Chapter 180-7 TECHNICAL STANDARDS FOR PROPERTY SURVEYS

Rule 180-7-.01 Preamble

In order to assure the public that proper and adequate surveys, maps, plats and writings are executed in connection with property, for whatever purpose, Technical Standards are hereby established. These standards establish the minimum degrees of accuracy, completeness and/or quality in the several areas of concern in order to be considered acceptable.

Rule 180-7-.02 Land Titles and Location

(1) (a) Every parcel of land whose boundaries are surveyed by a land surveyor should be made conformable with the record title boundaries of such land. The land surveyor prior to making such a survey shall acquire the following prerequisite data: deeds, maps, certificates of title, centerline data, right of way data, adjacent descriptions, and other boundary line locations in the vicinity as necessary or available. The land surveyor shall compare and analyze all of the data obtained and make most nearly correct legal determination possible of the position of the boundaries of such parcel. He shall make a field survey traversing and connecting all available monuments appropriate or necessary for the location, and coordinate the facts of such survey with the pre-determined analysis. Not until then shall the monuments marking the corners or such parcel be set, and such monuments shall be set in accordance with the full and most satisfactory analysis obtainable. It shall be the responsibility of the land surveyor to evaluate conformity with adjacent tracts for overlaps and gores and to report the same on all maps, plats, and reports.

(b) In the event that the land surveyor determines that it is not possible to make the survey of a parcel of land conformable with the record title of such land or that it is not possible to coordinate the predetermined analysis with the field survey, the surveyor shall explain the reason for his determination and shall denote in indisputable language, the source and reason for the corners, lines, and/or areas as shown on the plat. Such reasons may include, but are not limited to, the following: Disputed, property lines or areas; possession lines; acquiescence; adverse possession; unrecorded deeds; proposed purchase (new parcels); dubious and

boundaries, and definite recitals as to use or rights to be created through such descriptions. A description shall include the general location of the tract or lot with sufficient accuracy such that the tract can be readily located on the ground. The land lot, district, section, militia district number (in Headright Grant areas), city (if known to be within the city limits) and county shall be called out in said description. Description shall start at a point of commencement and/or a point of beginning that can be readily re-established. The description shall include the names of adjoining subdivision and/or property owners on all lines, as can be determined at the time of commencement of the survey through public records such as the county tax assessor and/or clerk of court records. (A title search is not required for this.) A metes and bounds description shall describe all courses in logical sequence around a tract or lot in a clockwise direction such that the ending point is the beginning point, the exception to this would be a description for a linear easement. The monument at each corner shall be described. All lines adjacent to streets, roads, or other rights-of-way shall be referenced to these and all pertinent distances and curve data shall be listed (arc length, chord length, chord bearing and radius) in addition to the parcel's area. All descriptions, being a form of report, shall bear the land surveyor's name, address, seal and signature.

Rule 180-7-.03 Measurements-Horizontal

Measurements shall be made with instruments capable of attaining the required accuracy for the particular problem involved. Angles and distances shall be measured to obtain an accuracy of not less than 1:10,000 in urban or suburban areas and 1:5,000 in rural areas except as follows:

(a) The allowable positional tolerance of property corners with respect to each other within a given survey may not be greater than:

1. 0.1 foot in urban blocks wherein buildings can be erected along the property line, or where high land values so warrant;

2. 0.25 foot in suburban subdivisions interior blocks and/or suburban lots or parcels;

3. 0.50 in rural areas, except as follows:

(i) Closer tolerance is required where land value in rural areas is increased by adjacency to major highway intersections or thruway complexes, building congestion, oil or mineral

made by compass in order to "follow the footsteps" of the original surveyor. However, such retracement also must be reduced to a non-magnetic traverse so that the error of closure as specified above is obtained.

Rule 180-7-.04 Topography and Vertical Measurements

(1) **Definitions.** As used in this rule, the following definitions apply.

(a) Field run precision leveling. A circuit of levels between precise benchmarks or a circuit closed upon the initial benchmark shall not differ more than 0.02 foot multiplied by the square root of the number of miles in the circuit, and in no case to exceed 0.05 foot.

(b) Field run local or temporary benchmark leveling. Levels run for control to topographic mapping of a site or project shall have an error of closure of not less than 0.1 foot per square root of the number of miles. The surveyor and client may agree upon different precision specifications that are deemed to be more applicable to individual situations.

