# INTRODUCTION

To contribute to the safeguarding of property and the enhancement of public welfare, I, have developed this manual for Land Surveyors and those interested in land surveys in California. I have made these guidelines to assist Land Surveyors in meeting the public's needs and working toward the highest standards achievable.

I encourage land surveyors and their clients to utilize the contents of this document for all surveys pertaining to the delineation, establishment, or retracement of property boundaries in the state, as well as any other surveys falling within the realm of land surveying practice.

While this manual serves as a practical and judicious guide for proficient surveying practices, Land Surveyors should continue to exercise their individual expertise, discretion, and judgment on each specific assignment. Thorough attention should be given to the California Codes, including the Business and Professions Code, as well as all relevant state and federal statutes, local ordinances, administrative regulations, judicial precedents, policies, and accepted surveying standards that may not be encompassed in this manual or that could potentially conflict with the guidelines provided herein.

**Standards are not intended to be used in place of professional judgment.** It must be understood that there will be circumstances and conditions that make it impossible to comply with some provisions of a standard. If the professional surveyor deviates from the standard or guideline, this deviation should be noted, described, and justified.

# DUTIES OF THE LAND SURVEYOR & CODE OF ETHICS

A surveyor’s duty, first and foremost, is to the public. Whenever the protection of the public is inconsistent with other interests sought to be promoted, the protection of the public shall be paramount.

Ethics may be considered the often unenforceable duties beyond the law that a professional person owes to the public, fellow professionals, and clients to create and maintain respect and confidence in a profession. Rules of ethics are only general guides of conduct but must be practiced consistently by each of us to be effective for the group. The proof of effective ethical conduct comes from the opinions of others and not from self-appraisal. Professional stature cannot be acquired by self-proclamation. A prudent surveyor acknowledges that it would be unethical to:

1. Be other than a faithful agent of a client and not act with fairness between a client and others.
2. Attempt to supplant a fellow surveyor after definite steps have been taken toward his engagement.
3. Review the work of another surveyor for the same client without the previous surveyor's knowledge or termination.
4. Accept an appointment with a client to replace another surveyor whose just financial claims remain unsettled, unless the previous surveyor fails to press a legal claim within a reasonable time.
5. Publicly attempt to injure the professional reputation of another surveyor.
6. Advertise in self-laudatory language or in any manner derogatory to the dignity of the profession.
7. Use the advantages of government employment while competing with surveyors in private practice.
8. Reduce normal fees to underbid the known charges of another surveyor, or undertake any work an a price that will not permit a professional performance.
9. Attempt to practice in any field of surveying in which he or she is not proficient.
10. Engage in competitive price bidding.

# PROJECT MANAGEMENT AND CONTRACTS

A prudent surveyor engages with a client prior to conducting any work in the following manner:

1. **Determine Purpose:**

A prudent surveyor should begin by inquiring as to the intended purpose for which the client will utilize the survey. The purpose should incorporate the specific needs of the client for its intended purpose as dictated by unique circumstances and conditions.

1. **Determine a Preliminary Scope of Services:**

A prudent surveyor should obtain sufficient information to understand the client’s requirements and to define services. If more information is necessary, surveyors should advise clients that it must be obtained prior to determining the scope of services.

1. **Evaluate Capabilities:**

Even though legally qualified by professional license, surveyors are still responsible for determining that their abilities meet the project's special needs. A prudent surveyor must possess proper knowledge, experience, equipment, and resources to undertake contemplated projects and should determine that their capabilities are adequate.

1. **Preliminary Records Research**

A prudent surveyor utilizes the ease of availability of public records to determine the legal requirements of fulfilling any contractual obligations. In most counties, GIS information allows a prudent surveyor to obtain available survey records within minutes. This information should be obtained and uses as a basis for a contract for services when available. When in a county or a situation where this information cannot be obtained, statements should be included in the contract, notifying the client that these requirements cannot be achieved. Additionally, when the scope of services relies on a title report the surveyor should not finalize the scope of services without obtaining such report or placing a similar statement within the contract notifying the client that a full understanding of the scope of services cannot be achieved without such documents.

1. **Evaluate Legal Requirements for Fulfilling a Contract.**

A licensed surveyor in California has a legal responsibility to file public records when conducting certain types of boundary work. These requirements typically include either a corner record, a record of a survey, or a map filed under the Subdivision Map Act. While there are some exceptions that cannot be known until under contract such as finding a physical change that results in a discrepancy, in most cases, a prudent surveyor knows to expect that these public record filings will be at the time of contract creation due to their preliminary records research. Where a reasonable surveyor would expect these legal obligations to occur during the course of the contract, the surveyor should provide a method of payment and notify the client within the contract of these requirements.

