TEXAS SOCIETY OF PROFESSIONAL SURVEYORS

MANUAL OF PRACTICE

FOR LAND SURVEYING IN THE STATE OF TEXAS

PREPARED BY THE TSPS STANDARDS COMMITTEE

Approved by Board of Directors ~~October 7, 2021~~ July 27, 2024
Effective ~~December 31, 2021~~ September 30, 2024

Table of Contents

Preface

by Ken Gold, RPLS 1223

In the mid-1970's, I served as the Chairman of the *first* Texas Surveyors Association (TSA) *Standards* Committee directed to develop and publish workable surveying standards. That committee was comprised of seven experienced Registered Public Surveyors (RPSs) engaged in practice from seven different geographic areas of the state. Among the most unusual fact we discovered at that time was that members had difficulty in verbally communicating . . . there was little if any common "survey" language amongst them. That had to be resolved, as did many other irregularities before we could even get started. Success came about through cooperation, learning, compromise . . . a bit of arm twisting and over two years of concentrated trying.

It is heartwarming today to see the current Standards Committee engaged in the enormous and challenging task of updating and revising this work. This committee has taken the time to study, weigh and evaluate the old specifications and judge each as to its worth in today's modern practice. It is comforting to see they have maintained the original committees' mantra of addressing only "*what should be done, not how to do it.*" This is meticulous, word sleuthing work. What has emerged are specifications that address current practice in a language that surveyors understand.

These specifications are handy for the veteran land surveyor, not only for a professional check list, but also for use by office and field technicians as training aids and/or to assure them their work is on the correct path. Every survey/engineering company responsible for quality land surveys should furnish their key employees with a copy of these specifications . . . so it can be used as a virtual string around their finger . . . a reminder that detailed product descriptions are not far away. Likewise, clients, the public, and surveying educators have an opportunity to become acquainted with this profession's services and objectives.

2. Introduction. This Manual of Practice is offered for voluntary use. The rules and regulations of the Texas Board of Professional Engineers and Land Surveyors (TBPELS) are mandatory and have the effect of law. The purpose of this Manual of Practice is to prescribe a more stringent standard of practice for land surveying in the State of Texas.

The Manual of Practice was first adopted in 1977 by Texas Surveyors Association (TSA), now Texas Society of Professional Surveyors (TSPS). In 1992, the Texas Board of Professional Land Surveying (TBPLS) adopted minimum Professional and Technical Standards, known as "board rules." The original TBPLS rules were largely derived from the Manual of Practice. Though changes have been made over the years, the influence continues even today with the rules in place at TBPELS.

While the tools available to surveyors are rapidly changing, this manual does not provide instructions for the proper use of various tools. Rather, the objective of this manual is to provide a uniform standard for professional surveying services.

3. Definitions.

- **A. Category.** A division of survey services of similar nature, procedure, and practice.
- **B. Condition.** A division of a category with different survey precision requirements.
- **C. Record.** Any document filed in the public records of a city, county, state, or federal office that pertains to the location of real property.
- **D. Shall.** The word "shall," as used in this Manual of Practice, means obligatory.
- **E. Should.** The word "should," as used in this Manual of Practice, means recommended.
- **F. Surveyor.** A Registered Professional Land Surveyor (RPLS), sometimes referred to as a Land Surveyor or Professional Surveyor, is a person who holds a valid license to practice land surveying in the State of Texas.
- **G. Boundary Survey.** A survey performed by a Registered Professional Land Surveyor licensed in the State of Texas for the primary purpose of locating, describing, monumenting, and mapping a legal property boundary.
- **H. Route Survey.** A survey that defines new or existing right-of-way lines for a linear project. A route survey may utilize parcel or centerline descriptions.
- **I. Land Title Survey.** A survey of real property performed by a Registered Professional Land Surveyor to be used by a title insurer for the purposes of insuring title to real property.
- **J. Title Insurance Company.** The insurer (underwriter) or the agent for the insurer.
- **K. Subject Tract.** The parcel of land or easement that is being surveyed.
- **L. Adjoiner.** A tract that is contiguous with and in contact with the subject tract.
- **M. Adjacent Tract.** A tract that is near, but does not necessarily adjoin, the subject tract.
- **N. Lot.** A parcel of land, often within a recorded or unrecorded subdivision.
- **O. Cemetery.** A burial ground or graveyard.
- **P. Source Documents.** The legal instrument referenced within the title commitment.

Q. **Description.** A written report/statement defining the parcel using metes and bounds (field notes), lot & block, or section & block. A valid description must provide the information needed to uniquely identify the lot, parcel, or tract of land on the ground.
R. **Record Monuments.** Natural or artificial objects described in a recorded description for the purpose of locating a boundary.
S. **Point of Beginning.** The first point on the boundary of the described tract.
T. **Point of Commencing.** The starting point if not a part of the tract being described.
U. **Passing Call.** A descriptive call to pass an object or feature that is on or close to the boundary line.
V. **Witness Monument.** A locative object referenced by a direction and distance from a boundary corner.
W. **Visible Improvements.** Visible improvements refer to significant or substantial improvements observed while conducting fieldwork.
X. **Measurement Tolerances.** (See chart in the Appendices)
    a. **Error of Closure.** The amount by which a value of a quantity obtained by the surveying operations fails to agree with a fixed or theoretical value of the same quantity.
    b. **Error of Closure (traverse).** The amount by which a value of the position of a traverse station, as obtained by computation through a traverse, fails to agree with another value of the same station as determined by a different set of observations or route of survey.
    c. **Error of Closure (description).** The amount by which a legal description fails to agree with a theoretical value of the same bearings and distances. The adjusted mathematical closure shall be no less than 1:50,000.
Y. **TBPELS.** Texas Board of Professional Engineers and Land Surveyors. TBPELS was created by the Texas Legislature in the 2019 legislative session by merging the engineering and surveying professions under one board on September 1, 2019.
Z. **Survey Grade GIS.** Survey grade GIS products shall meet or exceed the TSPS Manual of Practice Requirements for Categories 1 – 9 when appropriate.

4. Standards.

A. **Standard of Care.** A surveyor shall perform the survey at the level that an ordinary surveyor would under the same or similar circumstances, with the foreseeability of harm to others.
B. **Boundary Determination.** The boundary lines and corners of the subject property shall be determined in accordance with current case law, statutes, and Texas Board of Professional Engineers and Land Surveyors (TBPELS) standards. The surveyor shall judiciously consider the application of the following:
    a. Footsteps of the original surveyor
    b. Dignity of calls
    c. Intention of the parties as expressed within the instrument's four corners
    d. Best evidence
    e. TBPELS rules

C. Area reported on survey. The following reported area chart provides the recommended number of decimal places for reported acreages. This is based on using 4 significant figures. The surveyor shall use professional judgment in determining the appropriate number of decimal places for acreage or square footage reported.

Reported Area	
0.0001	0 - 0.9999 Acre
0.001	1 - 9.999 Acres
0.01	10 - 99.99 Acres
0.1	100 - 999.9 Acres

D. Survey Standards. Surveys shall be performed using equipment and methods capable of meeting or exceeding the tolerances shown in the Appendices attached hereto. Because of the errors that are inherent to measurements, absolute perfection cannot be obtained and near perfection is impossible to obtain for a reasonable fee. The appropriate condition for the survey shall be determined based on the purpose of the survey, location of the property, and existing use of the property, unless the planned use of the property is reported to the surveyor in writing.

5. Survey Request. When ordering the survey, the client or client representative must specifically request the Category and Condition to which the survey shall be performed. Making the request later could result in additional expense being incurred. If the survey requires special permissions or clearances for the surveyor to enter the property, the client may need to make the arrangements so the surveyor may begin performing fieldwork.

TSPS Manual of Practice Requirements for Category 1A - Land Title Survey

Approved ~~October 7, 2021~~ July 27, 2024
Effective ~~December 31, 2021~~ September 30, 2024

1. Purpose. Due to the unique history and laws regarding boundaries and title of real property in Texas, it is necessary to maintain a land title survey standard that is specific to Texas. The minimum standards set forth by the Texas Board of Professional Engineers and Land Surveyors (TBPELS) do not address matters that are unique to land title surveys. Therefore, it is necessary to maintain an independent standard for land title surveys. The TBPELS minimum standards shall be followed unless these standards provide more stringent specifications.

A land title survey, also known as a title survey, is a comprehensive examination and reporting of significant factors affecting a tract's boundary lines, right-of-way lines, and easements. The title survey includes detail not normally gathered for a traditional boundary survey, and, absent a title commitment or report, a survey of this magnitude cannot be performed. The parties to a transaction, including the title insurance company, lender, buyer, and seller, all benefit from a land title survey. The Category 1A Land Title Survey provides clear and concise standards so the parties can have clear expectations regarding the title survey.

