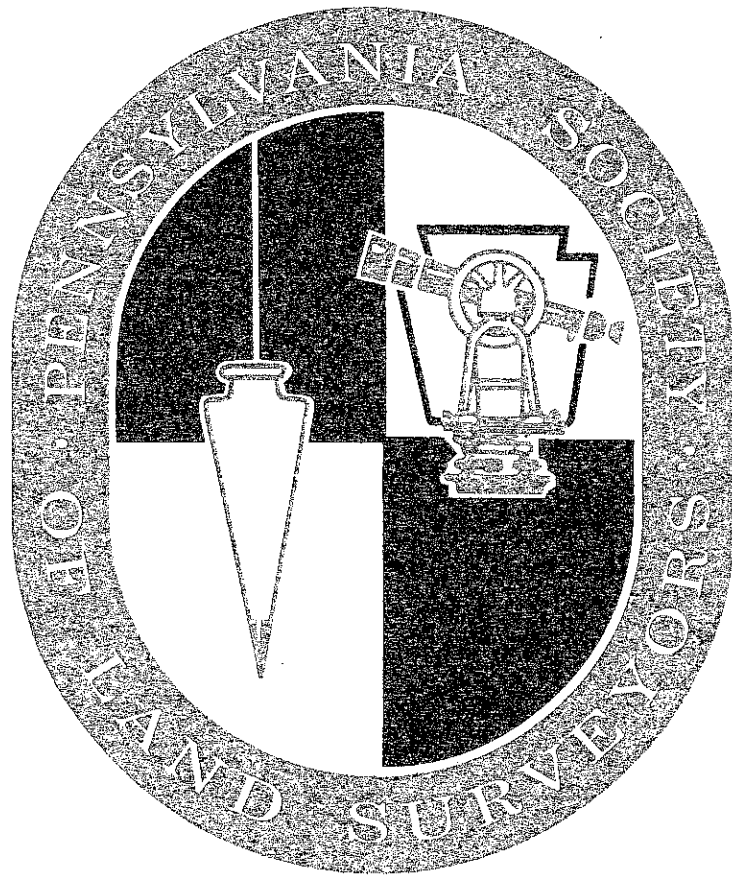


**Manual of Practice
for
Professional Land Surveyors
in the
Commonwealth of Pennsylvania**



**Manual of Practice for Professional Land Surveyors
in the
Commonwealth of Pennsylvania
as adopted by the
Pennsylvania Society of Land Surveyors
on
July 10, 1998**

This Manual of Practice has been produced through the voluntary efforts to the PSLS Standard of Practice Committee, PSLS Chapter affiliations, PSLS membership, other surveying professionals throughout the Commonwealth. The document will be reviewed and revised, if necessary, on a regular basis in order to evolve contemporaneously with the advances in technology. Comments concerning the Manual of Practice should be forwarded to the address printed below.

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SECTION 1 - INTRODUCTION

1.1 Introduction

Land Surveying is a licensed profession. Licensing and subsequent Registration of Land Surveyors are the subject of the Engineer, Land Surveyor and Geologist Registration Law (Act of 1945, P.L. 913, No. 367, last amended December 16, 1992). This law contains pertinent definitions and a code of ethics. It does not contain guidelines for the practice of land surveying - giving rise to the need for a Manual of Practice.

1.2 Statutory Definition of Land Surveying

According to the Registration Law, Section 2. Definitions

- a) "Practice of Land Surveying" means the practice of that branch of the profession of engineering which involves the location, relocation, establishment, reestablishment or retracement of any property line or boundary of any parcel of land or any road right-of-way, easement or alignment; the use of principles of land surveying, determination of the position of any monument or reference point which marks a property line boundary, or corner setting, resetting or replacing any such monument or individual point including the writing of deed descriptions; managing or conducting as managers, proprietors or agent any place of business from which land surveying work is solicited, performed or practiced; . . . (p.2)
- b) "Professional Land Surveyor" means an individual licensed and registered under the laws of this Commonwealth to engage in the practice of land surveying. A professional land surveyor may perform engineering land surveys but may not practice any other branch of engineering. (p.3)
- c) "Engineering Land Surveys" means surveys for: (i) the development of any tract of land including the incidental design of related improvements, such as line and grade extension of roads, sewers and grading but not requiring independent engineering judgment: Provided, however, That tract perimeter surveys shall be the function of the Professional Land Surveyor; (ii) the determination of the configuration or contour of the earth's surface, or the position of fixed objects thereon or related thereto by means of measuring lines and angles and applying the principles of mathematics, photogrammetry or other measurement method; (iii) geodetic survey, underground survey and hydrographic survey; (iv) storm water management surveys and sedimentation and erosion control surveys; (v) the determination of the quantities of materials; (vi) tests for water percolation in soils; and (vii) the preparation of plans and specifications and estimates of proposed work and attendant costs as described in this section. (p.3)

Commentary: The quoted definitions are nominal definitions, i.e. they give the meaning of terms as they are used in the Act. For purposes of the Act, land surveying is a branch of engineering, the proper and exclusive concern of which is the boundary of a tract of land. Its function is the demarcation and description of boundary lines and corners, according to the principles of land surveying. These principles are the laws governing boundaries and the rules of construction, as well as the laws of several mathematical disciplines and the rules of making and adjusting measurements. Land Surveyors may also perform engineering land surveys. This hybrid category includes virtually all the engineering entailed in the development of land: topographic surveying, complete engineering design (street and utility extensions, storm water management facilities, soil tests, and sedimentation and erosion control plans), construction stake-out and as-built plans. It also extends surveying to the entire surface of the earth, both land and water, as well as above and below the surface of the earth.