It is recommended that all contracts include a provision for achieving a surveyor’s legal requirements if they become necessary as a result of performance of the boundary survey.

1. **Finalize Scope and Estimate Cost and Time**

Once preliminary records research and legal requirements of the contract are evaluated, a prudent land surveyor finalizes the preliminary scope of work and informs clients before work starts of estimated costs, date when work could begin, and estimated time required to complete the project.

1. **Initiate Agreement**

Before beginning professional services for which payment is expected the surveyor and client should reach agreement to fix the scope of the surveyor’s duty, fee basis, and time period involved. For mutual protection, agreement should be documented (e.g. memorandum, services letter confirmation or work ordered, or contract). The agreement may also establish the extent of limitations of responsibility as well as a method for both parties to terminate the contract.

If previously unknown factors are discovered during the survey process that will significantly affect the cost or completion schedule, the client should be informed in a timely manner. The discovery of unknown factors, including latent or patent ambiguities, may require additional scopes of work to be negotiated.

# RESEARCH

A prudent land surveyor must conduct thorough research to conduct an action that locates, relocates, establishes, reestablishes, or retraces any property line or boundary of any parcel of land, right-of-way, easement, or alignment of those lines or boundaries shall be as follows:

* The recorded instrument that defines the boundary of the parcel, right-of-way, easement or alignment.
* Any subsequent related instruments referenced in the recorded instrument that define the boundary of the parcel, right-of-way, easement or alignment.
* Any filed publicly available map from the respective county recorder that delineates the boundary of the parcel, right-of-way, easement or alignment.

It is recommended that in order to provide a thorough and comprehensive survey, the client should provide the land surveyor with a current Preliminary Title Report, Title Commitment or documents from a Title Search and any other pertinent documents or maps available. In the case that title documents were not provided to support the survey, the land surveyor shall request these documents from the client. In the event the land surveyor does not have the benefit of receiving title documents, the land surveyor shall place the following or similar language as a note on the map:

“This survey was performed without the benefit of documents from a title search and is therefore subject to whatever state of facts that may be revealed in such search.”

For any sequential conveyance parcel, the surveyor is encouraged to obtain the adjoining deeds of record to ensure adequate boundary construction. When the surveyor does not obtain the adjoining deeds of record in a sequential conveyance parcel, the land surveyor shall place the following or similar language as a note on the map:

“This survey was performed without the adjoining deeds of record and is therefore subject to any discrepancies that would be revealed by an adequate resolution of the adjacent parcels .”

# RESEARCH ANALYSIS

A prudent land surveyor should:

1. Examine relevant documents to identify evidence to be recovered such as monuments, physical features, and providers of relevant testimony.
2. Analyze the record data to determine contiguity between the subject and relevant properties and to identify patent ambiguities,
3. When necessary, perform additional research upon discovery of patent ambiguities
4. Plan the procedure for performing the field survey.

# FIELDWORK

A professional land surveyor shall thoroughly:

1. Search for the physical monuments that represent each boundary corner
2. Search for other physical monuments set out in the description of the parcel or tract of land being surveyed;
3. Gather, analyze, and document evidence of occupation and physical evidence;
4. Gather, analyze, and document relevant parol evidence; and
5. Compare evidence discovered by field work with that discovered by record research while in the field to determine or reestablish the boundary of the tract or parcel of land being surveyed.

Survey control and boundary points shall be located with sufficient redundant measurements to enable the detection of measurement blunders and ensure consistency, which will result in precise measurements correlating with required accuracy.

Survey monuments that control land boundaries are often located on properties owned by persons or parties other than the client. The recovery and perpetuation of these survey monuments are vital to the successful completion of the survey and provides benefit to the public welfare. Survey monuments must be recovered, observed, measured, restored or established by the surveyor as an essential part of his practice and duty. The surveyor must be sensitive to the concerns of landowners when accessing survey monuments and shall provide identification upon request.

Nothing in this section shall prevent a professional land surveyor from delegating their field duties described herein. When such field duties are delegated by the professional land surveyor, the land surveyor shall place the following or similar language as a note on the map:

*“The fieldwork for this survey was performed by those under my direction”*

A similar statement may also be placed on the map if such duties are delegated to another professional land surveyor.

*“The fieldwork for this survey was performed by \_\_\_\_\_\_\_\_\_\_\_\_\_ PLS #\_\_\_\_\_”*

# POSITION STANDARDS

The following are basic measurement standards a prudent land surveyor should use:

* Distance and Elevation – Shall be expressed in US Survey Feet and/or metric units and sub-units of the same.
* Angles, azimuths or bearings shall be expressed in Degrees-Minutes-Seconds.
* If another standard of measurement is used, it shall be referenced as such and the conversion factor shall be noted. (i.e. decimal degrees, radians, chains, rods, poles, perches, local area standards.)