2. Research. Thorough research is a fundamental step in preparing a quality survey.

- **A. Boundary.** The surveyor will obtain sufficient research to adequately determine the boundaries surveyed. This research may be furnished by the client, title company, or any other third-party provider so long as the surveyor reasonably believes the research is sufficient to determine the boundaries and the surveyor states the source of the research on the survey.
- **B. Title Encumbrances.** The client or title company shall provide the surveyor with the most recent title commitment to complete the Category 1A Land Title Survey. If the surveyor finds a mistake in the title commitment, such as an omission of an easement that the surveyor knows to exist, the surveyor should notify the title company or make reference to the omitted easement on the survey. The client or title company should provide the surveyor with any source documents necessary to address and/or depict the relevant easements or restrictions on the survey. When a current title commitment is not available, the surveyor may complete the survey using a prior title commitment or title report, and note such on the survey.
- **C. Private & Quasi-public Records.** If private or quasi-public documents are needed to complete the survey, the surveyor may utilize such documents as provided, but will not be obligated to perform additional research unless such research is necessary to determine the boundary location in accordance with TBPELS minimum standards.

3. Fieldwork. Fieldwork shall be performed using equipment and techniques capable of attaining the precision and quality required by these standards and the profession. Surveying instruments

shall be calibrated and/or adjusted according to manufacturer's specifications and in good working order.

A. **Boundary Monuments.** Corners of the subject tract shall be monumented when practicable. When appropriate, witness monuments should be used.
    a. **Natural Monuments.** Natural monuments are the permanent objects which are the works of nature such as streams, rivers, ponds, lakes, bays, trees, ledges, rock outcrops, and other definitive terrestrial features.
    b. **Artificial Monuments.** A thorough on-the-ground search shall be made for called for artificial monuments affecting the location of the boundaries of the subject tract and adjoining boundary lines. Set monuments shall be of sufficient material to ensure that they will withstand the destructive forces of nature. Iron rods used for monuments shall be a minimum of 1/2 inch in diameter. Other monuments may be used to delineate or witness boundary corners such an X in concrete, a drill hole, etc. When practicable, monuments set to delineate or witness a boundary corner shall identify the registrant or associated firm.

B. **Water Features.** Visible evidence of water features shall be located. Water features include, but are not limited to, creeks, rivers, ponds, and swamps. If a water feature cannot be accessed, the lack of access shall be noted on the survey plat.

C. **Visible Improvements.** Visible improvements observed on the subject tract while conducting the survey shall be located, and visible improvements outside of the subject boundary but within approximately 5 feet of the boundary line should be located when practicable. Visible improvements could be evidence of easements, encroachments, protrusions, or prescriptive rights, and as such, the location of visible improvements is necessary to prepare a title survey. These improvements include, but are not limited to, the following:
    a. **Buildings.** Buildings observed while conducting fieldwork shall be located. Examples include, but are not limited to, houses, barns, sheds, offices, storage facilities, and other structures. A note shall be made on the plat if no buildings were observed on the property.
    b. **Access Roads.** Public and private roads can be evidence of access and possible prescriptive rights. Visible evidence of roads, streets, highways, alleys, or other public or private ways abutting or crossing the subject tract shall be located. Examples include, but are not limited to, back of curb, edge of pavement (absent curbing), curb cuts, driveways, culverts, and bridges.
    c. **Fences.** Perimeter fences and gates observed while performing fieldwork shall be located. Perimeter fences and gates may be evidence of prescriptive rights.
    d. **Water Wells.** Evidence of water wells and storage tanks observed while performing fieldwork shall be located.
    e. **Utilities.** Visible evidence of utilities observed while performing fieldwork shall be located. Examples include, but are not limited to, utility poles, guy wire anchors, cleanouts, septic tanks, pedestals, pipeline markers/signs, transformers, manhole covers, and meters. Visible evidence does not include sprinkler irrigation

system components. The surveyor is not responsible for locating buried utilities that are not visible, unless the surveyor has agreed to do so in writing.

f. **Energy Production.** Visible evidence of non-residential energy production on the property shall be located. Examples include, but are not limited to, oil and/or gas wells, wind turbines, solar panels, and other associated permanent equipment.

D. Cemeteries. Cemeteries, if (a) observed while conducting fieldwork or (b) disclosed in documents obtained by or provided to the surveyor, must be located and shown on the survey. If a cemetery has multiple graves, the cemetery may be identified by its perimeter.

4. Survey Plat. The survey plat, sometimes also referred to as a drawing or map, shall be drawn in a manner that provides a clear and unambiguous representation of the land surveyed and the improvements and easements located therein.

A. Fieldwork. Evidence collected as required in Section 3 above shall be depicted on the survey plat.

B. Sheet size. The minimum sheet size for the plat is 8.5 by 11 inches.

C. Scale. The plat shall be drawn at a standard engineering scale that is legible. Details or inserts shall be used when necessary to provide a clear depiction of the boundary, improvements, or potential encroachments.

D. Lines.

a. **Boundary.** The subject tract's boundary line shall be drawn using a line weight, width, or color that makes the boundary line distinguishable.

b. **Record.** Survey lines of any original land grants, original subdivision lot lines, and parent tracts affecting the survey shall be depicted on the survey plat in a distinguishable manner. These lines should be constructed based on the best available evidence, though the location may be approximate.

c. **Conflicts.** All apparent and visible boundary conflicts between the subject tract and adjoining tracts or surveys of the adjoining tracts shall be shown on the survey.

E. Easements & Restrictions. Easements and Restrictions, as described in Section 2.B., shall be noted or depicted on the survey.

F. Annotations.

a. **Boundary.** All boundary lines shall be annotated to report a bearing and distance. All curves shall be annotated to report a minimum of the radius, arc length, central angle, chord bearing, and chord distance.

b. **Record Boundary.** When appropriate, record bearings, distances, and curve data should be shown on the plat in parenthesis. If the parentheticals are not explained on the plat, the data should be designated as "call." Record data should be derived from the subject deed when available. When the record deed does not contain the necessary record data, the record data may be derived from a prior deed in the chain of title, the deed of a tract severed from the subject tract, a subdivision plat, a TXDOT right of way map, or any other reliable and relevant source. The source of the record data shall be indicated on the survey.

G. Area.
- **a. Reported.** The surveyor shall report the determined acreage or square footage of the subject tract(s) on the survey plat.
- **b. Record.** Record acreages, when available, shall be shown in parenthesis along with the volume and page or the instrument/file number of the source instrument.

H. Basis of Bearing. The basis of bearing used for the survey shall be noted on the plat and based on one of the following:
- **a. Grid.** A grid bearing based on a Texas Coordinate System approved by the Texas Legislature as defined by the Natural Resource Code.
- **b. Record.** A record bearing shall be based on found and accepted monuments called for in an instrument or plat of public record. The source of the record information shall be noted on the survey.
- **c. Geodetic.** The Geodetic meridian as observed within one mile of the surveyed site.

I. Adjoiner. Adjoiners shall be reviewed and a reference shall be cited on the survey plat to the instruments of record that define the location of adjoining or adjacent boundaries.

J. Additional Requirements. The survey plat shall also include the following:
- **a.** North arrow
- **b.** Graphic scale and stated scale
- **c.** Point of Beginning and Point of Commencing, if applicable
- **d.** Registrant's name and RPLS number
- **e.** RPLS seal, signature, and date of completion
- **f.** Firm name and TBPELS firm registration number, if applicable
- **g.** Legend of symbols, abbreviations, and/or lines, if applicable
- **h.** Sheet numbers, if more than one sheet (e.g. Sheet 2 of 5)
- **i.** The caption "Land Title Survey"

K. Notes.
- **a. Survey Notes.** Notes, if used, should be applicable for the intended use of the survey. Notes should address or clarify information relevant to the survey.
- **b. Title Note.** Title note shall reference the title commitment details (i.e. the GF number, the effective date, the issued date) and list the appurtenant items from the commitment.

L. Certification. All Category 1A survey plats shall include a certification. Each surveyor may determine the preferred wording for the certification, but all certifications shall contain the following language in the certification:

> This survey substantially complies with the current Texas Society of Professional Surveyors Manual of Practice requirements for a Category 1A, Condition ___, Land Title Survey.

5. Descriptions. The surveyor's description of the land surveyed shall provide a definite and unambiguous location of the tract of land.

