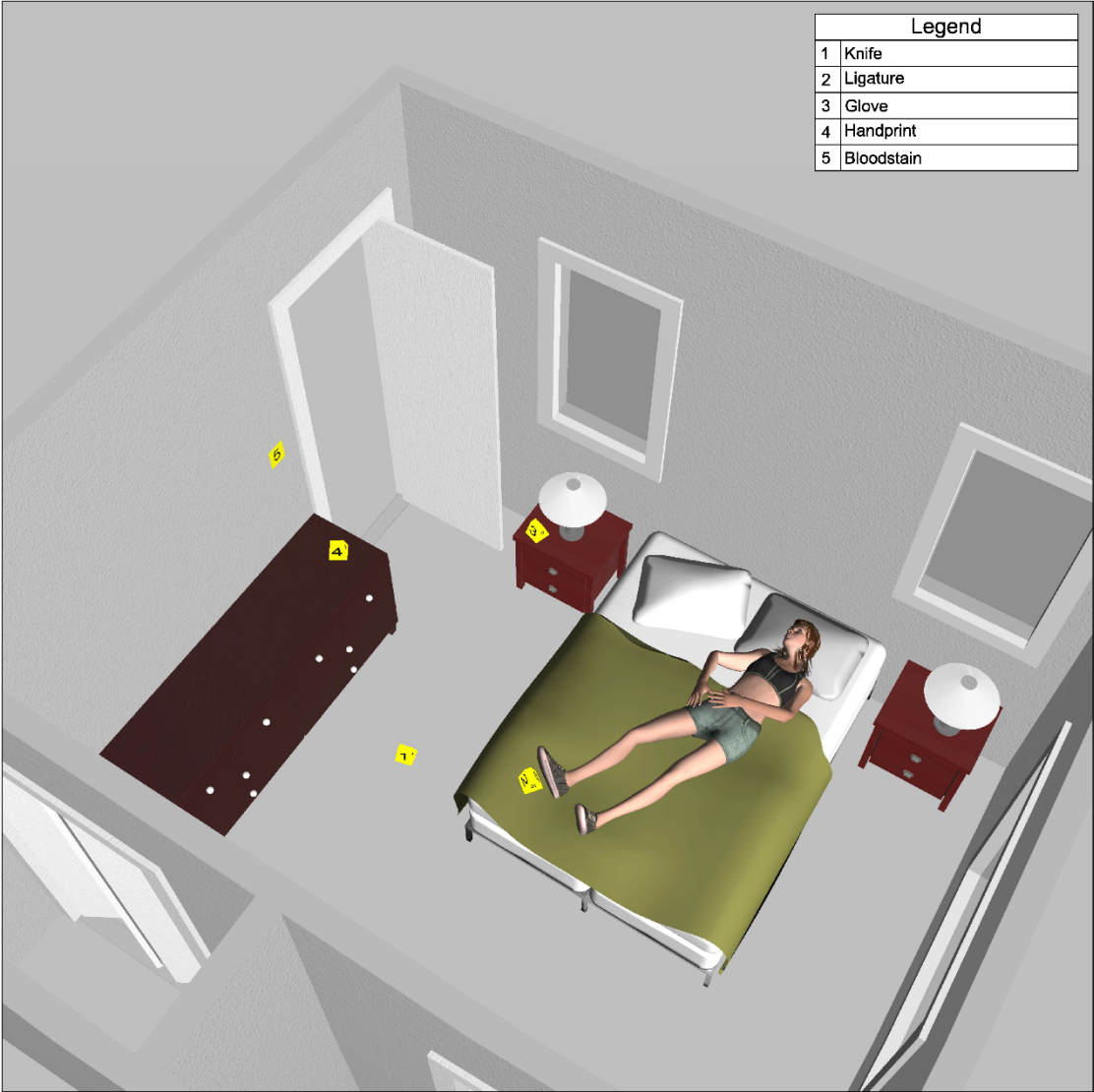
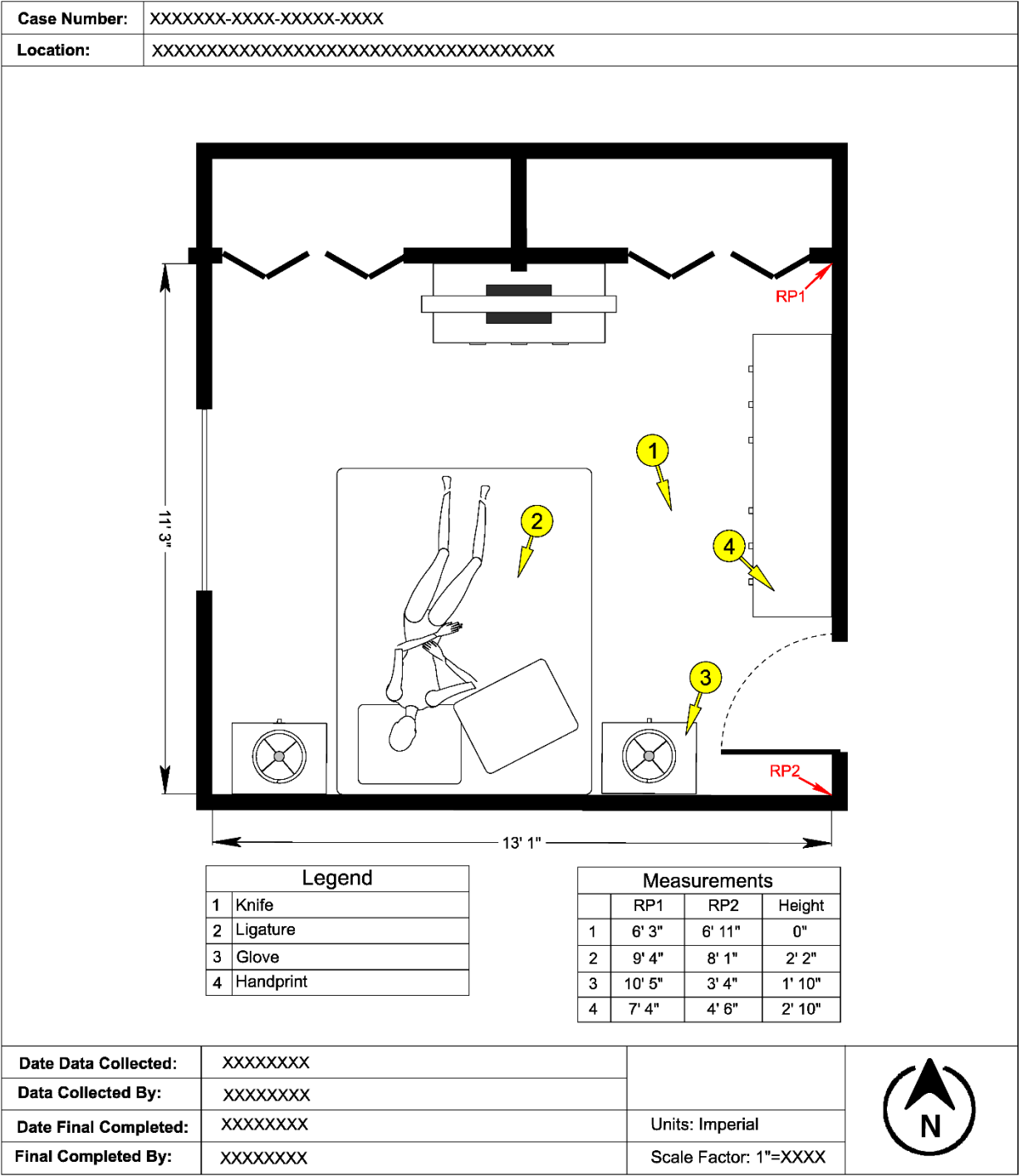
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Location:	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX														
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Legend															
1	Knife														
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4	Handprint														
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Final Completed By:	XXXXXXXX														

