

## STANDARDS

### I. INTRODUCTION

The standards and specifications detailed herein are for voluntary use. The rules and regulations of the Texas Board of Professional Land Surveying (TBPLS) are mandatory and have the effect of law. They are frequently referenced throughout this manual.

- A. These professional standards prescribe practices for land surveying in the State of Texas, so as to ensure the completion of the survey in accordance with commonly accepted standards of professional services, prevailing technological progress and current public welfare requirements. The standards further provide a means whereby competence may be readily distinguished in the land surveying profession. It is intended that these standards be commonly accepted as fundamental and necessary, except where a differing federal, state or local law, ordinance or rule may be more restrictive. Also see the introduction to the TBPLS Professional and Technical (P & T) Standards, found in the General Rules of Procedures and Practices.
- B. These standards will be of considerable value to property owners in Texas in obtaining professional surveying services. Further, these standards will assist the County Clerks of Texas in receiving and accepting maps for recordation.
- C. It is anticipated that these standards will be of considerable interest and value to the public and to other professions, most notably the legal and real estate professions.
- D. Surveys to be filed with the Texas General Land Office are to conform to existing statutes.
- E. All professional surveying must be conducted in accordance with the TBPLS General Rules of Procedures and Practices.

## STANDARDS

### II. GENERAL STATEMENT

- A. It shall be the duty of each Registered Professional Land Surveyor to counsel with his client or employer to determine the purpose of any surveying service so as to be certain the needs of the client or employer are met. The specific purpose of a survey will determine the Category of service needed, thereby identifying the information required, the work to be done and a sound basis for cost. Particular attention should be directed toward the client's needs regarding the sale or purchase of real property and the probability that title insurance may be issued on the basis of the survey.
- B. The land surveyor must provide the professional expertise, trained personnel and equipment necessary to achieve the results promulgated by these standards.
- C. Any land survey is greatly influenced by the determination and evaluation of record information as well as field evidence. It is essential therefore, that the land survey be accomplished in substantial compliance with these professional standards to ensure that every land survey is located, described, monumented and mapped in a professional manner.
- D. The computations of geometrical closure is seldom an assurance of the degree of accuracy to which a land parcel has been surveyed, but rather a means whereby excessive errors or blunders can be ascertained. Following the correction for the effects of systematic errors, the effects of accidental errors inherent in any linear or angular measurement must be determined by applied mathematical analysis.

### III. DEFINITIONS AND APPLICATIONS

- A. **Accidental Error:**  
An error for which it is equally probable that the sign of the error is a plus or minus value; an error for which there

## STANDARDS

is no proportional change or relationship between monuments, conditions and the sign or magnitude of the error; an error, evident in a series of measurements, which is compensated in total effect.

B. Bearing Source:

The source of the bearing (or course) must be related to a monumented line stated in the report, on the map or in any description as: 1) Geodetic Bearing, 2) Grid Bearing of the Texas Coordinate System of 1983 (or 1927), (with the proper zone specified), Sec. 21.071, et seq, Tex. Nat. Res. Code Ann. (Vernon 1978) or 3) A record bearing or the relation thereto.

C. Category:

A unit dividing major professional services of a Registered Professional Land Surveyor into defined segments of similar nature, procedure and practice. A Category is comprised of one or several services or products that are closely allied. A Route Survey is a Category. A Land Title Survey is a different Category. Each Category has specific requirements.

D. Closure:

A mathematical application whereby a determination is made as to the exactness that a geometrical form is generated or attained within its confined elements of connecting lines and points; a computation method used by a land surveyor to test the quality of field survey measurements and to apply corrections in balancing or adjusting the survey to meet precision specifications.

E. Condition:

Each Category is divided into 4 Conditions unless otherwise specified. A Condition is determined by the location of the site to be surveyed in regard to rural, suburban, urban or urban business district areas. Every site within the state will fall into one of the 4 Conditions. A Condition establishes the tolerances required for that survey. The below listed

## STANDARDS

Conditions are intended to provide for the large majority of land boundary surveying assignments. Where doubts exist between any two or more Conditions as to which sufficiently provides for the total needs of the surveying products, the higher conditions shall be used.

E.1 URBAN BUSINESS DISTRICT, CONDITION I: Any land survey made in a downtown business district of any city, town or village shall be known as an Urban Business District Land Survey, Condition I. A Condition I survey may define exterior boundaries, subdivide property, locate or relocate lots or tracts, define routes or rights of way and partition urban business district property for any legal use or purpose. An Urban Business District Land Survey may be made in any geographical area of the state for any appropriate legal purpose including title company insurance requirements for deletion of area and boundary exceptions on any real estate.