A. **Metes and Bounds Description.** When appropriate, the surveyor shall prepare a metes and bounds description of the surveyed property. A metes and bounds description shall be prepared if the surveyor finds significant differences between the surveyed dimensions and record description. A metes and bounds description will be written in two parts, the general description and the particular description.
    a. **General Description (Preamble).** The general description will provide a general location of the property in relation to the parent tract, survey, league, or other original land division by compiling the following as appropriate:
        i. County and state
        ii. Survey name and abstract number
        iii. Recorded and established subdivision
        iv. Recording information for the deed in which the tract is described and record area, when available
    b. **Particular Description.** The particular description shall compile and incorporate calls for the following:
        i. **Monuments.** All written descriptions shall adequately describe all monuments found or set as part of the surveyed boundary. The description shall include the diameter of the monument and the material of the monument. Monuments located in close proximity to the determined boundary shall be located by a reference or passing call. Monuments used to construct the surveyed boundary shall be referenced.
        ii. **Calls to Adjoin.** The surveyor shall consider adjoining properties during the boundary construction. When appropriate, a call to adjoin shall be used to define the relationship between the subject tract and the adjoining tract or right-of-way.
        iii. **Courses.** Descriptions shall report the bearing and distance of all lines. For curves, the description shall report a minimum of the radius, arc length, central angle, chord bearing, and chord distance.
        iv. **Area.** The surveyor shall report the determined acreage or square footage of the subject tract.
        v. **Basis of Bearing.** The basis of bearing used for the survey shall be noted and based on one of the following:
            1. **Grid.** A grid bearing based on a Texas Coordinate System approved by the Texas Legislature as defined by the Natural Resource Code.
            2. **Record.** A record bearing shall be based on found and accepted monuments called for in an instrument or plat of public record. The source of the record information shall be noted.
            3. **Geodetic.** The Geodetic meridian as observed within one mile of the surveyed site.
        vi. **Additional Requirements.** The description shall include the following:
            1. Point of Beginning and Point of Commencing, if applicable
            2. Registrant's name and RPLS number

3. RPLS seal, signature, and date
4. Firm name and TBPELS firm registration number, if applicable
5. Page numbers if more than one page (e.g. Page 2 of 5)

B. **Lot & Block.** When the surveyed dimensions are in close agreement with the lot's platted calls, the reference to the lot within the recorded subdivision plat is an adequate description. However, a metes and bounds description should be prepared for a platted lot in a recorded subdivision if (i) the subdivision plat contains insufficient data to locate the lot with reasonable accuracy or (ii) the boundary dimensions shown on the subdivision plat are subject to significant conflict, ambiguity, error, or blunder that would hinder the future location of the boundary.

C. **Aliquot Descriptions.** An aliquot description may be used to describe a portion of a lot, tract, survey, or section when the surveyed dimensions are in close agreement with record dimensions.

6. Tolerances. See Appendix A for Category 1A survey tolerances.

TSPS Manual of Practice Requirements for Category 1B – Standard Land Survey

Approved ~~October 7, 2021~~ July 27, 2024
Effective ~~December 31, 2021~~ September 30. 2024

1. Purpose. A standard land survey, also known as a boundary survey, is a comprehensive examination and reporting of significant factors affecting a tract's boundary lines. The Texas Society of Professional Surveyors (TSPS) Standard Land Survey provides clear and concise standards so the parties can have clear expectations regarding the services provided. The Texas Board of Professional Engineers and Land Surveyors (TBPELS) minimum standards shall be followed unless these standards provide more stringent specifications.

2. Research. Thorough research is a fundamental step in preparing a quality survey.

- **A. Boundary.** The surveyor will obtain sufficient research to adequately determine the boundaries surveyed. This research may be furnished by the client, title company, or any other third-party provider so long as the surveyor reasonably believes the research is sufficient to determine the boundaries and the surveyor states the source of the research on the survey.
- **B. Private & Quasi-public Records.** If private or quasi-public documents are needed to complete the survey, the surveyor may utilize such documents as necessary to determine the boundary location.

3. Fieldwork. Fieldwork shall be performed using equipment and techniques capable of attaining the precision and quality required by these standards and the profession. Surveying instruments shall be calibrated and/or adjusted according to manufacturer's specifications and in good working order.

- **A. Boundary Monuments.** Every corner of the subject tract shall be monumented when practicable.
  - **a. Natural Monuments.** Natural monuments are the permanent objects which are the works of nature such as streams, rivers, ponds, lakes, bays, trees, ledges, rock outcrops, and other definitive terrestrial features.
  - **b. Artificial Monuments.** A thorough on-the-ground search shall be made for called for artificial monuments affecting the location of the boundaries of the subject tract and adjoining boundary lines. Set monuments shall be of sufficient material to ensure that they will withstand the destructive forces of nature. Iron rods used for monuments shall be a minimum of 1/2 inch in diameter. Other monuments may be used to delineate or witness boundary corners such an X in concrete, a drill hole, etc. When practicable, monuments set to delineate or witness a boundary corner shall identify the registrant or associated firm.
- **B. Water Features.** There is no requirement to show water features unless the water feature is visible and evidence of adverse occupation or use.

C. **Visible Improvements.** There is no requirement to show visible improvements except for visible evidence of adverse occupation or use. Such evidence includes perimeter fences and improvements.

D. **Cemeteries.** Cemeteries, if (a) observed while conducting fieldwork or (b) disclosed in documents obtained by or provided to the surveyor, must be located and shown on the survey. If a cemetery has multiple graves, the cemetery may be identified by its perimeter.

4. Survey Plat. The survey plat, sometimes also referred to as a drawing or map, shall be drawn in a manner that provides a clear and unambiguous representation of the land surveyed ~~and the improvements and easements located therein~~.

A. **Fieldwork.** Evidence collected as required in Section 3 above shall be depicted on the survey plat.

B. **Sheet size.** The minimum sheet size for the plat is 8.5 by 11 inches.

C. **Scale.** The plat shall be drawn at a standard engineering scale that is legible. Details or inserts shall be used when necessary to provide a clear depiction of the boundary, improvements, or potential encroachments.

D. **Lines.**

a. **Boundary.** The subject tract's boundary line shall be drawn using a line weight, width, or color that makes the boundary line distinguishable.

b. **Record.** Survey lines of any original land grants, original subdivision lot lines, and parent tracts affecting the survey shall be depicted on the survey plat in a distinguishable manner. These lines should be constructed based on the best available evidence, though the location may be approximate.

c. **Conflict.** All apparent and visible boundary conflicts between the subject tract and adjoining tracts or surveys of the adjoining tracts shall be shown on the survey.

E. **Annotations.**

a. **Boundary.** All boundary lines shall be annotated to report a bearing and distance. All curves shall be annotated to report a minimum of the radius, arc length, central angle, chord bearing, and chord distance.

b. **Record Boundary.** When appropriate, record bearings, distances, and curve data should be shown on the plat in parenthesis. If the parentheticals are not explained on the plat, the data should be designated as "call." Record data should be derived from the subject deed when available. When the record deed does not contain the necessary record data, the record data may be derived from a prior deed in the chain of title, the deed of a tract severed from the subject tract, a subdivision plat, a TXDOT right of way map, or any other reliable and relevant source. The source of the record data shall be indicated on the survey.

F. **Area.**

a. **Reported.** The surveyor shall report on the survey plat the determined acreage or square footage of the subject tract(s).

b. **Record.** Record acreages, when available, shall be shown in parenthesis along with the volume and page or the instrument/file number of the source instrument.

G. **Basis of Bearing.** The basis of bearing used for the survey shall be noted on the plat and based on one of the following:
   a. **Grid.** A grid bearing based on a Texas Coordinate System approved by the Texas Legislature as defined by the Natural Resource Code.
   b. **Record.** A record bearing shall be based on found and accepted monuments called for in an instrument or plat of public record. The source of the record information shall be noted on the survey.
   c. **Geodetic.** The Geodetic meridian as observed within one mile of the surveyed site.

H. **Adjoiner.** Adjoiners shall be reviewed and a reference shall be cited on the survey plat to the instruments of record that define the location of adjoining or adjacent boundaries.

I. **Additional Requirements.** The survey plat shall also include the following:
   a. North arrow
   b. Graphic scale and stated scale
   c. Point of Beginning and Point of Commencing, if applicable
   d. Registrant's name and RPLS number
   e. RPLS seal, signature, and date of completion
   f. Firm name and TBPELS firm registration number, if applicable
   g. Legend of symbols, abbreviations, and/or lines, if applicable
   h. Sheet numbers, if more than one sheet (e.g. Sheet 2 of 5)
   i. The caption "Standard Land Survey"

J. **Notes.** Notes, if used, should be applicable for the intended use of the survey. Notes should address or clarify information relevant to the survey.

K. **Certification.** All final survey plats shall include a certification. Each surveyor may determine the preferred wording for the certification, but all certifications shall contain the following language in the certification:

> This survey substantially complies with the current Texas Society of Professional Surveyors Manual of Practice requirements for a Category 1B, Condition ___, Standard Land Survey.

5. Descriptions. The surveyor's description of the land surveyed shall provide a definite and unambiguous location of the tract of land.

