

## **SPECIFICATIONS**

## **CATEGORY 2**

SEC. 1 TYPE: Route Survey

SEC. 2 DEFINITION: A Route Survey is defined as being the required service and product that adequately locates the planned path of a linear project or right of way which crosses a prescribed area of real estate, extending from at least one known point and turning or terminating at another known point. Adequate location shall mean substantial compliance with the conditions and tolerances expressed in this standard. A route survey which defines new or proposed boundaries shall be conducted as a boundary survey and must adhere to the rules and regulations of the Texas Board of Professional Land Surveying (TBPLS).

SEC. 3 PURPOSES: A Route Survey is usually required for the planning of a right of way, the acquisition of fee or easement property and for eventual construction layout work. The location of the facilities within the right of way are often held in respect to the center line or a right of way line. A Route Survey is made on the ground to provide for the location of right of way lines, a centerline, or reference lines in relation to property lines and terrain features.

3.1 Route Surveys shall include but are not limited to the proper location, monumentation, description or platting of the following routes.

3.1.1 Roadways, highways and railroads.

3.1.2 Transmission lines for communications, fuel, chemical, water and electrical needs.

3.1.3 Canals, waterways, drainage ditches and sewers.

3.1.4 View easements, air space easements, ingress and egress easements such as approach routes.

SEC. 4 PRODUCT: A Route Survey shall produce, but not be limited to:

4.1 A signed, sealed, dated and certified route map depicting the survey as made on the ground. The route map may be enhanced by a scale-ratio or orthophoto mosaic aerial photo background to effectively show terrain details.

4.2 Signed and sealed written descriptions of each segment of the route or right of way crossing separate ownership tracts.

4.3 Computational data such as the coordinate values of monuments, points of intersection, reference monuments, etc., which may provide for further study, construction layout or reroute of the project when necessary.

4.4 Monuments as required for a project shall be consistent with requirements of TBPLS rules (see also Section 6 herein).

SEC. 5 INFORMATION REQUIRED: Sufficient information to perform the Route Survey should be furnished by the client, his agent or acquired for the client by the surveyor at an agreeable fee. The following data should be considered and evaluated by the surveyor:

5.1 A suitably marked preliminary route map on a reliable base such as a good quality commercial ownership map, a U. S. Geological Survey Map or other similar maps of private origin.

5.2 A set of recent aerial photographs covering the proposed route.

5.3 The most recent recorded instruments describing and locating the land involved with the route, being certain to include adjoiners on both sides of the proposed route.

5.4 The recorded easements or instrument (or unrecorded documents of which the surveyor has knowledge) which define the location of adjoining severing rights of way, particularly highways, roadways, pipelines, or utility corridors and drainage or flood control waterways (including grantees' names and recording references).

5.5 Any grant, patent, subdivision plat, historical data or other recorded data that will influence the position or description of the proposed route.

5.6 Permission to enter and survey on the land, preferably written.

5.7 Names of tenants or parties in charge of the properties.

SEC. 6 MONUMENTS: Monuments, references or witnesses, set or called for, whether artificial or natural, shall represent the footsteps of the surveyor and his professional opinion as to proper location of the point or corner. See TBPLS rules applicable to this subject.

6.1 Artificial monuments: An artificial monument considered permanent shall be construed as any mark or marker of relative permanence that if left undisturbed will remain in place, for a period of at least 25 years. Monuments must be set at sufficient depth to retain a stable and distinctive location and be of sufficient size to withstand the deteriorating forces of nature. Monuments shall be set in such fashion as to remain stable.

6.1.1 Monument material: Material for monuments shall be chosen in regard to the terrain and situation that exists at the site of the survey. Consideration must be given the following guidelines and the natural erosive forces that will work against the monument for decades to come.

6.1.1.1 Wooden stakes should only be used with discretion.

6.1.1.2 Iron or steel bars or rods for monuments should be a minimum size of 1/2" in diameter by 24" long. Longer bars or rods should be used in soft soil to insure stability of the monument. Where rocky or caliche soils prevent specified lengths, a shorter rod should be driven to refusal at such depths where it will remain stable.

6.1.1.3 Iron pipes for monuments should be a minimum of 1/2" inside diameter and 24" long. Longer pipes should be used in soft to insure stability of the monument. All iron pipes should be sized by the inside diameter. Where rocky or caliche soils prevent specified lengths, a shorter pipe should be driven to refusal at such depths where it will remain stable.