Figure A.4 —Perspective view

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Annex B (Normative)

Diagram View Decision Matrix

B.1 Diagram views are determined by the specific characteristics of the scene and the spatial relationships being conveyed. The following matrix provides guidance for selecting the appropriate view type.

B.1.1 Matrix

Scene Condition / Type	Effective View(s)	Reasoning	Additional View(s)
General overview or layout of a scene	Plan view	Provides a comprehensive depiction of spatial relationships in a horizontal plane; establishes overall orientation.	Elevation or exploded views for context.
Evidence or patterns on vertical surfaces (e.g., bloodstain patterns, bullet holes, impact marks), aquatic or shoreline	Elevation view	Depicts heights, slopes, and vertical relationships not visible in a plan view.	Perspective view to show placement in broader context.
Small, detailed areas or items requiring enlargement (e.g., footwear impressions, weapons)	Detail view	Enables enlarged depiction of small objects without overcrowding the main diagram.	Plan view for spatial context.
Obstructed or complex interior scenes (e.g., furnishings, stairwells, ceilings)	Exploded view	Separates layers or levels while maintaining spatial relationships between them.	Plan and elevation views for orientation.
Large or complex outdoor scenes	Plan view	Provides broad coverage of expansive areas; can combine multiple aligned plans for continuity.	Detail or perspective views for critical areas.
Vehicles	Elevation or exploded views	Allows depiction of multiple sides or compartments.	Plan, detail, or perspective views for context and clarity.
Confined spaces or small indoor scenes	Plan	Accurately represent tight spatial relationships and limited clearances.	Detail, elevation, or perspective views as needed.
Scenes requiring demonstration of perspective or relative scale for context	Perspective view	Provides spatial realism to aid comprehension; conveys relative distances and depth.	Plan or elevation views to preserve spatial accuracy.
Multiple connected rooms or structures	Plan view	Combines adjacent areas into a unified diagram for continuous spatial representation.	Perspective. Elevation or exploded views as needed for specific walls or features.

B.2 Additional drawing types (plan, elevation, detail) shall be incorporated as needed to address complex environments such as long corridors, outdoor expanses, or multi-room/multi-story scenes.

311 **Annex C**
312 **(informative)**

313 **Manual Measurement Methods**

314 NOTE The diagrams presented in this Annex are used as examples of how measurements may be
315 incorporated onto diagrams, and not as an example of all elements required in the production of a diagram.