(c) Positional check. A position whose location and elevation is determined by traditional or GNSS surveying equipment independently of the remainder of the survey effort or data collection exercise. When determining where to measure positional checks, the surveyor may use whatever approach and location choice that is deemed to be most applicable and feasible for the individual project. Running cross sections through a surveyed area is considered to be the most desirable, though most intensive, positional check approach. Positional checks should not be limited to easily visible and accessible areas but should include a reasonable portion in areas with ground cover and within the interior of the project. If firms or individuals are employed in the production of topographic or elevation surveys which are not regular employees under the direct supervision of the surveyor who is responsible for the work, special care must be given to providing adequate Direct Supervisory Control as defined by Rule 180-6-.03(6). Production of contour maps and elevation data to typical survey precision or for use in applications typical for surveying works, and the advertising thereof, is considered to be the practice of Land Surveying and must be performed by properly licensed individuals and authorized firms.

also includes existing data obtained from public agencies.

(3) All drawings or electronic work product which depict or provide contours or elevation data shall contain the following information:

(a) The vertical datum of the elevations provided or reported, how the datum was verified or placed on the site (whether by level loop, GNSS observations, published benchmark, etc.),

(b) The type of survey performed to produce contours or elevation data (see paragraph 4 for each type).

(c) The contour interval or vertical precision. Contours and elevation data provided shall be of such accuracy that no more than 10% of the area covered shall be in error by more than one half (1/2) of the contour interval shown; or such that no part of the surveyed area fails to achieve a 95% confidence level in the three-dimensional positioning provided. If initial results do not confirm required accuracy, the surveyor may either:

1. collect replacement data and retest for precision

2. identify areas which are not reliable in accordance with subparagraph e below

3. or increase the contour interval until measured precision conforms

(d) Depiction of the location of at least 3 fixed positions which can be used to situate future works into the vertical datum of the survey. Such fixed positions should include at least one stable survey monument and can also include fixed artificial positions such as fire hydrant bolts, pipe inverts, concrete surfaces, or finished floor elevations of structures.

(e) A clear explanation and delineation of any portion of the contours or elevation data which is not certified or reliable, such as areas which are obscured, shadowed, or otherwise which cannot be certified to the required mapping precision. This shall also apply to data which was obtained from a public agency or other lawful source. The following statement shall accompany any such obscured or uncertified topographic map or portion thereof: "The topographic and elevation

(4) The following types of elevation surveys are envisioned by this rule. Should any equipment or methodology be considered which is not clearly addressed, the most applicable type shall apply.

(a) Field run topographic surveys. Traditional surveying equipment and techniques are employed to produce a contour map. Field ran topographic surveys must state the date(s) of field work and the equipment used. Additional positional checks are not required for field ran topographic surveys.

(b) Traditional stereo photogrammetric maps. Traditional or digital photography of sufficient specifications is obtained by a manned aircraft. Contours and features are generated using stereoscopes or software. A minimum of four (4) three-dimensional ground control targets or photo-identifiable positions (known as "control points") shall be surveyed and incorporated into the preparation of such maps, and more are required as dictated by project size, photo overlap, and height of camera. The surveyor responsible for the accuracy of the survey shall perform positional checks at a number of locations that is at least that of the number of control points required, and shall report the vertical accuracy of each point or an average of the points checked. Such photogrammetric maps shall state the date of photography, the height flown, the firm or individual who performed portions of the survey, including which portions, if not the surveyor or firm issuing the map, and the results of the positional checks by the surveyor either listed individually or as an average.

(c) Ground based remote sensing (LIDAR, laser scanning, etc.). LIDAR equipment is used either from motor vehicles or fixed tripods to survey an area. Control points shall be placed and surveyed sufficiently along the perimeter of the mapped area to ensure adequate confidence level of the contours or elevation data. Positional checks shall be measured at positions deemed relevant by the surveyor who shall report the vertical accuracy of each point or an average of the points checked. Surveys and reports produced under this section shall provide the type of equipment used, the date(s) of data collection, the firm or individual who performed portions of the survey, including which portions, if not the surveyor or firm issuing the map, and the results of the positional checks by the surveyor either listed individually or as an average.

(d) Unmanned Aerial Systems (UAS) data collection. LIDAR, optical camera, or other remote sensing equipment is used to collect data used to prepare contour maps or elevation data. The

follows:

(i) For project size 1-10 acres, a minimum of 4 positional checks are required

(ii) For project size 10-25 acres, a minimum of 8 positional checks are required

(iii) For project size 25-100 acres, a minimum of 12 positional checks are required

(iv) For project size 100-200 acres, a minimum of 24 positional checks are required

(v) For project size 300 acres or more, a minimum of 36 positional checks are required

2. Topography or elevation data produced in this manner must provide the date(s) of UAS data collection, the type of UAS including model or other identifying description, the type of LIDAR sensor or camera used, how many ground control points were used, the firm or individual who performed portions of the survey, including which portions, if not the surveyor or firm issuing the map, and the results of the positional checks by the surveyor either listed individually or as an average.