A. **Metes and Bounds Description.** When appropriate, the surveyor shall prepare a metes and bounds description of the surveyed property. A metes and bounds description shall be prepared if the surveyor finds significant differences between the surveyed dimensions and record description. A metes and bounds description will be written in two parts, the general description and the particular description.
   a. **General Description (Preamble).** The general description will provide a general location of the property in relation to the parent tract, survey, league, or other original land division by compiling the following as appropriate:

i. County and state
ii. Survey name and abstract number
iii. Recorded and established subdivision
iv. Recording information for the deed in which the tract is described and record area, when available

b. **Particular Description.** The particular description shall compile and incorporate calls for the following:
   i. **Monuments.** All written descriptions shall adequately describe all monuments found or set as part of the surveyed boundary. The description shall include the diameter of the monument and the material of the monument. Monuments located in close proximity to the determined boundary shall be located by a reference or passing call. Monuments used to construct the surveyed boundary shall be referenced.
   ii. **Calls to Adjoin.** The surveyor shall consider adjoining properties during the boundary construction. When appropriate, a call to adjoin shall be used to define the relationship between the subject tract and the adjoining tract or right-of-way.
   iii. **Courses.** Descriptions shall report the bearing and distance of all lines. For curves, the description shall report a minimum of the radius, arc length, central angle, chord bearing, and chord distance.
   iv. **Area.** The surveyor shall report the determined acreage or square footage of the subject tract.
   v. **Basis of Bearing.** The basis of bearing used for the survey shall be noted and based on one of the following:
      1. **Grid.** A grid bearing based on a Texas Coordinate System approved by the Texas Legislature as defined by the Natural Resource Code.
      2. **Record.** A record bearing shall be based on found and accepted monuments called for in an instrument or plat of public record. The source of the record information shall be noted.
      3. **Geodetic.** The Geodetic meridian as observed within one mile of the surveyed site.
   vi. **Additional Requirements.** The description shall include the following:
      1. Point of Beginning and Point of Commencing, if applicable
      2. Registrant's name and RPLS number
      3. RPLS seal, signature, and date
      4. Firm name and TBPELS firm registration number, if applicable
      5. Page numbers if more than one page (e.g. Page 2 of 5)

B. **Lot & Block.** When the surveyed dimensions are in close agreement with the lot's platted calls, the reference to the lot within the recorded subdivision plat is an adequate description. However, a metes and bounds description should be prepared for a platted lot in a recorded subdivision if (i) the subdivision plat contains insufficient data to locate the lot with reasonable accuracy or (ii) the boundary dimensions shown on the subdivision

plat are subject to significant conflict, ambiguity, error, or blunder that would hinder the future location of the boundary.

C. **Aliquot Descriptions.** An aliquot description may be used to describe a portion of a lot, tract, or section when the surveyed dimensions are in close agreement with record dimensions.

6. Tolerances. See Appendix A for Category 1B survey tolerances.

TSPS Manual of Practice Requirements for Category 2 - Route Survey

Approved ~~October 7, 2021~~ July 27, 2024
Effective ~~December 31, 2021~~ September 30. 2024

1. Purpose. A route survey is often used to determine the alignment of a fee or easement right-of-way for roads, transmission lines, pipelines, waterways, etc. Facilities within the right-of-way are often located in relation to the baseline or right-of-way line. The route map, also known as an alignment sheet, depicts the route survey.

2. Information Required. Sufficient information to perform the route survey should be furnished by the client or acquired by the surveyor. The following data should be considered and evaluated by the surveyor:

- **A. Preliminary Alignment.** A map showing the preliminary route and affected tracts;
- **B. Research.** Sufficient research to adequately determine the location of property lines and rights-of-way along the route; and
- **C. Right of Entry.** Permission to enter and survey on the land, preferably in writing, and the names of owners, tenants, or parties in charge of the properties.

3. Fieldwork. Fieldwork shall be performed within the proposed route limits. Fieldwork shall be performed using equipment and techniques capable of attaining the precision and quality required by these standards and the profession. Surveying instruments shall be calibrated and/or adjusted according to manufacturer's specifications and in good working order.

- **A. Monuments.** Boundary monuments necessary to adequately determine the location of property lines and rights-of-way shall be located.
- **B. Water Features.** Visible evidence of canals, ditches, lakes, marshes, ponds, tanks, springs, streams, and swamps situated within the proposed route limits observed while performing fieldwork shall be located. If a water feature cannot be accessed, the surveyor shall note on the survey plat.
- **C. Visible Improvements.** Visible improvements observed within the proposed route limits while conducting the survey shall be located. These improvements include, but are not limited to, the following:
    - **a. Buildings.** Buildings observed while conducting fieldwork shall be located. Examples include, but are not limited to, houses, barns, sheds, offices, storage facilities, and other structures.
    - **b. Access Roads.** Visible evidence of roads, streets, highways, alleys, or other public or private ways abutting or crossing the route shall be located. Examples include, but are not limited to, back of curb, edge of pavement (absent curbing), curb cuts, driveways, culverts, and bridges.
    - **c. Fences.** Fences observed while performing fieldwork shall be located.
    - **d. Water Wells.** Evidence of water wells and storage tanks observed while performing fieldwork shall be located.

e. **Utilities.** Visible evidence of utilities observed while performing fieldwork shall be located. Examples include, but are not limited to, utility poles, guy wire anchors, cleanouts, septic tanks, pedestals, pipeline markers/signs, transformers, manhole covers, and meters. Visible evidence does not include sprinkler irrigation system components. The surveyor is not responsible for locating buried utilities that are not visible, unless the surveyor has agreed to do so in writing.

f. **Energy Production.** Visible evidence of non-residential energy production within or near the route shall be located. Examples include, but are not limited to, oil and/or gas wells, wind turbines, solar panels, and other associated permanent equipment.

D. Cemeteries. Cemeteries, if (a) observed while conducting fieldwork or (b) disclosed in documents obtained by or provided to the surveyor, must be located and shown on the route map. If a cemetery has multiple graves, the cemetery may be identified by its perimeter.

E. Profiles and Elevations. Profiles and elevations shall be compiled or established as required by the nature of the project or by request of the client.

F. Major Terrain Features. Major terrain features, such as rivers, creeks, lakes, highways, permanent improvements, physical objects, or structures such as buildings, wells, canals, power lines, railroads, signal lines, culverts, bridges, etc. shall be located.

4. Route Map. The route map, sometimes also referred to as alignment sheets or right-of-way maps, shall be drawn in a manner that provides a clear and unambiguous representation of the route surveyed and the improvements and easements located therein.

A. Fieldwork. Evidence collected as required in Section 3 above shall be depicted on the route map.

B. Sheet layout. The method of display may be in multi-sheet form or in a continuous strip. Where multi-sheet display is used, a separate index or cover sheet should be made of the appropriate area. This index sheet should identify the limits and bounds of each mapping sheet for reference. Individual sheets should include match lines indicating corresponding sheets.

C. Scale. The route map shall be drawn at a standard engineering scale that is legible. Details or inserts shall be used when necessary.

D. Equations & Exclusions. When a station equation or exclusion is necessary, the text shall be proximately labelled using large and bold text.

E. Tracts

a. **Parent Tracts.** The tracts of land crossed by the route survey shall be uniquely identified on the route map with a reference to the instruments of record.

b. **Adjoiner Tracts.** The tracts of land that adjoin the route shall be depicted on the route map with a reference to the instruments of record. When appropriate, tracts of land that are in close proximity to the route shall be depicted on the route map with references to the instruments of record.

F. Lines.

a. **Baselines.** Baselines shall be drawn using a line weight, width, or color that is distinguishable. A stationing system should be utilized, when appropriate, and

marked at appropriate intervals. Angle points, points of curvature, points of tangency, property lines, right-of-way lines, and topographic features should be identified by station and offsets as applicable. Lines shall be annotated to report a bearing and distance, and curves shall be annotated to report a minimum of the radius, arc length, central angle, chord bearing, and chord distance.

b. **Property Lines.** The boundary between owners shall be clearly depicted on the route map.

c. **Informational Lines.** Survey lines of any original land grants, original subdivision lines, internal tract lines, county lines, and city limit lines shall be depicted on the route map in a distinguishable manner. These lines should be constructed based on the best available evidence, though the location may be approximate.

G. Survey Control.

a. **Basis of Bearing.** The basis of bearing shall be noted on the route map and based on one of the following:

i. **Grid.** A grid bearing based on a Texas Coordinate System approved by the Texas Legislature as defined by the Natural Resource Code.

ii. **Record.** A record bearing shall be based on found and accepted monuments called for in an instrument or plat of public record. The source of the record information shall be noted on the route map.

iii. **Geodetic.** The Geodetic meridian as observed within one mile of the surveyed site.

b. **Vertical Control.** The vertical control shall reference (i) a published vertical datum, (ii) published benchmarks, or (iii) if assumed, the assumed project elevation datum point shall be stated.