1.3 Principles of Professional Conduct

The Registration Law contains the following Code of Ethics:

It shall be considered unprofessional and inconsistent with honorable and dignified bearing for any ... professional land surveyor ... :

- a) To act for his client or employer in professional matters other than as a faithful agent or trustee, or to accept any remuneration other than his stated recompense for services rendered.
- b) To attempt to injure falsely or maliciously, directly or indirectly, the professional reputation, prospects or business of anyone.
- c) To attempt to supplant another ... land surveyor ... after definite steps have been taken toward his employment.
- d) To compete with another ... land surveyor ... for employment by the use of unethical practices.
- e) To review the work of another ... land surveyor ... for the same client, except with the knowledge of such ... land surveyor ... , or unless the connection of such ... land surveyor ... with the work has been terminated.
- f) To attempt to obtain or render technical services or assistance without fair or just compensation commensurate with the services rendered: Provided, however, the donation of such services to a civic, charitable, religious or eleemosynary organization shall not be deemed a violation.
- g) To advertise in self-laudatory language, or in any other manner, derogatory to the dignity of the profession.
- h) To attempt to practice in any field of engineering, land surveying, or geology in which the registrant is not proficient.
- i) To use or permit the use of his professional seal on work over which he was not in responsible charge.
- j) To aid and abet any person in the practice of ... land surveying ... not in accordance with the provisions of this act or prior laws.

1.4 Principles of Professional Practice

- a) The Registration Law does not contain any guidelines to professional practice. It only defines the condition of professional practice, namely, "responsible charge":
"Responsible charge" means a position that requires initiative, skill and independent judgment, and implies such degree of competence and accountability gained by technical education and experience of a grade and character as is sufficient to qualify an individual to personally and independently engage in and be entrusted with the work involved in the practice of ... land surveying (p.3)
- b) However, Articles of Incorporation of the Pennsylvania Society of Land Surveyors state that:
"The corporation is to be formed for the purpose of promoting the interests of the land surveying profession in Pennsylvania and improving the professional status of Pennsylvania land surveyors by: (a) Encouraging maintenance of the highest standards of professional ethics and practice" ...

Commentary: The ten precepts (1.3, a through j) can be interpreted as prohibiting excessive and deficient ways of engaging in the five common professional business practices: setting acceptable fees (a and f), advertising (b and g),

competing for work (d and h), taking charge of the work (c and j), taking responsibility for completed work (e and i). Other interpretations of the code may be possible.

1.5 Manual of Practice

Given the absence of statutory guidelines for the practice of surveying and the presence of a commitment to maintain a commendable level of practice, there is a need for an outline of standard practice in the profession, i.e. a Manual of Practice.

a) The Profession of Land Surveying

- 1) The Manual is concerned with land surveying as a profession. Land surveying has been given the dignity of being called a profession by law. But the law does not define profession; it does not state the basis for calling it a profession; and it does not characterize professionalism.
- 2) In general, a profession is (i) an occupation requiring specialized knowledge or skills, acquired by formal education, informal training and practical experience, (ii) the business of providing a range of services applying these skills, and (iii) the aggregate of all those engaged in the business, but principally those licensed in the practice and therefore in responsible charge.
- 3) The licensing of a profession is undertaken by the state to protect the health, safety and welfare of the public. Licensing bestows on the professional a public trust that extends not just to the client, but to all those affected by the services. That trust is to carry out the protective obligations of the state in the practice of the profession.
- 4) Professionalism is the manner in which the profession carries out this public trust. It is carried out as a service to the public. Although a professional practice is a business, its principal aim is not the personal gain of the practitioner, nor that of the client. Its aim is the impartial application of the specialized knowledge and skills of the profession. The primary duty of the professional surveyor is to be true to the demands of the practice. Conscientious fulfillment of these demands cannot help but inspire public confidence.

b) Standard Practice

- 1) The focus of the Manual is the way in which most surveyors practice the profession most of the time; this way of practicing is generally called "standard practice". The guidelines of this Manual are, therefore, not the highest possible standards nor are they the absolute minimum standards for the profession. Rather, they express the level of practice that can generally be expected of practitioners. Although the way in which individual practitioners perform the work may vary according to their proficiency and efficiency, the procedures they employ in the performance of the work are fairly uniform among practitioners of the same competence working under similar circumstances.
- 2) The guidelines presented in this Manual are therefore valid for all licensed land surveyors in the Commonwealth of Pennsylvania, not just for members of the Pennsylvania Society of Land Surveyors. Land surveyors that are not members of the Society may not consider themselves subject to such guidelines, but they practice the profession no differently than members. By the same token, members cannot be held subject to different guidelines by virtue of membership.