6.1.1.4 Non-ferrous metal monuments should be equal to requirements for iron rods or iron pipes.

6.1.1.5 Precast reinforced concrete monuments shall have a precise station mark such as a center punch or cross embedded in the cap.

6.1.1.6 Poured in place concrete monuments shall contain a precise station mark (as in 6.1.1.5) and be reinforced with at least 1/4" or larger iron rods or pipe.

6.1.1.7 Other monumentation such as drill holes, chiseled marks in stone, concrete or steel, punch marks, precast bronze discs. etc., shall be of sufficient size, diameter or depth to be definitive, stable, and readily identified as a survey marker. Objects upon which such marks or markers are placed shall be of a stable and permanent nature equal to those of iron pipes or iron rods.

6.1.2 Monument Placement: All monuments for corners, for witness points, points of curve, etc., shall be set vertically whenever possible and shall be reasonably flush with the earth or ground surface. Monuments subject to construction damage or destruction shall be referenced to objects that will survive or buried deep enough to offer protection from earth grading or destructive machinery.

6.1.3 Monument Identification:

6.1.3.1 Monuments may be identified by code numbers or letters for brevity and easy recognition. Monuments may be identified by names of specific corners.

6.1.3.2 Monuments may be identified by appropriate caps, imprinted with surveyor's registration number, and must comply with TBPLS rules.

6.1.3.3 The size, shape and substance or construction material of each monument shall be duly recorded in the field notes, recited in the survey description and noted on the map, plat, or drawing.

6.1.3.4 When possible, monuments shall be referenced to prominent nearby objects and the information recited in the description of survey. Where permissible and feasible, witness trees should be marked facing the corner. Before marking any tree, the surveyor must consider the probability of his liability for defacing valuable private property, but where markings are acceptable and required, each property corner and witness corner will be witnessed by healthy witness trees, a minimum of 6" diameter, breast high (D.B.H.). Each such tree shall be described by species; diameter, breast high; and type of markings.

6.2 Natural or physical 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.

SEC. 7 CONDITIONS: See Section III E of the Standards for appropriate conditions.

SEC. 8 TOLERANCES FOR CONDITIONS: See Section III O of the Standards and in addition refer to the Tolerance Chart for Category 1A. See TBPLS rules applicable to this subject.

SEC. 9 FIELD PROCEDURES: Refer to Category 1A, Section 9 and in addition the following requirements shall apply: Also see TBPLS rules applicable to this subject.

9.1 All proposed routes or rights of way shall be located in respect to physical and record objects found or set on the ground.

9.1.1 Property line fences, and property or fence corners shall be physically tied with side measurements and angles or bearings.

9.1.2 Ranges within which improvements are to be located shall be determined by client requirements. No range limit is set for locating pertinent property lines or corners.

9.1.3 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 and bridges etc., shall be located by measurements as referenced to the planned route as noted on the tolerance chart.

9.2 Profiles and elevations shall be compiled or established as required by the nature of the project or by request of the client. Generally grades of about  $\pm$  0.3% (3 feet per 1000 feet) will not require a continuous line profile if the project does not involve a gravity flow. Intermediate profiles at railroad, road, river, creek or ditch crossings are usually suitable where gravity flow is not involved. At steeper grades or where gravity flow is involved a continuous profile should be made unless the needs of the project or client require otherwise. In which case:

9.2.1 Profiles may be plotted from standard U. S. Geological Survey topographical quadrangle sheets. Accuracies will be about plus or minus one half the contour interval.

9.2.2 Aerial photogrammetry may provide adequate profiles with limited ground control.

9.2.3 Altimeter or barometric leveling may be employed where elevation inaccuracy of plus or minus 5 feet are of little consequence.

9.2.4 Regardless of the intended use, elevations should be spot checked to avoid unpredictable, significant errors, especially when gathered from any source other than properly closed differential leveling procedures.

SEC. 10 PLATS, MAPS, AND DRAWINGS: A plat shall be prepared to represent the information gathered during a Route Survey. The method of display may be in multi-sheet form or in a continuous strip, rolled or preferably book folded. See TBPLS rules applicable to this subject.

10.1 Any reasonably stable-base, standard drawing paper, linen or film of reproducible quality will be considered as suitable material for route maps.

10.2 Where a multi-sheet display is used a separate index or cover sheet shall be made of the appropriate area. This index sheet should identify the limits and bounds of each mapping sheet for ready reference.

10.3 Dimensions, bearings or angles shall be neatly and legibly shown in respect to each angle point, point of curve or tangent and property or right of way lines intersected.