H. Additional Requirements. The route map shall also include the following:

a. North arrow on each sheet, if applicable
b. Graphic scale and stated scale
c. Registrant's name and RPLS number
d. RPLS seal, signature, and date of completion
e. Firm name and firm registration number, if applicable
f. Legend of symbols, abbreviations, and/or lines, if applicable
g. Sheet numbers, if more than one sheet (e.g. Sheet 2 of 5)
h. The caption "Route Survey"

I. Notes. Notes, if used, should be applicable for the intended use of the survey. Notes should address or clarify information relevant to the route survey.

J. Certification. All route maps shall include a certification. Each surveyor may determine the preferred wording for the certification, but all certifications shall contain the following language in the certification:

> This survey substantially complies with the current Texas Society of Professional Surveyors Manual of Practice requirements for a Category 2, Route Survey.

5. **Parcel Surveys.** Route surveying typically requires multiple surveying services. When surveying individual parcels, the surveyor may comply with and certify to Category 1A or Category 1B. When preparing a topographic survey as part of the Route Survey, the surveyor may comply with and certify to Category 6.

TSPS Manual of Practice Requirements for Category 5 – Construction Survey

Approved ~~October 7, 2021~~ July 27, 2024
Effective ~~December 31, 2021~~ September 30. 2024

1. Purpose. A construction survey is used to provide horizontal and vertical staking of the location of proposed buildings, structures, or facilities prior to and during construction according to engineering or architectural plans.

2. Plans. Obtaining the correct construction plans is crucial to performing a construction survey. Plans are subject to revisions that may substantially affect a construction survey. The construction plans should include the location of all proposed facilities, easements, and improvements.

3. Fieldwork. Fieldwork shall be performed using equipment and techniques capable of attaining the precision required by these standards and the profession. Surveying instruments shall be calibrated and/or adjusted according to manufacturer's specifications and in good working order.

- **A. Survey Control.** Horizontal and vertical control shall be based on data provided in the plans. To ensure that the control is reliable, control points shall be verified by observing multiple control points provided in the construction plans.
- **B. Control Points.** Control monuments should be of sufficient permanence to withstand the normal disturbances expected throughout construction. To avoid confusion, control monuments should not be set near existing boundary corners.
- **C. Construction Stakes.** The material used for construction stakes shall be chosen with regard to the use and permanence expected for the project.
- **D. Errors & Changes.** Construction staking shall correspond to the plans. Irregularities or conflicts found shall be promptly reported. Any revisions or corrections to the plans should be carefully noted.

4. Other Services. Construction projects may require other survey services. For as-built surveys, refer to Category 1A – Land Title Survey, Category 1B – Standard Land Survey, and Category 6 – Topographic Survey.

5. Tolerances. The staked location of any improvements or facilities should be as accurate as practicable and necessary. The degree of precision required is dependent on many factors all of which must remain judgmental. The surveyor shall assess the appropriate precision by examining the plans and consulting with the appropriate authority regarding the tolerances necessary for that specific project.

TSPS Manual of Practice Requirements for Category 6 - Topographic Survey

Approved ~~October 7, 2021~~ July 27, 2024
Effective ~~December 31, 2021~~ September 30. 2024

1. Purpose. A topographic survey is the service performed to determine the configuration, relief, or elevations of a portion of the earth's surface, including the location of natural and/or man-made features thereon. The preparation of a topographic survey requires the expert skill of a Registered Professional Land Surveyor well versed in techniques used to prepare reliable topographic maps. A topographic survey is not a boundary survey, although some approximate property lines may be delineated. The limits of the topographic survey will be determined based on the intended use.

2. Fieldwork. Fieldwork, for collecting data on-the-ground or field-verifying remote sensing data, shall be performed using equipment and techniques capable of attaining the precision required by these standards. Surveying instruments shall be calibrated and/or adjusted according to manufacturer's specifications and in good working order.

- **A. Temporary Benchmark.** A minimum of two benchmarks shall be placed at the site of the topographic survey.
- **B. Water Features.** Water features situated within the project limits and observed while performing fieldwork shall be located.
- **C. Visible Improvements.** Visible improvements observed within the project area while conducting the survey shall be located. These improvements include, but are not limited to, the following:
    - **a. Buildings.** Buildings observed while conducting fieldwork shall be located. Examples include, but are not limited to, houses, barns, sheds, offices, storage facilities, and other structures. Finished floor elevations should be collected when appropriate.
    - **b. Roads.** Visible evidence of roads, streets, highways, alleys, or other public or private ways abutting or crossing the project area shall be located. Examples include, but are not limited to, centerline, back of curb, edge of pavement (absent curbing), curb cuts, driveways, culverts (with flow line & sizes when appropriate), and bridges.
    - **c. Fences.** Fences observed while performing fieldwork shall be located and defined.
    - **d. Water Wells.** Evidence of water wells and storage tanks observed while performing fieldwork shall be located.
    - **e. Utilities.** Visible evidence of utilities observed while performing fieldwork shall be located. Examples include, but are not limited to, antennas, utility poles, guy wire anchors, cleanouts, septic tanks, pedestals, pipeline markers/signs, transformers, manhole covers, and electric, gas, and water meters. The surveyor is not responsible for locating buried utilities that are not visible, unless the surveyor

has agreed to do so in writing. Invert flowlines and pipe sizes for manholes and inlets should be obtained when appropriate.

f. **Energy Production.** Visible evidence of non-residential energy production on the property shall be located. Examples include, but are not limited to, oil and/or gas wells, wind turbines, solar panels, and other associated permanent equipment.

D. **Cemeteries.** Cemeteries, if (a) observed while conducting fieldwork or (b) disclosed in documents obtained by or provided to the surveyor, must be located and shown on the survey. If a cemetery has multiple graves, the cemetery may be identified by its perimeter.

E. **Topographic Data.** The topographic data used for the survey may be collected by any means so long as the data is capable of attaining the precision required for the project.

3. Survey Plat. The survey plat, sometimes also referred to as a drawing or topographic map, shall be drawn in a manner that provides a clear and unambiguous representation of the improvements and topographic features located therein.

A. **Fieldwork.** Any survey data collected in accordance with Section 2 above shall be depicted on the survey plat if a plat is prepared. See plat exception in Section 4 below.

B. **Sheet Size.** The minimum sheet size for the plat is 8.5 by 11 inches.

C. **Scale.** The plat shall be drawn at a standard engineering scale that is legible. Details or inserts shall be used when necessary.

D. **Topographic Data.** Topographic data may be presented using one or more of the following formats:

a. **Contour Lines.** Contour lines are interpolated from topographic data to provide an approximation of the elevation contour as it exists on the ground. Contours shown on the survey plat may include contour and index contour lines. Index contours should be labeled and displayed as heavier lines at appropriate intervals of five feet (or multiples thereof).

b. **Spot Elevations.** Spot elevations, plotted on a grid of appropriate size, can be an effective way to demonstrate topographic data. Spot elevations are most suitable for relatively flat terrain and heavily timbered areas but can be used in almost any situation. The horizontal location of the spot elevations should be clearly depicted on the plat. Such locations may be depicted with a dot, small "x" mark, “+” mark, etc. The marked spot shall be accompanied by the appropriate elevation.

c. **Surface Model.** The three-dimensional representation of the topography may be provided in a .tin file or some other surface model file.

E. **Lines.** Lines shown on the plat shall be drawn using a line weight, width, or color that makes the lines distinguishable.

F. **Survey Control.**

a. **Horizontal Control.** The horizontal control used for the topographic survey shall be noted on the plat and based on one of the following:

i. **Grid.** Grid control (bearings & coordinates) shall be based on a Texas Coordinate System approved by the Texas Legislature as defined by the Natural Resource Code.

ii. **Record.** A record bearing shall be based on found and accepted monuments called for in an instrument or plat of public record. The source of the record information shall be noted on the survey.

iii. **Geodetic.** The Geodetic meridian as observed within one mile of the surveyed site.

b. **Vertical Control.** The vertical control shall reference (i) a published vertical datum, (ii) published benchmarks, or (iii) if assumed, the assumed project elevation datum point shall be stated.

c. **Project Control Point.** Each project control point, also known as a benchmark, shall be shown on the plat with a locative and physical description of the monument and the elevation.

G. **Additional Requirements.** The survey plat shall also include the following:

a. North arrow
b. Graphic scale and stated scale
c. Registrant's name and RPLS number
d. RPLS seal, signature, and date of completion
e. Firm name and TBPLS firm registration number, if applicable
f. Legend of symbols, abbreviations, and/or lines, if applicable
g. Sheet numbers, if more than one sheet
h. The caption "Topographic Survey"

H. **Notes.** Notes, if used, should be applicable for the intended use of the survey. Notes should address or clarify information relevant to the survey.

I. **Certification.** All final survey plats shall include a certification. Each surveyor may determine the preferred wording for the certification, but all certifications shall contain the following language in the certification:

> This survey substantially complies with the current Texas Society of Professional Surveyors Manual of Practice requirements for a Category 6, Condition ___, Topographic Survey.