(5) Incorporation of publicly available contour or elevation data. When the surveyor incorporates contour or elevation data into a survey, map, or electronic work product, and such data is from a public source which is exempt from professional licensing and oversight by O.C.G.A. 43-15-29(b)(7), the surveyor must state the source of the data (such as the specific agency or department), the date of data acquisition if known, the contour interval shown, the type of collection used for such data (such as photogrammetric, LIDAR, etc.), and any other pertinent information available. The work product (whether map, electronic drawing file, or other terrain model format) shall include the following statement:" The topographic and elevation data shown hereon was obtained from (state source) and is not certified as correct by this surveyor. Users of this data do so at their own risk". Failure to provide this statement and the required data shall be both a violation of this rule and an acceptance of responsibility for the depicted work by the surveyor. The surveyor may also identify which portion(s) of elevation data is from a public source in situations where the surveyor has also verified some of the data provided

quality.

(2) The land surveyor shall set monuments as defined herein, unless monuments already exist or cannot be set due to physical obstructions. Said monuments shall be set at all boundary corners. Those monuments that cannot be set due to physical obstructions shall have a reference monument set. Said reference monument shall be referenced on the plat by bearing and distance from the true position of said monument. Also, said reference monument shall be set far enough away from the true corner so as not to be confused with the position of the true corner.

(3) All monuments set shall be composed of a durable material and shall incorporate a ferrous material to aid in location by magnetic locators. Said monuments shall have a minimum length of 18 inches. Longer monuments are required in soils less likely to hold and maintain the true position of the monument. Said monuments composed of solid metal rods shall have a minimum cross sectional area of 0.2 square inches. Concrete, composite or stone monuments shall have a minimum dimension of 3 inches by 3 inches. Monuments placed at land lot corners, district corners or county corners shall if a rod have a minimum diameter of 5/8 inches, a pipe of 1 inch diameter or a concrete or stone monument of not less than 4 inches square.

(4) Every boundary monument set shall be identified with a durable marker or cap bearing the Georgia registration number of the land surveyor in responsible charge or the name of the business entity and/or Certification of Authorization number (COA #).

(5) If a boundary corner falls in a hard surface such as concrete or asphalt; alternate monumentation may be used that is durable and identifiable.

(6) For irregular boundaries such as non-engineered roads, rivers, streams, lakes, beach, etc. a dimensioned meander or survey line may be used. If a meander or survey line is used, monuments shall be set at the meander or survey line's terminus points on real property boundary lines.

(7) All monuments found or placed shall be described on the survey plat. The corner descriptions shall state the size, material and cap identification of the monument as well as whether the monument was set or found.

Rule 180-7-.06 Coordinates and Triangulation

Rule 180-7-.07 Maps and Plats

All maps, plats and similar documents which depict and describe real property boundaries shall comply with all requirements of O.C.G.A. § 15-6-67 and conform to the following minimum standards and specifications: The sealing of documents, reports, preliminary subdivision plats, topographic surveys, and other drawings that do not depict and describe real property boundaries shall be subject to Rule 180-12 (Sealing of documents). Preliminary subdivision plats shall state the source of the boundary information shown thereon and also bear a note to the effect that it is a preliminary subdivision plat that has been prepared for the purpose of review and approval, is not to be recorded, and is not to be used to convey property. Topographic surveys shall state the source of the boundary information shown thereon and also bear a note to the effect that the surveyor's certification extends only to the topographic and/or geospatial aspects shown thereon, and that the topographic survey does not constitute a boundary survey and is not to be recorded or used to convey title or interest in the property.

(a) Material.

1. Any such surveys, maps, or plats shall be clearly legible;

2. The minimum line widths and letters or character heights delineated on such maps or plats shall be sufficient to be legible when copied or scanned at a resolution of 300 d.p.i.

(b) Required Data. The maps or plats shall have a title or name, and shall also provide the following information:

1. The name of the entity who authorized the survey, the entity for whom the survey is prepared, or the subject of the survey such as a subdivision name or site name;

2. The county, municipality; land district and land lot (if within an area of Georgia that is divided into land lots and districts); Georgia Militia District, Reserve, or other qualifying notation (if within an area of Georgia that is not divided into land lots and districts); and subdivision, if the property lies within a particular subdivision;

3. The date(s) of field work, plat preparation and all subsequent revisions including a brief explanation of each revision;

6. The name, address, telephone number, and registration number of the registered land surveyor who prepared and sealed the survey and, if working for a firm, the name and Certificate of Authorization Number of the firm that prepared the survey (the address and telephone number of the firm are acceptable in lieu of the individual surveyor's address and telephone number) or the statement that he is the county surveyor and is not required by law to be a registered surveyor; and

7. All maps or plats are to contain the applicable Surveyor Certification from O.C.G.A. § 15-6-67(b)(2) and signature in accordance with Board Rule 180-12-.02, in order to be a valid and recordable map or plat. The original maps or plats shall be retained by the land surveyor or land surveying firm in either hard copy or electronic file, along with all applicable work material which includes, but is not limited to, field notes, field data, computations, coordinate data, electronic drawing files and property research for a period of six years from the more recent date on the map or plat.