E.2 URBAN, CONDITION II: Any land survey made within the corporate limits of any city, town or village, but not in the recognized downtown business district, shall be known as an Urban Land Survey, Condition II. A Condition II survey may determine exterior boundaries, subdivide property for subdivision purposes, locate or relocate individual lots or tracts, define routes or rights of way and partition urban property for any legal use or purpose. An Urban Land Survey may be made in any geographical area of the state except within the downtown, business district of a city, town or village and may be used for any appropriate legal purpose, including title company insurance requirements for deletion of area and boundary exceptions on any real estate in urban, suburban, and rural areas.

E.3 SUBURBAN, CONDITION III: Any land survey that is made outside the corporate limits of any city, town or village but in any area that is or is intended to be primarily used for residential, commercial or industrial purposes or land lying

## STANDARDS

between such residential, commercial or industrial areas whose value is influenced by the presence of such nearby developed real estate shall be known as a Suburban Land Survey, Condition III. A Condition III survey may determine exterior boundaries, subdivide property for subdivision purposes, locate or relocate individual lots, or tracts, define routes or rights of way and partition suburban property for any use or purpose. The Suburban Land Survey may be made in any geographical area of the state except within corporate limits of a city, town, or village and may be used for any appropriate legal purpose including: Title company insurance requirements for deletion of area and boundary exceptions on any real estate in suburban or rural area.

E.4 RURAL, CONDITION IV: All land boundary surveys that are made outside a corporate city, town or village limit or outside a suburban residential, commercial or industrial subdivision to locate boundaries of unimproved or improved lands used for the production of crops, livestock or minerals, including gas, oil or coal (fossil fuels), shall be known as a Rural Land Survey, Condition IV. Partitioning of such land may also be done provided the primary purpose, nature or use of the surveyed land is known to remain unchanged. A Rural Land Survey is intended to locate the boundaries and determine the quantity of improved or unimproved farm, ranch, or quarry lands, define routes or rights of way, or to partition the site for like use, but is not to be used for subdividing into tracts or lots for a different purpose or use.

F. Controlling Monument:  
A monumented land corner to which a land survey is referenced. Is often a monument of record.

G. Land Survey, Boundary Survey or Property Survey:  
A survey performed by a Registered Professional Land Surveyor for the primary purpose of locating, describing, monumenting and mapping a parcel of land.

## STANDARDS

- H. Land Title Survey:  
A survey of real property performed by a Registered Professional Land Surveyor to be used by a title insuring agency for purposes of insuring title to said real property.
- I. Positional Tolerance:  
A measure of the accuracy of the position of a monumented boundary corner with respect to its described location without error. Also see applicable TBPLS rules for this subject.
- J. Record:  
Any documentary material filed in the public records of a city, county or state office that pertains to the location of real property.
- K. Shall, Should:  
"Shall", in this document, is considered obligatory; "should" is considered advised and recommended.
- L. The compliance or conformity with essential requirements. Also the equivalent of substantial performance, where inconsequential, trivial variations or omissions are minimized, but may occur.
- M. Surveyor, Land Surveyor or Registered Professional Land Surveyor:  
A person holding a valid license to practice land surveying as a Registered Professional Land Surveyor in the State of Texas, as issued by the Texas Board of Professional Land Surveying.
- N. Systematic Error:  
An error which, for known changes in measurement conditions, results in proportional changes of values which remain unchanged, both in magnitude and sign; an error, evident in a series of measurements, which is cumulative in total effect.

## STANDARDS

0. Tolerance:
- The allowable imperfection of any value stated or established in a survey. Each Category has 4 Conditions and each Condition has certain tolerances or specifications for values that must be met. The following explanations of tolerance items are to be used with the tolerance chart for each Category.
- 0.1 **Error of closure** reflects the precision of the survey and is the result of mathematically determining the latitude and departures and subsequently the misclosure of the traverse. Once this value has been determined and found to be of no lesser quality than required, any suitable adjustment may be made.
- 0.2 **Angular closure** for each Condition is expressed as the number of seconds allowable for any angle multiplied by the square root of the number of angles in the traverse. This value should not be exceeded in any loop closure. The basis for this angular value is well documented in standard textbooks on surveying practice and procedures.
- 0.3 **Accuracy of the bearing** (or course) in relation to source is the relationship of each bearing as expressed on a map, plat, and/or in a description of the new survey. This shall not exceed the angular relationship of the stated source by more than the following tolerance:
- $$\sin A = 1/P \text{ (approximately) and rounded to nearest 5 seconds}$$
- Where  $A = \pm$  bearing accuracy in seconds (rounded) and  $p =$  the denominator of the allowable error of closure (precision) for the particular Condition (i.e. 5,000; 7,500; 10,000; or 15,000)
- 0.4 **Positional tolerance of any monument** is the distance that any monument may be mislocated. This distance can be determined by dividing the length of the course between two monuments by denominator of the appropriate error of closure. The results

STANDARDS

of this calculation will establish the tolerance or radius around a point. No traverse adjustment shall be made to any distance larger than this positional error. The preceding tolerance calculations shall not apply to distances of 225 feet or less; however, all distances between monuments from 0 through 225 feet shall have a positional error not to exceed 0.03 feet.