- 3) The Pennsylvania Society of Land Surveyors does not have legal authority to impose or power to enforce these guidelines. Adherence to them is strictly voluntary. But, in the best interest of the profession, it has assumed the moral authority to urge all practitioners, members and non-members alike, to excellence in their practice.

c) Rules Governing the Practice

- 1) The guidelines presented in this Manual are best described as rules of reason. They are rules, which any reasonable Professional Land Surveyor would follow of his own initiative, or can reasonably be expected to follow once they are made known.
- 2) These rules can be distinguished from rules of law according to their source, and from rules of construction according to their purpose. The rules of law are taken from judicial rulings, whereas the rules presented herein are derived from the well considered application of the knowledge and skills of the profession. The rules of construction govern the correct retracement of boundary lines, whereas the rules presented herein govern the orderly performance of the work.
- 3) The rules presented in this Manual are of two kinds, divided according to their coerciveness. Some are obligatory; others only discretionary. The first kind are stated in imperative terms, namely, "shall"; the second only in normative terms, "should". Deviation from the first kind is unprofessional, while deviation from the second kind may only be imprudent.
- 4) The rules are supplemented by commentaries containing either explanations or illustrations of the rules, or directions for implementing them. The commentaries are more specific than the rules, and are intended to clarify or amplify the instance.

d) Use of the Manual

- 1) The Manual is intended to be a guide to the standard practice of the profession of land surveying. It can serve as a handy reference for determining compliance or non-compliance with professional requirements in various phases of the practice and for various types of survey. The phases are: coming to an agreement (Section 3), searching the evidence (Section 4), making and adjusting measurements (Section 5), monumentation (Section 6), providing a record of the survey (Section 7), and problematic boundaries (Section 8). Other types of surveys permitted to the land surveyor are, broadly speaking, mapping and engineering related surveys (Section 9). As a guide to standard practice, the Manual can be used as an aide in preparing contractual agreements.
- 2) The Manual is not intended to supplant individual judgment and so-called local standards. Each survey is unique, and each surveyor must apply his knowledge and skills as he sees fit. Although compliance with the guidelines may make the practice more uniform throughout the state, the guidelines should be modified to accord with practices peculiar to a given area.
- 3) This Manual is not intended to be a basis for disciplinary action or for criminal or civil prosecution. However, practitioners should be aware that non-compliance with any of the rules presented in this Manual may expose them to such action or prosecution. Nonetheless, a complaint against a practitioner must be examined in light of the practitioner's contractual agreement with the client, not simply by reference to the rules stated in this Manual.

Commentary:

1.5 (c) (3) Both kinds of rules are only guidelines. Compliance with both is conditional on the contractual agreement with the client. Not all rules apply all the time - only those relevant to the contracted functions. By entering into a contract, the practitioner commits himself to perform certain functions. Some other functions may or may not be performed without breach of duty. Hence, the two kinds of rules.

1.5(d) As a guide to standard practice, the manual may also make practitioners aware of actions that could result in a complaint against them. Historically, by far the most complaints have cited unprofessional conduct, perhaps because they can make reference to the code of ethics. Apart from practicing without a license, the second most frequent complaint is malpractice, and the third is negligence. Incompetence is a distant fourth. The best precaution against malpractice and negligence, however, is a level of care that meets or exceeds the norm, or standard practice.

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SECTION 2 - DEFINITIONS AND INTERPRETATIONS

2.1 Definitions

Words do not always have singular meanings. To achieve clarity and precision, and to avoid obscurity and confusion, the following meanings are ascribed to keywords in this Manual.

- a) Agreement - An arrangement as to a course of action. A contract, verbal or written, specifying type of work and terms under which it is to be done.
- b) Boundary - A legal line of demarcation between real property title or rights and capable of being located on the face of the earth.
- c) Client - A person or legal entity with whom the practitioner enters into an agreement. Distinct from third party, to whom a benefit also accrues.
- d) Equipment - Implements used in an operation or action. In a surveying practice, the field and office machinery.
- e) Evidence - Information, observations, or objects that aid the surveyor in determining the position of a boundary.
- f) Misconduct - Any action that is illegal or unethical, notably as determined by the Registration Law and the Regulations of the Registration Board.
- g) Practitioner - Any person performing professional services, primarily one that is licensed, but also anyone else acting consistently with the law (under direct supervision of a licensed professional).
- h) Professional Practice - A business for profit, offering the usual services of the profession and operated by a duly licensed individual(s).
- i) Reason - Thought, in this case, applied to action, rather than a subject of study, to determine prudent conduct under given circumstances.
- j) Record - Writing that provides official evidence of an action and of its intent, usually deposited with a legally designated officer and available to the public.
- k) Report - A narrative compilation and analysis of facts and circumstances concerning a survey. Sometimes, including a certification of the survey.
- l) Research - The search for written evidence, both public and private. May include the search for physical evidence called for in the written evidence.
- m) Standard - A model, example, or rule established by customary use or general consent, differentiated into imperative (shall) and discretionary (should).
- n) Survey - The aggregate of services and products concerning the location of points and lines on, above or below, the surface of the earth, both land and sea.

Commentary: The above could be considered interpretations, i.e. the meaning of the words strictly within the context of this Manual. On occasion, the words may warrant other interpretations, but their meaning should not be altered without good reason. For clarification of their meaning and the meanings of other words, a practitioner should consult other texts.