10.4 As appropriate, where centerline for the route is shown, a stationing system may be planned and utilized with the point of beginning assigned the 0 + 00 station. One hundred foot or one hundred meter stations should be lightly marked with a thin tic across and perpendicular to the centerline. Five hundred or one thousand foot, or meter, stations should be labeled with the appropriate designations. All angle points, points of curve or tangent, property or right of way lines and topographic features should be identified by stationing pluses.

10.5 When a centerline stationing system is used, and equations in the stationing system become necessary, the equation shall be labeled and shown in bold and larger numbers. This requirement is to reduce the possibility of an equation being overlooked by the client or his representatives.

10.6 Parcels or tracts of land affected by the route survey shall be identified by their legal description, the current record owner and the recording data of the locating instrument.

Example:

John Q. Jones deeded and described in Vol. 12, Page 345 Able County Deed Records 47 acres

Or

James L. Smith Vol. 472 Page 123, Baker County Deed Records, Lots 12 and 13 Block. 3, ABC Subdivision

10.7 Surveys, leagues or original land grants, and subdivisions, county lines, city, town or village limit lines shall be shown in their proper positions and prominently labeled. Abstract numbers for original patents or grants shall be shown centered beneath or beside the appropriate name.

10.8 Relevant terrain features, improvements and other pertinent data shall be represented by symbols on the map in the proper location. Symbols shall be clear as to what is represented or should be labeled for identification individually or in a separate key to symbols.

10.9 A north arrow shall be shown on each plat sheet and at intervals of about 36 inches on rolled or book folded strips.

10.10 A statement as to the origin of the bearings or angles shall be made on each plat sheet referring to the monumented line on the ground. Where an index sheet is used a statement may be made thereon, referring to monumented lines on the ground, and deemed sufficient information for all sheets. All bearings or angles shall refer to one of the following:

10.10.1 The Geodetic meridian as observed at a station or stations along the route, but at intervals of no more than five miles.

10.10.2 The Texas Coordinate System of 1927 or 1983, with the proper zone, theta angle, and traverse or triangulation station noted.

10.10.3 A record bearing, or relation there to, along a line monumented on the ground as called for in said record. Also see TBPLS rules applicable to this subject.

10.11 Where the Texas Coordinate System is used for both bearings and coordinates, a statement similar to the following shall be shown on the plat, but should begin, "All bearings and coordinates refer to the Texas Coordinate System of 1927 or 1983, specifying the proper zone and traverse or triangulation station and the X,Y coordinates for the station".

10.11.1 The appropriate scale and elevation or grid factor used for the route should be shown on the plat.

10.11.2 The appropriate theta angle for the route should be shown at frequent intervals on the plat.

10.12 Line weights or width of drawn lines should be chosen to distinguish the surveyed route from other surrounding real estate.

10.13 Any elevations shown on the map in the form of spot elevations or contours shall be in reference to some datum or specific bench marks even though the elevation was assumed. A statement as to basis of elevations shall be made on the map similar to one of the following examples:

Example #1.

Elevations refer to a BM set near the N.E. corner of the  
(LOCATION)  
intersection of First St. and Ave. B, on the north rim of a  
(DESCRIPTION)  
manhole. Elevation is assumed as 200.00 feet.

Example #2.

Elevation and contours are based upon N.G.S. bench mark A 142, mean sea level. Published elevation = 326.042 feet (NGVD 1929 or NAVD 1988 ).

SEC. 11 CERTIFICATION: See Section 11 of Category 1A. The certification for each route survey plat must be signed and sealed by the Registered Surveyor responsible for the Route Survey. Rubber stamps of signatures are not to be used. Rubber stamps of seals are acceptable. Also see TBPLS rules applicable to this subject.

Example:

I hereby certify that this survey was made on the ground, that this plat (map or drawing) correctly represents the facts found at the time of survey and that this professional service conforms to the current Texas Society of Professional Surveyors Standards and Specifications for a Category 2, Condition\_\_\_\_Survey.

Surveyor's Seal \_\_\_\_\_

Registered Professional Land Surveyor

\_\_\_\_\_  
Texas Registration Number

SEC. 12 DESCRIPTIONS: A description written to describe a route or right of way survey must provide the information to properly locate the particular strip of land on the ground and distinctly set it aside from all other lands. All information shall comply with or exceed the tolerances explained in Section 8, herein. Also see TBPLS rules applicable to this subject.