4. Survey Report. In lieu of a survey plat, data may be provided to the client via a digital data set. The data set shall be accompanied by a survey report containing the following:

A. **Survey Control.**

a. **Horizontal Control.** The horizontal control used for the topographic survey shall be noted on the survey report and based on one of the following:

i. **Grid.** Grid control (bearings & coordinates) shall be based on a Texas Coordinate System approved by the Texas Legislature as defined by the Natural Resource Code.

ii. **Record.** A record bearing shall be based on found and accepted monuments called for in an instrument or plat of public record. The source of the record information shall be noted on the survey.

iii. **Geodetic.** The Geodetic meridian as observed within one mile of the surveyed site.

b. Vertical Control. The vertical control shall reference (i) a published vertical datum, (ii) published benchmarks, or (iii) if assumed, the assumed project elevation datum point shall be stated.

c. Project Control Point. Each project control point, also known as a benchmark, shall be shown on the plat with a locative and physical description of the monument and the elevation.

B. Additional Requirements. The survey report shall also include the following:

a. Data acquisition date(s)

b. Registrant's name and RPLS number

c. RPLS seal, signature, and date of completion

d. Firm name and TBPLS firm registration number, if applicable

e. Legend of symbols, abbreviations, and/or lines, if applicable

f. The title "Topographic Survey Report"

C. Notes. Notes, if used, should be applicable for the intended use of the survey. Notes should address or clarify information relevant to the survey.

D. Certification. All survey reports shall include a certification. Each surveyor may determine the preferred wording for the certification, but all certifications shall contain the following language in the certification:

> The survey data set accompanying this report substantially complies with the current Texas Society of Professional Surveyors Manual of Practice requirements for a Category 6, Condition ___, Topographic Survey.

5. Tolerances. See Appendix B for Category 6 survey tolerances.

TSPS Manual of Practice Requirements for Category 7 – Horizontal Control Survey

Approved ~~October 7, 2021~~ July 27, 2024
Effective ~~December 31, 2021~~ September 30. 2024

1. Purpose. Horizontal control surveys are used to establish the horizontal position of a network of control points on the ground that are sufficiently accurate to provide control for subsequent survey projects. Horizontal control surveys are performed with a greater precision and accuracy than dependent surveys and therefore require redundant measurements. These surveys allow surveyors to perpetuate the accurate location of features and monuments. Horizontal control surveys are also used to correlate individual survey projects with one common geometric system.

2. Fieldwork. Fieldwork shall be performed using equipment and techniques capable of attaining the precision required by these standards. Surveying instruments shall be calibrated and/or adjusted according to manufacturer's specifications and in good working order.

- **A. Control Points.** Control surveys establish physical monuments on the ground. These monuments should be of sufficient size, depth, and material to ensure that they will withstand the destructive forces of nature. To avoid confusion, control monuments should not be set near existing boundary corners.
- **B. References.** When appropriate, references shall be made to identifiable objects or features from which the control points can be located.

3. Survey Plat. The survey plat, sometimes also referred to as a drawing or map, shall be drawn in a manner that provides a clear and unambiguous representation of the features located thereon.

- **A. Sheet Size.** The minimum sheet size for the plat is 8.5 by 11 inches.
- **B. Scale.** The plat shall be drawn at a standard engineering scale that is legible. Details or inserts shall be used when necessary.
- **C. Lines.** Lines shown on the plat shall be drawn using a line weight, width, or color that makes the lines distinguishable.
- **D. Horizontal Survey Control.** The basis of survey control shall be noted on the survey plat and based on one of the following:
  - **a. Grid.** Grid control (bearings & coordinates) shall be based on a Texas Coordinate System approved by the Texas Legislature as defined by the Natural Resource Code.
  - **b. Project.** Control may be established as a continuation of an existing project control system. The source of the control information shall be noted.
- **E. Control Points.**
  - **a. Description.** A locative and physical description of the control monuments
  - **b. Location.** The horizontal location and coordinates of each control point
- **F. Additional Requirements.** The survey plat shall also include the following:
  - **a.** North arrow
  - **b.** Graphic scale and stated scale
  - **c.** Registrant's name and RPLS number
  - **d.** RPLS seal, signature, and date of completion
  - **e.** Firm name and TBPELS firm registration number, if applicable

f. Legend of symbols, abbreviations, and/or lines, if applicable
g. Sheet numbers, if more than one sheet
h. The caption "Horizontal Control Survey"

G. Notes. Notes, if used, should be applicable for the intended use of the survey. Notes should address or clarify information relevant to the survey.

H. Certification. All final horizontal control survey plats shall include a certification. Each surveyor may determine the preferred wording for the certification, but all certifications shall contain the following language in the certification:

> This survey substantially complies with the current Texas Society of Professional Surveyors Manual of Practice requirements for a Category 7, Condition ___, Horizontal Control Survey.

4. Data Sheet. A data sheet may be prepared in lieu of or in addition to a survey plat.

A. Horizontal Survey Control. The basis of survey control shall be noted on the data sheet and based on one of the following:
a. Grid. Grid control (bearings & coordinates) shall be based on a Texas Coordinate System approved by the Texas Legislature as defined by the Natural Resource Code.
b. Project. Control may be established as a continuation of an existing project control system. The source of the control information shall be noted.

B. Control Points.
a. Description. A locative and physical description of the control monuments
b. Location. The horizontal location and coordinates of each control point

C. Additional Requirements. The data sheet shall also include the following:
a. Data acquisition date(s)
b. Registrant's name and RPLS number
c. RPLS seal, signature, and date of completion
d. Firm name and TBPELS firm registration number, if applicable
e. Legend of symbols, abbreviations, and/or lines, if applicable
f. The caption "Data Sheet"

D. Notes. Notes, if used, should be applicable for the intended use of the survey. Notes should address or clarify information relevant to the survey.

E. Certification. All data sheets shall include a certification. Each surveyor may determine the preferred wording for the certification, but all certifications shall contain the following language in the certification:

> This survey substantially complies with the current Texas Society of Professional Surveyors Manual of Practice requirements for a Category 7, Condition ___, Horizontal Control Survey.

5. Tolerances. See Appendix C for Category 7 survey tolerances.

TSPS Manual of Practice Requirements for Category 8 – Vertical Control Survey

Approved ~~October 7, 2021~~ July 27, 2024
Effective ~~December 31, 2021~~ September 30. 2024

1. Purpose. Vertical control surveys are used to establish the elevations of control points based on a vertical datum. Vertical control surveys are performed with a greater precision and accuracy than dependent surveys and therefore require redundant measurements.

2. Fieldwork. Fieldwork shall be performed using equipment and techniques capable of attaining the precision required by these standards. Surveying instruments shall be calibrated and/or adjusted according to manufacturer's specifications and in good working order.

- **A. Control Points.** Vertical control surveys establish physical monuments on the ground. Vertical control points, also known as benchmarks, should be of sufficient size, depth, and material to ensure that they will withstand the destructive forces of nature.
- **B. References.** When appropriate, references shall be made to identifiable objects or features from which the control points can be located.

3. Survey Plat. The survey plat, sometimes also referred to as a drawing or map, shall be drawn in a manner that provides a clear and unambiguous representation of the features located thereon.

- **A. Sheet Size.** The minimum sheet size for the plat is 8.5 by 11 inches.
- **B. Scale.** The plat shall be drawn at a standard engineering scale that is legible. Details or inserts shall be used when necessary.
- **C. Lines.** Lines shown on the plat shall be drawn using a line weight, width, or color that makes the lines distinguishable.
- **D. Vertical Survey Control.** The basis of vertical control shall be noted on the survey plat and based on one of the following:
  - **a. Datum.** A published vertical datum
  - **b. Benchmarks.** Published benchmarks. In areas known to be subject to subsidence, the surveyor shall take extra care to verify the accuracy of existing control.
  - **c. Assumed.** When the basis of elevation is assumed, the elevation of the project benchmark shall be stated and defined.
- **E. Control Points.**
  - **a. Description.** A locative and physical description of the control monuments
  - **b. Elevation.** The elevation of each control point
- **F. Additional Requirements.** The survey plat shall also include the following:
  - **a.** North arrow
  - **b.** Graphic scale and stated scale
  - **c.** Registrant's name and RPLS number
  - **d.** RPLS seal, signature, and date of completion
  - **e.** Firm name and TBPELS firm registration number, if applicable
  - **f.** Legend of symbols, abbreviations, and/or lines, if applicable
  - **g.** Sheet numbers, if more than one sheet
  - **h.** The caption "Vertical Control Survey"

G. Notes. Notes, if used, should be applicable for the intended use of the survey. Notes should address or clarify information relevant to the survey.