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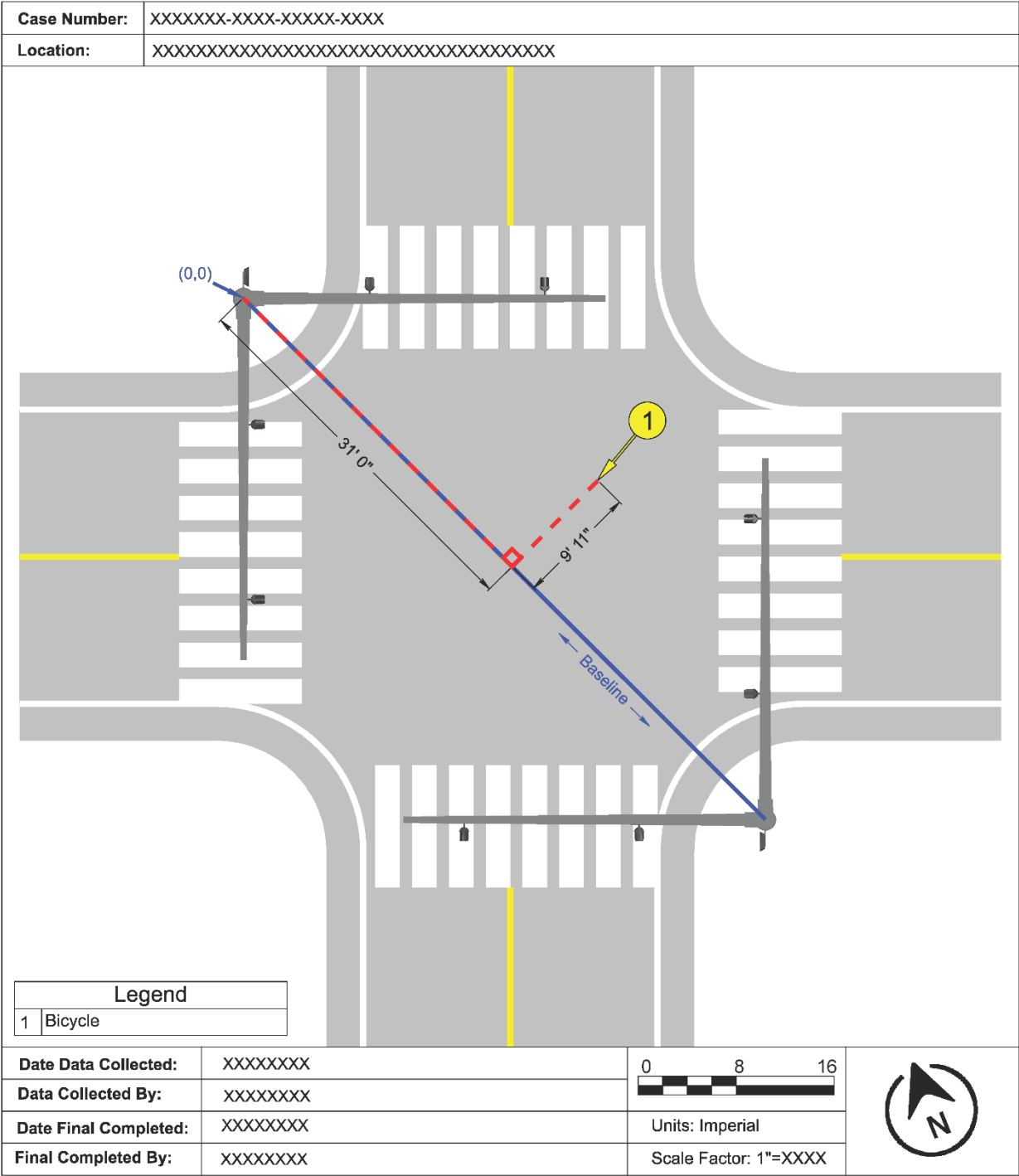