12.1 Basic information to be conveyed in any description will consist of the general location of the property in relation to the parent tract, established and recorded subdivisions, surveys, leagues or other original land divisions, the abstract number or numbers of such original land divisions and the name of the county in which the surveyed land is situated.

12.2 A centerline or baseline description is written in two parts. The first part, called the general description, will logically compile all the requirements of 12.1, above. The second part of the center line or baseline description, called the particular description, shall logically compile and incorporate calls for the following:

12.2.1 A point of entry into the property reciting the relationship of bearings or angles to the property line and the proposed centerline or baseline.

12.2.2 A tie measurement from the point of entry to the nearest identifiable property corner or angle point in property line (See Sec. V. B of Standards).

12.2.3 The width of the easement being described. This is properly referred to as being a certain width, with the appropriate width on both sides of the described centerline.

12.2.4 The course or courses or bearings of the centerline and the appropriate distances for each course.

12.2.5 Calls for monuments along the route, set, replaced or found. Descriptions of other nearby permanent structures and tie measurements. Passing calls for topographic features, entering and leaving.

12.2.6 An exit point from the property reciting the relationship of bearings or angles to the property line and the proposed centerline or baseline.

12.2.7 A tie measurement from the point of exit to the nearest identifiable property corner or angle point in property line. See Sec. V. B of Standards.

12.2.8 The area contained in the described parcel of land.

12.3 A geometrical parcel description, such as a fragment or fraction of a particular tract, lot or plot of real estate may be made to clearly describe a route or right of way survey. The accepted way of creating this description is to first design the general description in accord with 12.1, herein and then give a geometrical description of the parcel in question, such as a "rectangular strip of land" or a "triangular parcel of land" or simply a "strip of land being so many feet in width". This description method must then incorporate the following information in logical fashion:

12.3.1 The relationship of the described tract to the boundaries of the parent tract, lot or plot (by course and distance).

12.3.2 The geometrical parcel must be described as to length and width.

12.3.3 When calls for particular property lines of the parent tract or lot are required as part of the geometrical parcel, adjoiner statements shall be made when appropriate.

12.3.4 Special attention must be given to the words of the description. Ambiguous language must be avoided.

12.4 A metes and bounds description is to be written in two parts. The first part, called the general description, will logically compile all the requirements of 12.1, herein. The second part, called the particular description, shall logically compile and incorporate calls for the following:

12.4.1 Monuments, including descriptions as to the type, nature, size, substance or construction material, and as to whether set or found.

12.4.2 Adjoining property or right-of-way.

12.4.3 Courses and distances of the new survey.

12.4.4 Appropriate passing calls

12.4.5 Parenthetical deed calls where the deed calls significantly differ from the new survey may be used. (Or explain differences in a written report). Also see TBPLS rules applicable to this subject.

12.4.6 The area stated in acres or square feet within the specified tolerances in Section 8, herein.

12.4.7 The source of bearings.

12.5 The point of beginning of any description shall be carefully chosen and described so as to distinguish the point from any other point. Any other point used to locate the point of beginning shall be known as a "commencing" point.

12.5.1 The point of beginning should be the corner that is the most easily recognized or found by any interested parties.

12.5.2 The point of beginning must be located by course and distance or other locatable methods in relation to established and recognized, record monuments.

12.6 It is recommended, for uniformity, that any metes and bounds description be written so that the progression of courses is in a clockwise direction.

12.7 The subsequent written courses in the description shall be as brief and yet as explanatory as the author can construct. Brevity shall not cause important locative information to be omitted and explanatory phrases shall not enlarge the description to the extent of confusion.

12.8 Curved boundaries shall be identified as tangent or non-tangent curves and sufficient data to locate the curve shall be recited. In all cases the radius and length of the curve must be given as well

as the general direction the curve takes. Additional compatible data to assist in locating the curve is desirable such as bearing and length of the long chord, central angle, degree of curve by arc or chord definition, tangent lengths, bearing and distance to radius point, etc.

12.9 Each metes and bounds description must close, return to the point of beginning and recite the area enclosed within the specified tolerances stated in Section 8, herein.

12.10 Upon completion of the route or right of way description, the total description shall be read for correctness and continuity. A separate comparison of mathematical data regarding the computation sheets, the map, plat or drawing and the written description shall be made as a check on all work. The surveyor's files should contain a hard copy of the mathematical closure check of the description.

12.11 The route or right of way description shall show the date of the survey, seal, and original signature of the Registered Professional Land Surveyor. Also see TBPLS rules applicable to this subject.