H. Certification. All final vertical control survey plats shall include a certification. Each surveyor may determine the preferred wording for the certification, but all certifications shall contain the following language in the certification:

> This survey substantially complies with the current Texas Society of Professional Surveyors Manual of Practice requirements for a Category 8, Condition ____, Vertical Control Survey.

4. Data Sheet. A data sheet may be prepared in lieu of or in addition to a survey plat.

A. Vertical Survey Control. The basis of vertical control shall be noted on the data sheet and based on one of the following:

- **a.** Datum. A published vertical datum
- **b.** Benchmarks. Published benchmarks. In areas known to be subject to subsidence, the surveyor shall take extra care to verify the accuracy of existing control.
- **c.** Assumed. An assumed project elevation datum point shall be stated.

B. Control Points.

- **a.** Description. A locative and physical description of the control monuments
- **b.** Elevation. The elevation of each control point

C. Additional Requirements. The data sheet shall also include the following:

- **a.** Data acquisition date(s)
- **b.** Registrant's name and RPLS number
- **c.** RPLS seal, signature, and date of completion
- **d.** Firm name and TBPELS firm registration number, if applicable
- **e.** Legend of symbols, abbreviations, and/or lines, if applicable
- **f.** The caption "Data Sheet"

D. Notes. Notes, if used, should be applicable for the intended use of the survey. Notes should address or clarify information relevant to the survey.

E. Certification. All data sheets shall include a certification. Each surveyor may determine the preferred wording for the certification, but all certifications shall contain the following language in the certification:

> This survey substantially complies with the current Texas Society of Professional Surveyors Manual of Practice requirements for a Category 8, Condition ___, Vertical Control Survey.

5. Tolerances. See Appendix D for Category 8 survey tolerances.

TSPS Manual of Practice Requirements for Category 9 – Investigative Survey

Approved ~~October 7, 2021~~ July 27, 2024
Effective ~~December 31, 2021~~ September 30. 2024

1. Purpose. An investigative survey reports the spatial relationship of facts and circumstances that impact the health, welfare, environment, or property of individuals including, but not limited to, criminal investigations, civil litigation, natural disasters, and serious accidents.

2. Scope. The scope of an investigative survey shall be determined by the client or the investigative authority.

3. Fieldwork. Fieldwork, whether performed on-the-ground or aerially, shall be performed using equipment and techniques capable of attaining the precision required by these standards. Geospatial instruments shall be calibrated and/or adjusted according to manufacturer's specifications and in good working order.

- **A. Control Point.** A minimum of three control points shall be placed at the site. The surveyor shall provide sufficient control to produce residuals that meet or exceed specified accuracy standards.
- **B. Evidence.** Evidence pertaining to the scope of the investigative survey shall be located.

4. Survey Plat. The survey plat, sometimes also referred to as a drawing or map, shall be drawn in a manner that provides a clear and unambiguous representation of the features located thereon.

- **A. Fieldwork.** Field data collected as required in Section 3 above shall be depicted on the survey plat.
- **B. Sheet Size.** The minimum sheet size for the plat is 8.5 by 11 inches.
- **C. Scale.** The plat shall be drawn at a standard engineering scale that is legible. Details or inserts shall be used when necessary.
- **D. Lines.** Lines shown on the plat shall be drawn using a line weight, width, or color that makes the lines distinguishable.
- **E. Survey Control.**
    - **a. Basis of Bearing.** The basis of bearing shall be noted on the route map and based on one of the following:
        - **i. Grid.** A grid bearing based on a Texas Coordinate System approved by the Texas Legislature as defined by the Natural Resource Code.
        - **ii. Record.** A record bearing shall be based on found and accepted monuments called for in an instrument or plat of public record. The source of the record information shall be noted on the route map.
        - **iii. Geodetic.** The Geodetic meridian as observed within one mile of the surveyed site.
    - **b. Vertical Control.** The vertical control shall reference (i) a published vertical datum, (ii) published benchmarks, or (iii) if assumed, the assumed project elevation datum point shall be stated.

F. Control Points.
- **a. Description.** A locative and physical description of the control monuments
- **b. Elevation.** The elevation of each control point

G. Additional Requirements. The survey plat shall also include the following:
- **a.** North arrow
- **b.** Graphic scale and stated scale
- **c.** Registrant's name and RPLS number
- **d.** RPLS seal, signature, and date of completion
- **e.** Firm name and TBPELS firm registration number, if applicable
- **f.** Legend of symbols, abbreviations, and/or lines, if applicable
- **g.** Sheet numbers, if more than one sheet
- **h.** The caption "Investigative Survey"

H. Notes. Notes, if used, should be applicable for the intended use of the survey. Notes should address or clarify information relevant to the survey.

I. Certification. All final survey plats shall include a certification. Each surveyor may determine the preferred wording for the certification, but all certifications shall contain the following language in the certification:

> This survey substantially complies with the current Texas Society of Professional Surveyors Manual of Practice requirements for a Category 9, Condition ____, Investigative Survey.

5. Tolerances. See Appendix E for Category 9 survey tolerances.

TSPS Manual of Practice Requirements for Category 10 – GIS Products

Approved ~~October 7, 2021~~ July 27, 2024
Effective ~~December 31, 2021~~ September 30. 2024

1. Purpose. This standard is to be used for reporting the outcome of a GIS Survey. GIS Surveys are prepared with the primary intention of being incorporated into a GIS database, though a plat or data sheet is commonly produced along with the dataset. The purpose of this standard is to provide a clear understanding of the quality and nature of the underlying data.

2. Scope. The scope of the services provided shall be determined by the client.

3. Fieldwork. Fieldwork, whether performed on-the-ground or aerially via remote sensing, shall be performed using equipment and techniques capable of attaining the precision required by these standards. Geospatial instruments shall be calibrated and/or adjusted according to manufacturer's specifications and in good working order.

4. GIS Products. GIS products shall be accompanied by the following data and metadata:

- **A. Fieldwork.** GIS products shall include the results of the data collected in accordance with Section 3 above.
- **B. Datum.** Horizontal datum & projection and vertical datum and geoid, where relevant.
- **C. Additional Requirements.** The metadata shall also include the following, if applicable:
  - **a.** Registrant's name and RPLS number
  - **b.** RPLS seal, signature, and date of completion
  - **c.** Firm name and TBPELS firm registration number, if applicable
  - **d.** Data acquisition date(s)
- **D. Notes.** Notes, if used, should be applicable for the intended use of the data, and should address or clarify relevant information.
- **E. Certification.** All GIS Products shall be accompanied by a report that includes a certification. Each surveyor may determine the preferred wording for the certification, but all certifications shall contain the following language in the certification:

> This GIS Product substantially complies with the current Texas Society of Professional Surveyors Manual of Practice requirements for a Category 10, Condition ___, GIS Products.

If the data within the GIS Product is not Survey Grade as defined by this standard, a disclaimer shall be included. Each surveyor may determine the preferred wording for the disclaimer, but all disclaimers shall contain the following:

> The representation of parcel lines, improvements, and features shown in this dataset are approximate and do not represent a professional land surveying product.

5. Tolerances. See Appendix F for Category 10 survey tolerances. GIS products shall conform to current American Society of Photogrammetry and Remote Sensing (ASPRS) Positional Accuracy Standards for Geospatial Data. https://www.asprs.org/wp-content/uploads/2015/01/ASPRS_Positional_Accuracy_Standards_Edition1_Version100_November2014.pdf

TSPS Manual of Practice Requirements for Category 11 – Three-Dimensional Control Survey

Approved ~~October 7, 2021~~ July 27, 2024
Effective ~~December 31, 2021~~ September 30. 2024

1. Purpose. Three-dimensional control surveys, commonly known as GNSS control surveys, are used to establish the position of a network of control points on the ground that are sufficiently accurate to provide control for subsequent survey projects. Historically, control surveys were either horizontal or vertical. Due to the changes in technology, modern survey control is often collected as both horizontal and vertical control at the same time using a Global Navigation Satellite System (GNSS). This standard combines horizontal and vertical control surveys into one comprehensive standard.

2. Fieldwork. Fieldwork shall be performed using equipment and techniques capable of attaining the precision required by these standards. Surveying instruments shall be calibrated and/or adjusted according to manufacturer's specifications and in good working order.

- **A. Control Points.** Control surveys establish physical monuments on the ground. These monuments should be of sufficient size, depth, and material to ensure that they will withstand the destructive forces of nature. To avoid confusion, control monuments should not be set near existing boundary corners.
- **B. References.** When appropriate, references shall be made to identifiable objects or features from which the control points can be located.

3. Survey Plat. The survey plat, sometimes also referred to as a drawing or map, shall be drawn in a manner that provides a clear and unambiguous representation of the features located thereon.