2.2 Interpretations

- a) The following publications should be used to define additional terms not encompassed in the definitions section of this manual:
 - 1) Definitions of Surveying and Associated Terms
American Congress on Surveying and Mapping and American Society of Civil Engineers, latest edition
 - 2) Black's Law Dictionary, latest edition

- b) In the event that different publications provide conflicting definitions, the practitioner should use the definitions given in the following publications in this order of preference:
 - 1) Professional Engineers, Land Surveyors and Geologists Registration Law of the Commonwealth of Pennsylvania, Act 367, as amended.
 - 2) Manual of Practice for Professional Land Surveyors in the Commonwealth of Pennsylvania.
 - 3) Definitions of Surveying and Associated Terms (ACSM).
 - 4) Black's Law Dictionary

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SECTION 3 - AGREEMENTS

3.1 Agreements

A clear and specific agreement with a client is a precondition of rendering professional services satisfactorily. Not only will it prevent misunderstanding and ill feeling; it will, in some instances, preclude a dispute and preserve the integrity of the practitioner.

a. Content

- 1) Prior to performing any professional services, a practitioner should
 - A) State with reasonable exactitude
 - (i) the scope or extent of services to be performed,
 - (ii) the cost or fee basis of the services,
 - (iii) the approximate time of its completion, and
 - (iv) the payment schedule.
 - B) Explain foreseeable contingencies or repercussions of the work,
 - C) Come to an understanding about the survey specifications to be followed, and apprise the client of the consequences of non-standard performance.
- 2) At the same time, the practitioner should
 - A) Put the terms of the agreement in writing, and retain a signed copy of the agreement, and
 - B) Provide the client with a copy of the agreed-upon survey specifications, or inform the client of their availability.

b. Qualifications

- 1) Exceptions to the Agreement
 - A) Clients should be made aware of services that are not included in the agreement.
 - B) Any survey specifications not to be followed in providing agreed-upon services should be explicitly mentioned.
- 2) Additions and Amendments to the Agreement
 - A) The terms of any services that substantially alter the original agreement should be negotiated;
 - (i) as requested by the client,
 - (ii) as required by reviewing agencies, or
 - (iii) as arising from the circumstances of the agreed-upon work.
 - B) Any change in the required survey specifications should be negotiated.

Commentary:

- 3.1(a)(1)(A)(ii) *If the cost of services is not a firm price but only an estimate, that fact should be stressed, whether the agreement is oral or written.*
- 3.1(a)(1)(B) *The stake-out of a building, for instance, is normally contingent upon a boundary survey. Protruding stakes or pins may inadvertently result in harm to person or machine.*
- 3.1(a)(1)(C) *This section may be made discretionary, if the client is already familiar with the survey specifications or demands a completion period too short for the survey specifications to reach him.*
- 3.1(a)(2)(A) *It is common in many areas of the state to perform surveying services on the basis of an oral agreement. The practitioner should, however, beware of making oral agreements, especially on projects the scope or extent of which is either indeterminate or possibly misrepresented.*
- 3.1(b)(1)(A) *Some services may be excepted as a rule, such as setting corner pins in doing a mortgage survey or placing a written certification on a survey plan.*
- 3.1(b)(1)(B) *Some standards are set by statute or municipal ordinance, or required by a lender or title insurer, and cannot be excepted, regardless of the client's desire.*

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SECTION 4 - EVIDENTIARY SEARCH

4.1 Evidentiary Search

The definition of the Practice of Land Surveying in the Registration Law makes no reference to the surveyor's search for written and physical evidence. This search, however, is indispensable, and an inadequate search is the most common cause of error in relocating boundaries. Any relevant information (e.g., title report) in the possession of the client should be supplied to the surveyor.

a) Written Evidence

1) Public Records

- A) The search of public records shall be sufficient in breadth and depth to identify with reasonable certainty
 - (i) the described location of the client's boundaries,
 - (ii) any gaps and/or overlaps with the adjoining's described boundaries,
 - (iii) apparent errors in the written descriptions of client's boundaries,
 - (iv) rights associated with the property,
 - (v) restrictions upon the use of the property in the most recent deed, and
 - (vi) the intent of the conveyance.
- B) The search of public records should be extended to all pertinent information
 - (i) recorded in the Office of the Recorder of Deeds (Plans filed with Deeds, Subdivision Plans, Highway Right-of-way Plans, Railroad Valuation Maps, Recorded Ordinances, Letters of Attorney, Affidavits),
 - (ii) filed in other county offices (Real Estate Assessment Office, Recorder of Wills, Prothonotary, Clerk of Courts), and
 - (iii) kept in state (PennDOT) and municipal offices (City Clerk; Engineering, Planning and Building Inspection Offices).

2) Private Records

- A) The search shall also be extended to privately held information to which reference is made in public records, notably
 - (i) subdivision plans,
 - (ii) property surveys, and
 - (iii) private restrictions and agreements, provided, however, that such information is
 - a) significant or critical, not merely redundant, and
 - b) readily obtainable, i.e. in good time and at a reasonable cost, and with the cooperation of those in possession of it.