The degree of precision and accuracy necessary for a particular survey shall be based upon the intended use of the land. If the client does not include information regarding the intended use, the classification of the survey shall be based upon the current use of the land.

The Classifications of Surveys are as follows:

1. Urban Surveys - Urban surveys are performed on land lying within or adjoining a city or densely populated town, and include commercial and industrial properties, condominiums, townhouses, apartments and other multi-unit developments, regardless of geographic location. All ALTA/NSPS Land Title Surveys are included in this classification.
2. Suburban Surveys - Suburban surveys are performed on land lying outside of urban areas and developed for single family residential use.
3. Rural Surveys - Rural surveys are performed on land lying outside of developed urban and suburban areas such as but not limited to farms and wood lots.

# Relative Positional Precision Table

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| Classification of Survey | Acceptable Relative Positional Precision |
| Urban | 0.07 feet plus 50 PPM |
| Suburban | 0.13 feet plus 100 PPM |
| Rural | 0.26 feet plus 200 PPM |

The lines and corners on any property survey have uncertainty in location which is the result of (1) availability and condition of reference or controlling monuments, (2) occupation or possession lines as they may differ from record lines, (3) clarity or ambiguity of the record descriptions or plats of the surveyed tracts and its adjoiners and (4) positional tolerance.

The first three sources of uncertainty must be weighed as evidence in the determination of where, in the Professional Surveyor’s opinion, the boundary lines and corners should be located. Positional tolerance is a measure of how precisely the Surveyor can perform positional measurements and report those positions; it is not a substitute for the application of proper boundary law principles. A boundary corner or line may have a small Positional tolerance because the survey measurements were precise, yet still be in the wrong position (i.e., inaccurate) if it was established or retraced using faulty or improper application of boundary law principles.

Of these four sources of uncertainty, only positional tolerance can be limited through proper procedures and care, although due to the inherent error in any measurement, it cannot be eliminated. The first three can be estimated based on evidence; positional tolerance can be estimated using statistical means.

The Surveyor should, to the extent necessary to achieve the standards contained herein, (1) compensate or correct for systematic errors, including those associated with instrument calibration, (2) select the appropriate equipment and methods, and use trained personnel, and (3) use appropriate error propagation and other measurement design theory to select the proper instruments, field procedures, geometric layouts, and computational procedures to control random errors.

# BOUNDARY CONSTRUCTION

When delineating any title line as an integral portion of a survey, a prudent land surveyor shall:

1. Respect junior/senior rights for boundary retracement;
2. Follow the footsteps of the original land surveyor;
3. Follow the documented records of the land title affecting the boundaries being surveyed;
   1. Rely on the appropriate deeds and/or other documents including those for adjoining parcels for the location of the boundaries of the subject parcel(s).
   2. A land surveyor assuming the responsibility of performing a land survey also assumes the responsibility for such research of adequate thoroughness to support the determination of the location of the boundaries of the land being surveyed.
   3. All boundaries shall be connected to identifiable physical monuments. In the absence of such monumentation, the land surveyor's opinion of the boundary location shall be supported by other appropriate physical evidence, which shall be explained in a land surveyor's deliverable documents.
4. Follow the intent of the boundary location as evidenced by the record
5. Respect the proper application of the rules of dignity (priority) of calls and applicable California statutory and case law.

# IDENTIFICATION AND RESOLUTION OF CONFLICTS

Professional land surveyors are said to have a quasi-judicial function. While surveyors

do not have the power to adjudicate boundary disputes, a prudent surveyor must exercise sound judgment, in accordance with the law, in resolving boundary differences. Professional land

surveyors do not determine ownership but do determine the locations of boundary lines.

1. Questionable Boundaries
   1. Every reasonable effort should be made by a land surveyor to determine:
      1. the degree of conformity of the record evidence of adjoining property boundaries; and
   2. the quantitative, i.e., measured, differences between record boundaries and apparent occupation lines or lines of possession.
2. Upon discovery of any irreconcilable difference(s), the surveyor should:
   1. communicate the existence and the extent of the circumstance to the client;
   2. identify the nature of the issue, describe the difference in numbers, and if possible, provide an explanation for the difference;
   3. relate to the client, to the extent it can be anticipated, any possible effect on the use and ownership of the property;
   4. apprise the client of foreseeable options and mention the advisability of legal counsel;
   5. place explanatory notes and appropriate disclaimers on any documentation of the survey work; and
   6. conclude the fieldwork and set monuments when appropriate.
3. Disputed Boundaries
   1. When a surveyor is called upon after a dispute has arisen, the surveyor should:
      1. determine 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:
      2. attempt to determine the necessary scope of the surveying services, or the effective contribution of a survey, to the resolution of the dispute; and decide about:
         1. their availability;
         2. their ability to serve as an expert witness; and
         3. the propriety of his/her involvement in the dispute.
4. When the surveyor has been retained in connection with a boundary dispute, the surveyor may:
   1. if litigation has not yet commenced, suggest alternate dispute resolution, such as an amicable agreement, mediation, or arbitration; or
   2. if litigation has commenced, coordinate their efforts with the attorney for the client and prepare to serve as an expert witness for the client.