- **A. Sheet Size.** The minimum sheet size for the plat is 8.5 by 11 inches.
- **B. Scale.** The plat shall be drawn at a standard engineering scale that is legible. Details or inserts shall be used when necessary.
- **C. Lines.** Lines shown on the plat shall be drawn using a line weight, width, or color that makes the lines distinguishable.
- **D. Survey Control.** The detailed statement regarding the basis of survey control and the adjustment used shall be noted on the survey plat.
  - **a. Horizontal.** The horizontal datum shall be based on a Texas Coordinate System approved by the Texas Legislature as defined by the Natural Resource Code.
  - **b. Vertical.** The vertical datum shall be based on NGVD29, NAVD88, or another published vertical survey datum when appropriate.
- **E. Control Points.**
  - **a. Description.** A locative and physical description of the control monuments
  - **b. Location.** The horizontal location and 3D coordinates of each control point
- **F. Additional Requirements.** The survey plat shall also include the following:
  - **a.** North arrow
  - **b.** Graphic scale and stated scale
  - **c.** Registrant's name and RPLS number
  - **d.** RPLS seal, signature, and date of completion

e. Firm name and TBPELS firm registration number, if applicable
f. Legend of symbols, abbreviations, and/or lines, if applicable
g. Sheet numbers, if more than one sheet
h. The caption "3D Control Survey"

G. Notes. Notes, if used, should be applicable for the intended use of the survey. Notes should address or clarify information relevant to the survey.

H. Certification. All final survey plats shall include a certification. Each surveyor may determine the preferred wording for the certification, but all certifications shall contain the following language in the certification:

> This survey substantially complies with the current Texas Society of Professional Surveyors Manual of Practice requirements for a Category 11, Condition ___, Three-Dimensional Control Survey.

4. Data Sheet. A data sheet may be prepared in lieu of or in addition to a survey plat.

A. Survey Control. The detailed statement regarding the basis of survey control and the adjustment used shall be noted on the data sheet.
a. Horizontal. The horizontal datum shall be based on a Texas Coordinate System approved by the Texas Legislature as defined by the Natural Resource Code.
b. Vertical. The vertical datum shall be based on NGVD29, NAVD88, or another published vertical survey datum when appropriate.

B. Control Points.
a. Description. A locative and physical description of the control monuments
b. Location. The horizontal location and 3D coordinates of each control point

C. Additional Requirements. The data sheet shall also include the following:
a. Data acquisition date(s)
b. Registrant's name and RPLS number
c. RPLS seal, signature, and date of completion
d. Firm name and TBPELS firm registration number, if applicable
e. Legend of symbols, abbreviations, and/or lines, if applicable
f. The title "Data Sheet"

D. Notes. Notes, if used, should be applicable for the intended use of the survey. Notes should address or clarify information relevant to the survey.

E. Certification. All data sheets shall include a certification. Each surveyor may determine the preferred wording for the certification, but all certifications shall contain the following language in the certification:

> This survey substantially complies with the current Texas Society of Professional Surveyors Manual of Practice requirements for a Category 11, Condition ___, Three-Dimensional Control Survey.

5. Tolerances. See Appendix G for Category 11 survey tolerances.

Appendix A

SURVEY TOLERANCES for Category 1A – Land Title Survey & Category 1B – Standard Land Survey			
CONDITION	**2**	**3**	**4**
	Urban	**Suburban**	**Rural**
Positional Standards at the 95% confidence level			
Relative Positional Precision	0.10’	0.14’	0.20’
	Plus 50 PPM		
Traverse Standards			
Traverse Error of Closure	1:20,000	1:15,000	1:10,000
	Loop or between control monuments		
Angular Error of Closure	6"(√N)	8"(√N)	10"(√N)
	N = Number of Angles in Traverse		
Elevation for Boundaries by Tides, Contours, Rivers	±0.05'	±0.1'	±0.15'
Location of Improvements Measurement ties to boundary	±0.1'	±0.2'	±0.5'
Scale of Plats (No less than)	1" = 200'	1" = 400'	1" = 1000'

Condition 2 – Urban is appropriate for any land survey made in a business district.

Condition 3 – Suburban is appropriate for any land survey made within a municipality (but not within an urban as defined above); within the extra-territorial jurisdiction (ETJ) of a municipality; or outside of the ETJ, but in an area that is or is intended to be used for residential, commercial, or industrial purposes.

Condition 4 – Rural is appropriate for any land survey of any tract containing more than 10 acres of land made outside the limits of a municipality.

Appendix B

SURVEY TOLERANCES for Category 6 – Topographic Survey			
CONDITION	**1**	**2**	
	Detailed	**Wide Area**	**Comments**
Traverse Error of Closure	1:15,000	1:10,000	System control loop
Unadjusted Level Loop Closure	0.04 √M	0.08 √M	System Control Loop
	M = Number of Miles		
Contour Interval (Max.)	2	10	Or as needed by client
Contour Precision	1/2 Interval	1/2 Interval	
Location of Improvements	±0.2'	±2'	Horizontal
Spot Paving Elevations	±0.5'	±2'	Horizontal
	±0.1'	±0.5'	Vertical
Spot Ground Elevations	±0.5'	±2'	Horizontal
	±0.2'	±0.5'	Vertical
Finished Floor Elevations	±0.2'	±2'	Horizontal
	±0.1'	±1'	Vertical
Sewer Flow Lines (Inverts)	±0.2'	±2'	Horizontal
	±0.1'	±1'	Vertical
Scale of Plats (No less than)	1" = 200'	1" = 2000'	

Remote Sensing (airborne or spaceborne survey) shall be performed in accordance with the standards established by Part 3 of the current Federal Geographic Data Committee (FGDC) Geospatial Positioning Accuracy Standard. Accuracy for remote sensing data shall meet the requirements for the current American Society of Photogrammetry and Remote Sensing (ASPRS) Positional Accuracy Standards for Digital Geospatial Data.

Appendix C

SURVEY TOLERANCES for Category 7 – Horizontal Control Survey			
CONDITION	**1**	**2**	**3**
Positional Standards			
Relative Horizontal Positional Precision	0.07'	0.08'	0.10'
	2σ (95% confidence level)		
Traverse Standards			
Traverse Error of Closure (horizontal)	1:50,000	1:40,000	1:20,000
	Loop or between control monuments		
Angular Error of Closure (horizontal)	3"(√N)	4"(√N)	6"(√N)
	N = Number of Angles in Traverse		
Minimum Horizontal Survey Methods	Static Traverse	Static Traverse	Rapid Static RTN Traverse

Appendix D

SURVEY TOLERANCES for Category 8 – Vertical Control Survey			
CONDITION	**1**	**2**	**3**
Positional Standards			
Relative Vertical Positional Precision	0.03'	0.08'	0.20'
	2σ (95% confidence level)		
Minimum Vertical Survey Methods	Level	Static Level	Rapid Static RTN Level

Appendix E

SURVEY TOLERANCES for Category 9 – Investigative Survey		
Positional Standards		
Relative Positional Horizontal Precision	0.14'	Plus 50 PPM
	at the 95% confidence level	
Traverse Standards		
Traverse Error of Closure	1:15,000	
	Loop or between control monuments	
Angular Error of Closure	8"(√N)	
	N = Number of Angles in Traverse	
Unadjusted Level Loop Closure	0.04 √M	System Control Loop
	M = Number of Miles	
Spot Paving Elevations	±0.5'	Horizontal
	±0.1'	Vertical
Spot Ground Elevations	±0.5'	Horizontal
	±0.2'	Vertical
Finished Floor Elevations	±0.2'	Horizontal
	±0.1'	Vertical
Sewer Flow Lines (Inverts)	±0.2'	Horizontal
	±0.1'	Vertical
Elevation for Boundaries by Tides, Contours, Rivers	±0.1'	
Location of Improvements Ties to Boundary	±0.2'	
Scale of Plats (No less than)	1" = 400'	

Appendix F

SURVEY TOLERANCES for Category 10 – GIS Products			
CONDITION	**1**	**2**	
	Survey Grade	**Mapping Grade**	
Positional Standards			
Relative Positional Precision	0.2’	3’	
	2σ (95% confidence level)		

Appendix G

SURVEY TOLERANCES for Category 11 – Three-Dimensional Control Survey			
CONDITION	**1**	**2**	**3**
	1st Order	**2nd Order**	**3rd Order**
Positional Standards at the 95% confidence level			
Relative Horizontal Positional Precision	0.02'	0.06'	0.10'
	Plus 50 PPM		
Relative Vertical Positional Precision	±0.02'	±0.06'	±0.10'
	Between benchmarks on site		
Traverse Standards			
Traverse Error of Closure (horizontal)	1:80,000	1:50,000	1:20,000
	Loop or between control monuments		
Angular Error of Closure (horizontal)	3"(√N)	3"(√N)	8"(√N)
	N = Number of Angles in Traverse		
Level Error of Closure (vertical)	0.017√#miles	0.035√#miles	0.05√#miles
	Loop or between control monuments		
Scale of Plats (No less than)	1" = 2000'	1" = 2500'	1" = 3000'