- B) The search of private records should ultimately be extended to any and all information indirectly indicated or implied in public and private records, both professional opinion and personal knowledge, that may
 - (i) aid in any way in the correct location of boundaries, and thereupon,
 - (ii) explicitly or implicitly become part of the public record.
- b) Physical Evidence
 - 1) Called-for Monuments
 - A) Sufficient field investigation shall be conducted to establish
 - (i) the existence and the condition of monumentation called for in the written evidence,
 - (ii) any discrepancies in the location of the physical evidence compared to the written evidence,
 - (iii) any differences between occupation lines and record boundaries, and
 - (iv) any problematic use of land indicated by the record evidence.
 - B) Due care shall be taken in the unearthing of called-for physical evidence to preserve it in place and in good condition.
 - 2) Uncalled-for Monuments
 - A) The reliability of monuments other than those called for in the public record shall be verified by their correlation to
 - (i) record monuments,
 - (ii) witness monuments cited in record,
 - (iii) record measurements,
 - (iv) other document information,
 - (v) accepted occupation or possession lines,
 - (vi) parol evidence.
 - B) The credibility of such monuments should be based in part on their apparent age and the prevalent practice in a given area.

Commentary:

- 4.1(a)(1)(A) *ALTA/ACSM Land Title Surveys require the client to supply a current title report. It is taken for granted that the surveyor's search includes a search of both the client's property and that of adjoining - immediate and distant, in both place and time, if necessary.*
- 4.1(a)(1)(A)(iv) *The reference is to two kinds of rights: 1) rights of ownership, senior and junior, and 2) rights of way, which differentiate properties into dominant and servient estates.*
- 4.1(a)(1)(A)(v) *Other restrictions imposed by municipal ordinances or established by other agencies (F.E.M.A., etc.), should be part of the surveyors search whenever required for that particular survey.*
- 4.1(a)(1)(B) *The sufficiency of the search differs for each survey. The search must always be sufficiently complete to perform the agreed upon services.*
- 4.1(a)(2)(A) *Information actually provided constitutes express actual notice. Information that merely makes reference constitutes implied actual notice. Information that is not actually mentioned, but can be inferred, is constructive notice.*

- 4.1(b)(2)(A)(vi) *Parol evidence is a notarized statement confirming the identity or corroborating the location of called-for property monumentation.*
- 4.1(b)(2)(B) *Historical and biographical information, even if anecdotal, can on occasion be decisive in determining the credibility of monuments.*

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SECTION 5 - MEASUREMENTS

5.1 Measurements

Surveying consists largely of determining the measurements of parcels of land. The reliability of the measurements depends on the equipment and techniques employed in measuring.

a) Measuring Equipment

1) Type

- A) Field equipment should be chosen on the basis of its appropriateness to a given task.
- B) Office (i.e. calculating and drafting) equipment should be integrated with field equipment.

2) Maintenance

- A) Condition: *All* field equipment shall be kept in such working order as to achieve the precision normally expected of the equipment.
- B) Placement: Precaution should be taken to avoid unexpected damage to the equipment in actual use, as well as in transport and in storage.

b) Measuring Techniques

1) Field

- A) Human Errors: Sufficient redundant measurements shall be made to detect blunders and oversights.
- B) Instrument Errors: Repeat measurements and proper corrections to measurements shall be made to minimize systematic errors.

2) Office

- A) Random Errors: Judgment shall be exercised regarding
 - (i) the need for, and
 - (ii) the proper method of adjusting measurements for random errors.
- B) Record Keeping: Collected and processed data should be
 - (i) in durable form,
 - (ii) stored safely, and
 - (iii) retrievable upon demand.

Commentary:

5.1(a)(1) *Three types of equipment are meant: (1) transiting theodolite and steel tape, (2) repeating theodolite with electronic distance measuring device, or total station with data collector, and (3) global positioning system receivers.*

5.1(a)(1)(A) *The use of a particular type of instrumentation may be a business decision, based either on availability or on efficiency, rather than suitability and common use.*

5.1(a)(1)(B) *This rule may seem superfluous. Data collectors are useless without the appropriate computer hardware and software. But drafting still need not be aided by computer.*

- 5.1(a)(2)(A) *Theodolites, for instance, should be serviced according to the manufacturer's specifications, and their precision checked periodically against a base line. Failure to detect an error in measurement, resulting either from poor care or poor use of equipment, is prima facie evidence of a violation of this section.*
- 5.1(b) *The techniques in question are those of plane surveying, rather than curvilinear or geodetic surveying. If ties of parcels of land to geodetic monuments are required, the land surveyor is expected to know the principles and techniques of geodetic surveying (see Section 9).*
- 5.1(b)(2)(a)(ii) *The proper method for adjusting measurements depends on the type and size of the survey. Small lot surveys may not require any adjustment. For larger surveys, one of the traditional adjustments (transit rule, compass rule or Crandall method) may be employed. For geodetic surveys, least squares adjustments are appropriate.*
- 5.1(b)(3)(B) *Keeping detailed records is not a statutory requirement, but it is a time-honored tradition, and a service to oneself and to the profession.*

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SECTION 6 - MONUMENTATION

6.1 Monumentation

The placement of boundary markers distinguishes boundary surveying from all other forms of surveying and makes land surveyors professionals in their own right - a fact that is recognized by statute.

a) Setting

1) Boundary corner markers should

- A) whenever possible, be composed of ferrous or other material detectable by an electromagnetic locator, of substantial length and width, and
- B) be placed solidly, to minimize the likelihood of disturbance.