0.5 **"Calculation of area - accurate and carried to"** means that the perimeter courses and distances as shown on a map, plat or drawing representing the survey shall compute to the area stated on the map. The decimal shall be carried only so far as it is compatible with the precision of the survey and not beyond the last significant number. A one acre survey with a precision of 1:5,000 will result in an area calculation of  $\pm$  value of 0.0002 acre. The acreage should then be carried only to the nearest 0.001 acre. Likewise a survey of a one acre tract with a precision of 1:15,000 will result in an area calculation of  $\pm$  3 square feet or about  $\pm$  .00007 acre. The acreage can then be carried to the nearest 0.1 acre. Similar values can be mathematically applied to any size tract by the formula:

$$Ae = A - (e/e+1 \times A)$$

Where Ae =  $\pm$

A = area of tract in square feet, determined from survey

e = denominator of error of closure for the particular Conditions (5,000; 7,500; 10,000; 15,000)

P. Water Course:

A stream of water such as a river, brook, creek, bayou, etc. A visible channel for water such as a ditch, channel or stream bed.

## STANDARDS

### Q. Working Sketch:

A map prepared from record data depicting the relationship of the various record tracts, usually in, but not limited to, the immediate vicinity of the parcel being considered or surveyed.

### R. Other Definitions:

Most terminology used in these standards is common within the profession or is defined herein; or when not defined herein refer to the *Definitions of Surveying and Associated Terms* (1978), as compiled by the joint committee of the American Society of Civil Engineers (ASCE), and American Congress on Surveying and Mapping (ACSM), Library of Congress Catalog Card No. 72-76807 or to *Glossary of the Mapping Sciences*, published by ASCE, ACSM and the American Society for the Photogrammetry and Remote Sensing (ASPRS), 1994.

## IV. RECORDS SEARCH

A. 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 intended boundaries of the land parcel surveyed.

B. In the absence of sufficient record evidence substantiating the intended boundaries of a parcel of land and the adjoining parcels, the land surveyor shall inform the client of such need and pursue every reasonable opportunity to accrue equivalent evidence through unrecorded sources, such as the testimony of local land owners, government officials, land surveyors, abstracters, real estate brokers, attorneys and any other person or agency which is normally involved in the disposition of real property.

C. The land surveyor may accompany his record search determination and evaluation with a comprehensive field investigationwhich may reveal the existence of record monumentation supporting the land parcel description to be surveyed.

## STANDARDS

### V. DESCRIPTIONS

- A. Any description written for the purpose of defining land boundaries shall provide a definite and unambiguous identification of the location thereof. Any form of description, regardless of the presence or absence of any or all dimensions, but specifically tying to adjoining conveyance descriptions, and which fulfills the foregoing conditions, is acceptable; however, such description, in addition to all necessary ties to such adjoiners, shall contain sufficient data of dimension to enable the description to be mapped in accordance with these standards.
- B. Every description for a land parcel, prepared by a land surveyor, shall describe all monuments found or placed.

### VI. MAPS

- A. When a land survey performed by a land surveyor requires a map, it shall be drawn to a convenient scale, and provide a clear and unambiguous representation of the location of the surveyed land parcel by its legal description. Measurements shown upon the map of a land survey shall be in substantial compliance with these standards.
- B. Where a surveyed boundary line varies materially in distance and/or bearing from a recorded boundary distance and/or bearing, the land surveyor should apprise his/her client or employer of such. This may be done by (1) Report of Survey, (2) Working Sketch, or (3) Showing and identifying such recorded distance and/or bearing along the mapped boundary line in proximity to the surveyed values, but not so as to cause confusion.
- C. Map bearings shall be referenced by notation upon the map to an identifiable, monumented line for directional control.

## STANDARDS

D. The map shall bear the name, firm name, and address of the land surveyor responsible for the land survey, his official seal, his original signature, date surveyed, and certification required herein.

E. Monuments found, placed, or replaced by the land surveyor shall be described upon the map, including those controlling monuments to which the survey may be referenced. The land surveyor shall note upon the map which monuments were found and which monuments were placed as a result of his/her survey.

### VII. MEASUREMENTS

A. Land survey measurements shall be made with equipment and methods of practice capable of attaining the tolerances specified by these standards. Also see the TBPLS minimum standards requirement.

### VIII. MONUMENTS

A. Sufficient corners shall be monumented or witnessed on all completed boundary surveys except where existing monuments (monuments being any significant physical object and/or its physical witness) are found in place. Every land survey performed by a land surveyor shall be monumented or witness monumented at all boundary corner locations. All monuments may (or should) bear the land surveyor's registration number or equivalent identification at or near the top of the monument whenever practical. Also see the TBPLS minimum standards requirement.

## STANDARDS