Figure C.1—Baseline

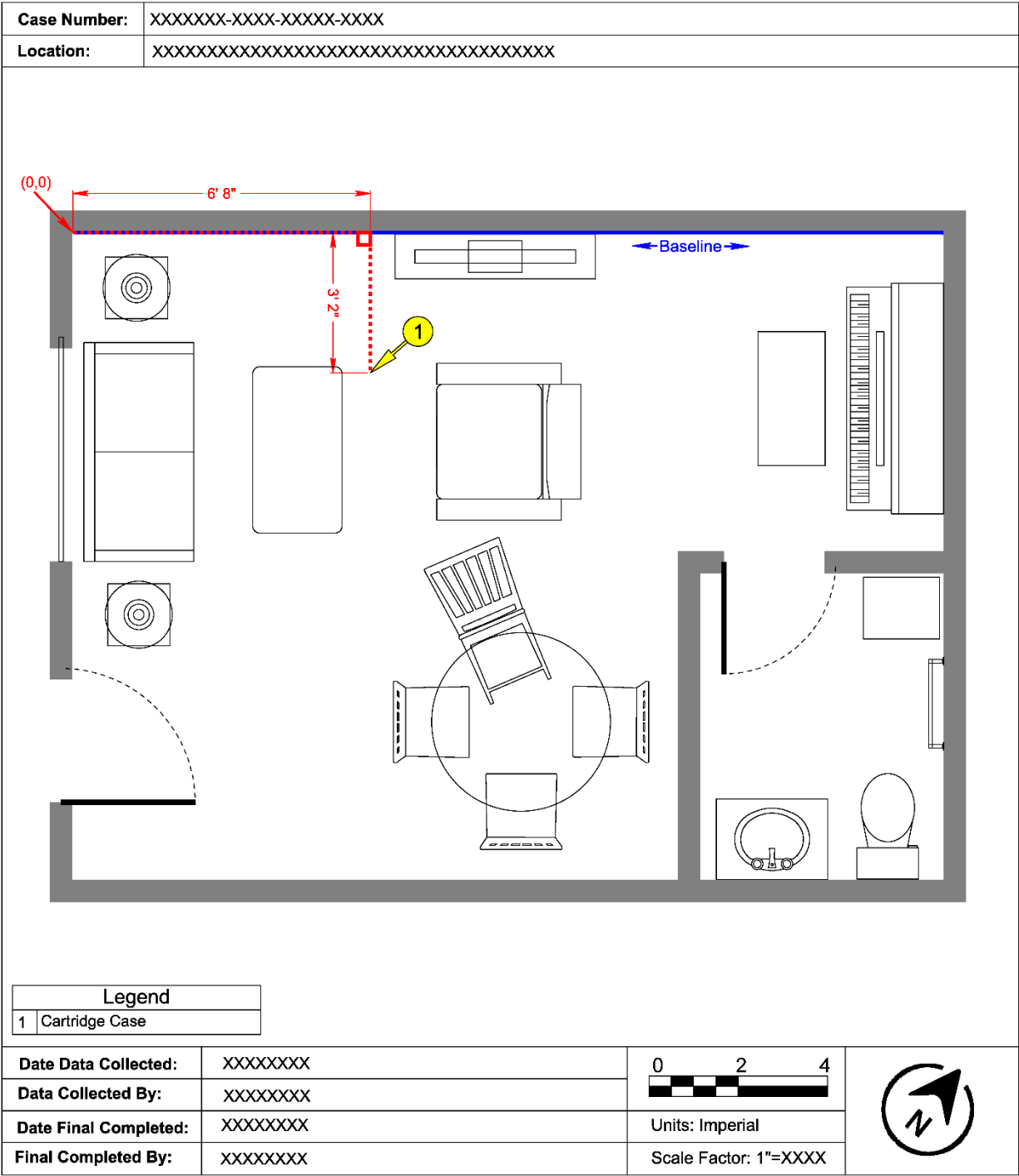


Figure C.1.2 —Baseline

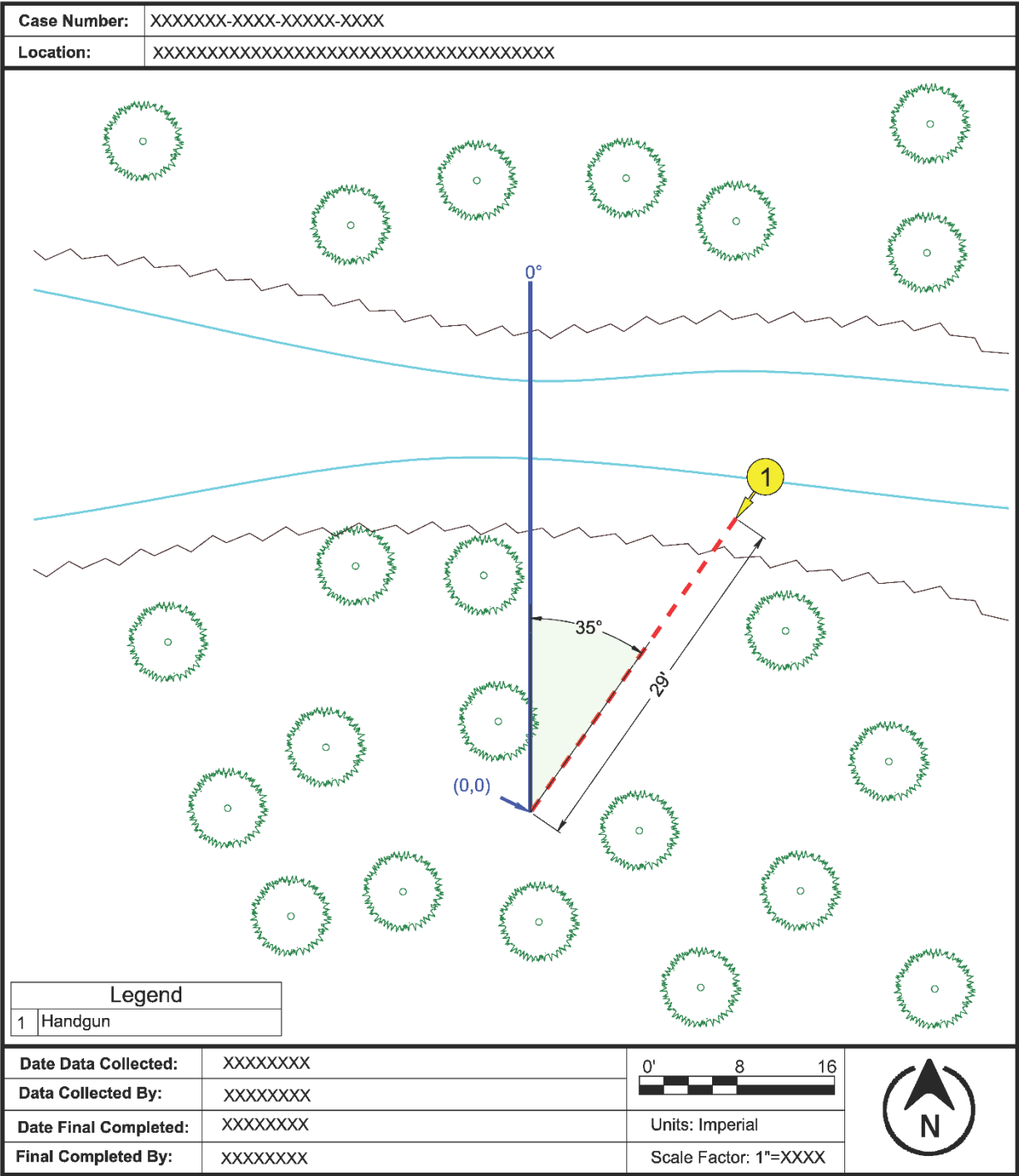


Figure C.2 —Polar

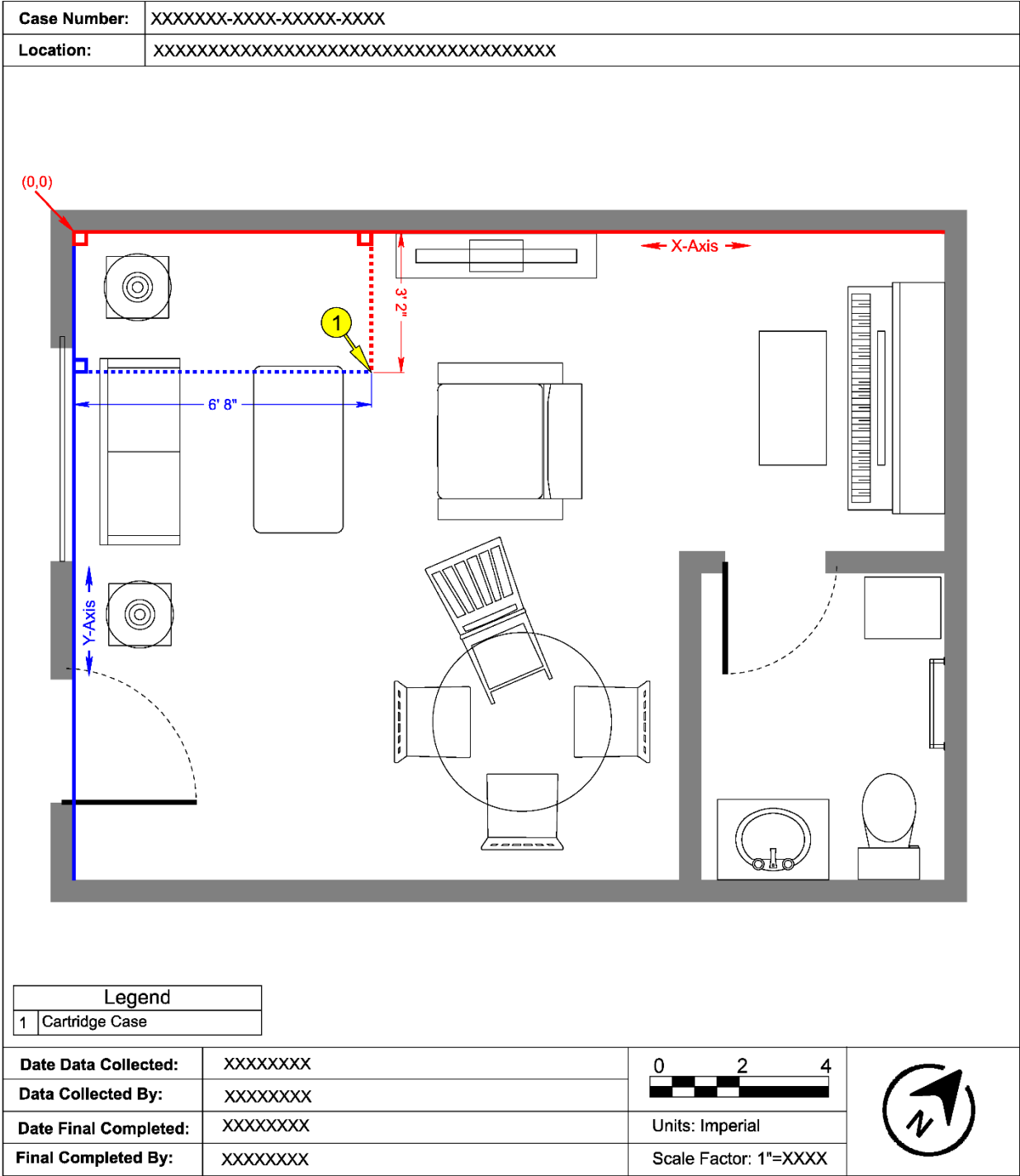


Figure C.3—Rectangular

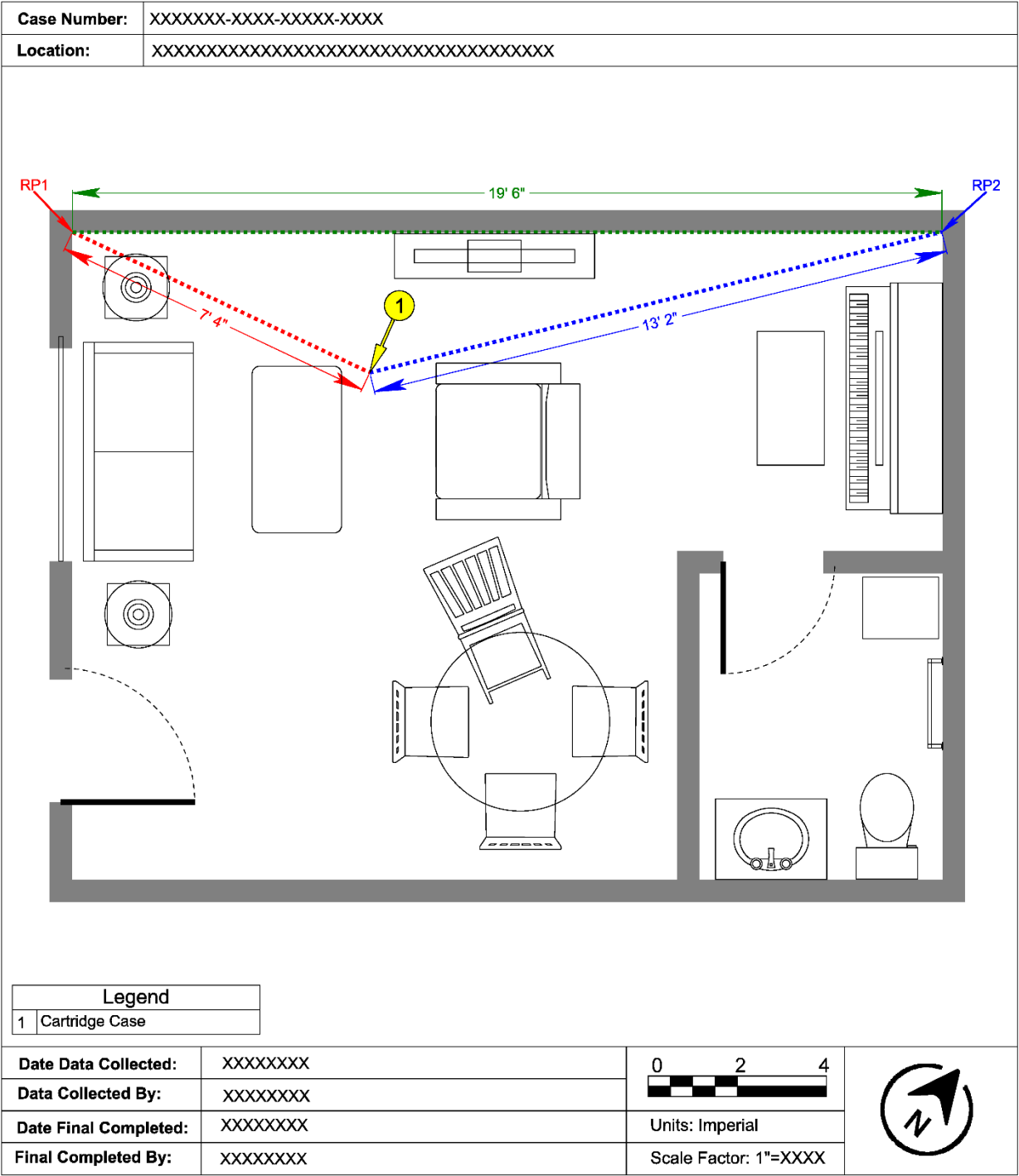


Figure C.4 —Triangulation

Annex D (informative)

Bibliography

The following bibliography is not intended to be an all-inclusive list, review, or endorsement of literature on this topic. The goal of the bibliography is to provide publications cited informationally, and publications relevant to the standard.

- 1] ASTM International, E2916-19-e1: *Standard Terminology for Digital and Multimedia Evidence Examination*. In: Book of Standards Volume: 14.02. DOI: 10.1520/E2916-19E01
- 2] ISO 9001:2015, *Quality Management Systems- Requirements*. International Organization for Standardization
- 3] Organization for Scientific Area Committees for Forensic Science. *OSAC Lexicon*¹.
- 4] Organization for Scientific Area Committees for Forensic Science. Standard Guide for Crime Scene Photography. Draft standard. Video/Imaging Technology and Analysis (VITAL) Subcommittee 2022.

¹ Available from: <https://www.nist.gov/organization-scientific-area-committees-forensic-science/osac-lexicon>

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