2) Boundary corner markers should be set

- A) in sufficient number to make the boundary apparent to anyone who has reason to know their location, and
- B) in a manner consistent with the rules of construction (boundary analysis).

b) Identification

- 1) Markers found or set should be conspicuous to anyone who has reason to look for them, and identified as boundary markers.
- 2) The practitioner who placed the markers should be identifiable by inspection of the markers in the field.

Commentary:

- 6.1 *This subsection is not meant to apply to natural markers, such as trees, streams, and roads, or to previously set markers. Nor is it meant to be applied to surveys that do not require the placement of corner markers, such as mortgage/inspection surveys, title surveys, or permit-related surveys. It is incumbent upon the surveyor to know the various requirements regarding monumentation.*
- 6.1(a)(1) *This section does not obligate the practitioner to replace existing markers that may be damaged or disturbed, although their replacement is advisable.*
- 6.1(a)(1)(A) *The composition, length and width of markers is determined either tacitly by common practice in a given area, or noted in writing by ordinances and other specifications, and should be appropriate to the circumstances.*
- 6.1(a)(2)(A) *This includes adjoining and other land surveyors, in addition to the land owner, unless the client requests otherwise for reasons of prudence or safety. Reference markers or ties to permanent structures are advisable for easy retracement.*
- 6.1(a)(2)(B) *Rules of construction, sometimes taken to be rules of law or rules of evidence, form the backbone of the land surveyors' practice. In general, rules of construction are rules for clarifying the intent or meaning of a document. In surveying, they are rules for resolving ambiguities in legal descriptions and inconsistencies in monumentation. Mostly they specify superiority: record monuments over undocumented monuments, physical monuments over measurements, and direction over distance; provided, however, that their application does not violate the evident intent of the conveyance or lead to absurd consequences.*
- 6.1(b)(1) *Prudence and safety must also be considered in making any markers conspicuous. The client should be notified of differences between use and record lines before making them obvious to anyone else.*
- 6.1(b)(2) *A metal or plastic cap with the surveyor's name and license number (or other means of identification as they become available) will meet this standard.*

SECTION 7 - RECORD OF SURVEY

7.1 Record of Boundary Survey

A survey may include a plan, showing the results of the survey and bearing the seal of the surveyor, and may be accompanied by a written (legal) description. It can be amplified by a written report and a certification.

- a) Survey Plan
 - 1) Form
 - A) the record of the survey shall take the form of a graphic representation of the results of the survey that can be
 - (i) viewed comprehensively,
 - (ii) reproduced in a reasonable quantity, and
 - (iii) stored for future reference and remain property of the surveyor.
 - B) The survey plan should
 - (i) be drawn at an appropriate scale,
 - (ii) be of an appropriate size, and
 - (iii) satisfy the needs of the client.
 - 2) Content (based on scope of services)
 - A) The survey plan shall identify (usually in a title block)
 - (i) the type of survey,
 - (ii) the ownership or address of the property,
 - (iii) the municipality and county in which it is located,
 - (iv) the date and scale of the drawing, and
 - (v) the practitioner responsible for the survey and plan.
 - B) The survey plan shall contain
 - (i) an accurate representation of the boundary,
 - (ii) the geometry of the lines (calls),
 - (iii) the corner markers (found/set) and any points of reference,
 - (iv) the names of record adjoiners and other property identifications, and
 - (v) any differences between record and occupation lines.
 - C) The survey plan should, if appropriate, contain
 - (i) topographic features (notable improvements),
 - (ii) encumbrances (encroachments and easements), and
 - (iii) restrictions (zoning and deed).
- b) Legal Description
 - 1) The written description of the property shall be based on the survey and conform to the graphic depiction of the property on the survey plan.
 - 2) The description should be written in the commonly required form of a metes-and-bounds description, and include

- A) an identification and location of the property, and, if applicable, reference to the subdivision by which it was created, or any other source of the property,
 - B) a description of all individual property lines in sequence, preferably clockwise, along with the identification of the corner markers and adjoiners,
 - C) the computed area of the property,
 - D) any easements and deed restrictions, if apparent and applicable, and
 - E) deed reference, or source of title reference.
- c) Survey Report
- 1) A separate written report should be made whenever the results of the survey require explanation, and include
 - A) all the pertinent facts and an analysis of the facts, and
 - B) the conclusion drawn or opinion derived from the facts.
 - 2) An affidavit should be filed at the discretion of the surveyor whenever
 - A) the record is not clear, or
 - B) the record has been falsified.
- d) Written Certification
- 1) Upon request, the surveyor shall provide a signed written statement of either or both of the following;
 - A) the parties to whom the certification is made, and
 - B) the specific items, the correctness of which is being certified.
 - 2) The certification should, in part or in whole, be placed on the plan itself.