# MONUMENTATION

Monumentation is integral to every boundary survey,

1. Unless an adequate monument already exists at each boundary corner, a prudent land surveyor shall set a monument or a reference monument at each corner of the boundary as provided in this section
2. A monument or reference monument set by a surveyor shall conform to the following categories and shall meet the following criteria:
   1. "Typical and Preferred" an iron rod, iron pipe, or iron pin that is:
      1. Not less than one-half (1/2) inch in diameter and eighteen (18) inches in length;
      2. Equivalent to, or greater than, schedule-forty (40) weight if a pipe is utilized; and
      3. Identified with a cap bearing the license number of the professional land surveyor under whose direct supervision the survey was performed, and which cap does not display any other license number.
3. "Non-typical" to be used only when it is not practical to set the monuments described in subsection (a) of this subsection, and that:
   1. Preferably contains a ferrous material or is otherwise capable of being located with a magnetic locator, and may include P. K. or mag nails at least one 1 1/2 and one-half inches in length; and
   2. It is identified with the license number of the professional land surveyor under whose direct supervision the survey was performed, and it does not display any other license number.
4. "Alternate" to be used only when it is not practical to set the monuments described in subsections (a) and (b) of this subsection and may include railroad spikes, mine spikes, cross-cuts, chisel cuts, drill holes and curb notches, and shall be referenced to a durable, physical feature.
5. A boundary corner shall be identified by a reference monument if it is impractical to set a monument at the corner for either of the following reasons:
   * 1. The corner is likely to be disturbed; or
     2. The corner is inaccessible.
6. A reference monument shall be set on the boundary line, if practicable, to perpetuate the location of each corner.
7. A professional land surveyor shall set each monument in a manner to avoid or minimize the likelihood of its destruction.
8. A professional land surveyor may use a tree as a monument under the following conditions:
   * 1. A tree may be established as a corner monument only on a Rural boundary survey. Each tree utilized as a monument shall be marked in a conspicuous manner that is both physical and permanent and will not otherwise be harmful to the tree.
     2. A tree that a professional land surveyor establishes as a corner monument shall meet the following criteria:
        1. Be at least ten (10) inches in diameter at breast height;
        2. Be in sound condition;
        3. Be marked in a conspicuous manner that is both physical and permanent; and
        4. Be clearly described by size, species, and method of marking, on the plat and in the written description.
     3. Trees shall not constitute more than fifty (50) percent of the established monuments for a rural boundary survey.
     4. For an urban or suburban retracement survey in which a tree is found to be the monument of record, the tree shall be reference-monumented.
9. A corner monument that a professional land surveyor has determined is not of sound condition, fails to meet the standards established in this standard of practice, or is inadequate under the definition of monument within this standard of practice, shall be reference-monumented to perpetuate the corner location. All existing record monuments discovered during the performance of the survey shall be preserved and shall not be altered or destroyed.
10. Linear monuments may consist of a watercourse, ridge, road, or cliff, and:
    * 1. The point at which a boundary line intersects a linear monument shall be monumented or reference monumented; and
      2. A physical feature that represents a linear monument shall be monumented or reference monumented at a minimum of every 1,000 feet, and those monuments shall be set in intra-visible pairs not to exceed 1,000 feet in spacing between pairs.
11. All maps filed under the Subdivision Map Act shall state the date upon which the monuments shall be set in accordance with the Subdivision Map Act. The typical date that may be used is an estimate of 3 years beyond the map's filing date. This is intended to allow adequate time for construction to take place before final monuments are set. The date may be modified as the surveyor sees necessary or local ordinances require.
12. At the request of any licensed surveyor, any surveyor whose map which has been recorded but has not yet had its monuments set due to construction shall set reference monuments or provide adequate temporary monuments to allow their map to be retraced. However, the licensed surveyor requesting the ability to retrace such recorded map must show an adequate need. This requirement may be waived if electronic files are given to the satisfaction of the retracing surveyor.

# DOCUMENTATION OF BOUNDARY SURVEYS