Commentary

- 7.1 *The rules stated in this section apply whether the form of the record is graphic or digital. The form depends on the sophistication of the practitioner and his clients. The Regulations issued by the Registration Board list "documents" as being "specifications, land surveys, reports, plats, drawings, plans, design information and calculations".*
- 7.1(a)(2) *The contents of a survey plan may be further specified by title and lending institutions; the contents of subdivision plans by municipal ordinances.*
- 7.1(a)(2)(A) *A note on the content of a plan; the format and any original idea shown on the plan may be copyrighted, but the information contained in it cannot be copyrighted.*
- 7.1(a)(2)(A)(i) *The title of the plan is to be so specific as not to be misleading, especially when the survey does not require monumentation or serves a specific purpose, such as the transfer of title or the issuance of a loan or a permit.*
- 7.1(a)(2)(B) *Any dependence on or disagreement with a prior survey should be noted on the survey plan, as well as any acknowledgment or disclaimer.*
- 7.1(a)(2)(B) *The Registration Act requires the seal to be embossed on the first page of all documents issued to clients, a facsimile being permitted on the other pages. An ink stamp seal or a digitally reproduced seal is assumed to be a facsimile.*
- 7.1(b) *The Registration Act exempts the writing of legal descriptions from licensure and registration. A good description, however, is one the calls of which can be reproduced on the ground. For this reason, the land surveyor is the best judge of a good description, and the most capable of writing one.*
- 7.1(b)(1) *Descriptions written without benefit of survey should contain a reference to the source of the information and appropriate disclaimers.*

- 7.1(b)(2) *The fact that a description need not contain numerical information to be legally acceptable requires that this section be discretionary.*
- 7.1(c)(1) *A log of all communications and of the administration of a survey is advisable. A written report accompanying the survey plan is appropriate when the survey is inconclusive in some respect. It may be required when the plan provides evidence for a legal proceeding or an insurance claim, and may be forensic in nature.*
- 7.1(c)(1)(A) *The client should be given notice of circumstances that may adversely affect the use or ownership of the property, or constitute a safety hazard.*
- 7.1(d)(1)(B) *The written statement should be limited to the items in question, should be based on actual observation, and should avoid absolute terms (such as "all" or "no"). A practitioner is urged to take extreme care in providing a written certification to avoid liability, not only for misrepresentations but also for assumptions.*

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SECTION 8 - PROBLEMATIC BOUNDARIES

8.1 Problematic Boundaries

Land Surveyors are said to exercise a quasi-judicial function. Although surveyors do not have the power to adjudicate boundary disputes, they must nonetheless exercise judgment in accordance with the law in resolving boundary differences. They must also exercise good sense in resolving personal differences.

a) Questionable Boundaries

- 1) Every reasonable effort should be made by a land surveyor to determine
 - A) the degree of conformity of the record evidence of adjoining property boundaries, and
 - B) the quantitative, i.e. measured, differences between record and ownership lines.
- 2) Upon discovery of any perceived irreconcilable difference(s), the surveyor should
 - A) immediately communicate the existence and the seriousness of the circumstance to the client,
 - B) identify the problem by name, describe the difference in numbers, and, if possible, provide an explanation for the difference,
 - C) relate to the client, to the extent it can be anticipated, any possible effect on the use and ownership of the property,
 - D) apprise the client of foreseeable options and of their likely consequences, and mention the advisability of legal counsel,
 - E) conclude the field work only after an understanding by the adjoiners that an acceptable location of the boundary has been reached, and
 - F) place explanatory notes and appropriate disclaimers on the survey plan.

b) Disputed Boundaries

- 1) When a surveyor is called upon after a dispute has arisen, the surveyor should
 - A) ascertain the stage to which the dispute has progressed, most notably whether legal counsel has been retained, litigation has been initiated, or the case has already been heard or decided,
 - B) attempt to determine the necessary scope of the surveying services, or the effective contribution of a survey, to the resolution of the dispute, and
 - C) decide about
 - (i) his/her availability,
 - (ii) his/her desirability as an expert witness, and
 - (iii) the propriety of his/her involvement in the dispute.
- 2) When the surveyor has been retained in connection with a boundary dispute, the surveyor should

- A) suggest, if litigation has not yet commenced, alternate dispute resolution, such as an amicable agreement, mediation or arbitration, or
- B) coordinate, if litigation has commenced, his/her efforts with the attorney for the client and prepare to serve as an expert witness for the client.

Commentary:

- 8.1(a)(1) *Reasonable effort means all necessary record research and field investigation, as well as the judicious application of the rules of law and the rules of construction, and at least an evaluation of the evidence according to the rules of evidence. Particular notice should be paid to the transfer of title by means other than recorded deeds and related documents, to physical occupation relative to record descriptions, to both extrinsic and intrinsic evidence, and to the hearsay nature of the evidence.*
- 8.1(a)(2)(A) *Prompt and accurate communication in this circumstance cannot be sufficiently stressed. Any hesitation or reservation only increases the risk to the surveyor and to the client.*
- 8.1(a)(2)(B) *Upon discovery of differences, the surveyor has effectively reached the limit of his/her expertise, and should defer to lawyers about matters of title and to real estate appraisers about matters of value.*
- 8.1(a)(2)(c) *Sometimes, the problem is only perceived or is of insufficient magnitude, or there is no burden of proof, and the best advice to the client is to do nothing.*
- 8.1(b)(1)(A) *Surveyors, on being asked the name of a good lawyer, should be impartial in their recommendation. If the case has already been heard but not decided, restraints on the admission of further evidence may have been placed on one or the other disputant, and a survey, though still desirable, may be of little value to the case.*
- 8.1(b)(1)(C) *The surveyor must be available, not just for the survey, but for depositions and court appearances, for which he/she may be subpoenaed. The surveyor cannot appear to be less than reliable and trustworthy, or to have a conflict of interest.*
- 8.1(b)(2)(A) *An agreement is a compact reached by the disputing parties themselves; mediation is an agreement reached with the help of a go-between that can only negotiate; arbitration is mediation by a court-appointed or contracted individual or panel that is binding. All three types of alternate resolution tend to avoid lengthy and costly litigation.*
- 8.1(b)(2)(B) *Once litigation has commenced, it is advisable that the surveyor be retained by the attorney for the disputant, for reasons of professional-client privilege. An expert witness differs from a lay witness in that he can testify not just to facts, but to his opinion, and may charge his usual professional fee for this service. A surveyor can be called as an expert witness by someone other than his client, notably the other disputant.*

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SECTION 9 - OTHER LAND SURVEYS

9.1 Other Land Surveys

The Registration Law defines land surveying as a branch of engineering and permits land surveyors to perform, albeit not exclusively, certain surveys the purpose of which is other than establishing property boundaries. These surveys are collectively called engineering land surveys, but can be differentiated into surveys for the purpose of mapping and surveying for the purpose of engineering. The apparent reason for including both under one heading is that the Registration Law did not envision mapping independent of engineering, such as the compilation of geographic information or the preparation of plans used for forensic purposes.

General rule: The rules articulated in the preceding sections with regard to boundary surveys shall apply in appropriately modified form to all surveys mentioned in this section.

a) Mapping-related Surveys

1) Topographic Surveys

Topographic surveys determine the horizontal and vertical location of the physical features on the surface of the earth, chiefly to provide information on the basis of which improvements can be designed. Topographic surveys can also be underground (mining) surveys, underwater (hydrographic) surveys and aerial surveys. The primary intent of topographic surveys is to present existing conditions.

- A) Land surveyors performing or employing the results of topographic surveys that require specialized knowledge and skills should be competent in them.
- B) Topographic information should be obtained by the most efficient means, without sacrificing
 - (i) the principle of responsible charge, and
 - (ii) the accuracy of the information.

2) Geodetic Surveys

Geodetic surveys are surveys of land masses, with or without regard for ownership or jurisdiction, and take into consideration the curvature of the earth. Such surveys are conducted mainly by means of the Global Positioning System, and are apt to employ the Pennsylvania State Plane Coordinate or Latitude/Longitude Systems.

- A) Land surveyors performing geodetic surveys or employing the results of geodetic surveys should be knowledgeable about the principles of geodetic surveying.
- B) Geodetic information appearing on individual land survey plans (i.e. geodetic ties) or systematic land information plans should
 - (i) make reference to the datum of the information,
 - (ii) identify the source of the information,
 - (iii) state the degree of its accuracy, and
 - (iv) disclaim any use for which the information is inappropriate.

b) Engineering-related Surveys

Engineering land surveys are concerned primarily with proposed conditions, both the incidental design of the improvements to the land - by the preparation of plans of the various improvements, construction specifications, and estimates of quantity and cost - and the implementation of the design - by construction stake-out, and the preparation of as-built surveys.

1) Engineering Design

- A) The design of the infrastructure of a development (i.e. line and grade extensions of public streets and utilities, on-site water and sewer systems, storm water management facilities, and sediment and erosion pollution control measures), shall follow commonly accepted or specified engineering practices.
- B) Land Surveyors shall engage in these practices only to the extent of their competence.

2) Implementation of the Design

- A) Land Surveyors engaging in construction stake-out shall have sufficient understanding of the principles of design and sufficient ability to interpret engineering plans to perform stake-outs in the field, in conjunction with the ability
 - (i) to devise a strategy to provide contractors with reference markers that permit the correct and efficient construction of improvements,
 - (ii) to perform the necessary calculations for lines and grades, and
 - (iii) to detect any omissions or inconsistencies in the design.
- B) Construction stake-out and post-construction surveys on relatively small projects should apply the same principles and methods of measurement as boundary surveys.

Commentary:

- 9.1 *Land surveying is perhaps better described as an arm of engineering. Its designation as a branch of engineering is the result of a legal challenge to an earlier law requiring registration (1927), which was found to be unconstitutional because it completely separated the functions of surveying and engineering.*
- 9.1(a)(1)(A) *Reference is made to photogrammetry and remote sensing, referred to as methods of measuring in the Registration Law.*
- 9.1(a)(1)(B) *Land surveying in Pennsylvania is generally plane surveying. Geodetic surveying, employing the state coordinate system or the global positioning system, is used in land surveying either to make ties to geodetic monuments or to establish control points for surveys of large projects.*
- 9.1(b)(1) *The Registration Law uses the wording "incidental design", which, strictly interpreted, means only the part of the design concerned with the location of any of the improvement (e.g. the position and slope of the area of a drain field). Inasmuch as examination for licensing includes questions on the various aspects of engineering applied in land development, "incidental" really means "obligatory".*
- 9.1(b)(1)(A)(ii) *It is incumbent upon land surveyors designing land developments to be familiar with applicable municipal ordinances and the requirements of county and state agencies, as well as time schedules and review costs.*
- 9.1(b)(1)(B) *Dual registration is prima facie evidence of such competence. Licensing upon examination that included engineering design is also evidence of such competence.*
- 9.1(b)(2)(A) *Frequently, unlicensed party chiefs effectively exercise responsible charge in the field. The Registration Law excludes party chiefs from auxiliary survey personnel.*