(c) Size. Maps and plats shall be of a size that is commonly available. The map or plat shall be drawn to a scale in feet commonly found on an engineer's scale or to a scale in chains commonly found on a forester's scale. Scans or images created electronically shall be at full size and legible at a resolution of 300 d.p.i., so that future users may be able to plot all or part of the map or plat at full size and resolution. The issue of printed reductions of maps or plats which meet this requirement is allowable.

(d) Required Content. All maps and plats shall be made in a professional manner and in accordance with the standards of good drafting procedures and shall show the following information, as specified:

1. The direction and distance from a point of reference to a point on the boundary of the individual survey, and such additional data as may be required to relocate the boundary point from the point of reference with the same degree of accuracy required of the parcel surveyed. The point of reference shall be an established, monumented position which can be identified or relocated from maps, plats or other documents on public record, including state plane coordinates when applicable. The point of reference may lie on or within the boundary of the survey;

as to which are measured and which are record. Distances that are shown for proximity purposes only and have not been measured shall be clearly labeled as "approximate";

3. The closure precision of the field survey as the ratio of one foot to the traversed distance in which an error of one foot would occur, angular error, and a statement as to the method of adjustment. The field closure stated shall be the actual linear error of closure calculated from the surveyor's actual field measurements, whether a closed traverse or otherwise, and shall not be a generalization.

   If the surveyor determines that a closure precision statement is not appropriate for the survey because a substantial portion of the field measurements were obtained using Global Positioning Systems, then a note of precision or positional accuracy may be placed in compliance with Rule 180-7-.09; or if the surveyor feels that a closure precision statement is not appropriate for the survey because redundant linear measurements were used to verify accuracy, the calculated positional tolerance shall be stated and shall comply with Rule 180-7-.03;

4. The closure precision of the data shown on the map or plat. The closure may be stated as follows: "This map or plat has been calculated for closure and is found to be accurate within one foot in _____ feet". The closure precision placed on the survey shall be based on an actual map closure that has been independently calculated by the surveyor by using the bearings and distances from the face of the plat, and shall not be a generalization. All lots or parcels shown on the plat shall be map checked for closure and area. In the case of a subdivision plat or a survey that depicts more than one tract, the closure precision stated may be that of the exterior or an average of the tracts;

5. The width and the former widths, if pertinent, of easements or rights-of-way adjacent to or crossing the property;

6. Apparent encroachments and observed evidence of human burials or cemeteries;

7. In the case of curved lines, the curve shall be defined by curve data to include the radius, arc length, chord bearing, and distance of regular curves. Chord distances and directions shall be given for irregular curves;

9. All corner markers and markers of pertinent reference points shall be fully described and indicated as to the material or types, size or dimensions, and whether set, found, or replaced. In the case of badly disturbed or deteriorated monuments that are replace for the purpose of position preservation, the survey shall indicate the size, type, and material of both the found monument and the monument with which it was replaced;

10. An arrow to indicate the principal meridian and a notation as to the reference of bearings to magnetic north, astronomic north, record or grid north. A grid north reference shall indicate the zone. Record north shall reference the document or survey to which the meridian is oriented and the line of the survey to which the "record bearing" was applied;

11. All linear distances shown on maps or plats shall be expressed as follows:

    a. Distances shall be horizontal distances.

    b. Distances shall be stated as "ground" distances (which shall also be the basis for any corresponding area calculations). Should it be necessary to state "grid" distances, both "ground" and "grid" distances shall be stated, along with the grid scale factor used, the elevation scale factor used, and the combined factor used.

    c. When expressed in feet, the definition of the foot shall be based on the conversion of the meter equals 3.280839895 feet or 1 foot equals 30.48 centimeters. Nothing in this rule shall prohibit the stating of distances in meters or units other than feet, provided that a conversion factor to the foot must be stated;

12. All angular directions shall be represented in degrees, minutes, and seconds. All angular directions shall be referenced to the meridian of the survey and be denoted starting with the letter N or S (for North or South), and the degrees, minutes, and seconds, followed by the letter E or W (for East or West). All bearings and distances around the perimeter of the property shall progress consistently in either a clockwise or counter-clockwise direction so as to form a closed shape. Azimuths, or interior (or exterior) angles may also be shown for reference but not in lieu of bearings and shall also be stated in degrees, minutes, and seconds;

documents were reviewed for each adjacent property as required by Rule 180-7-.02(1)(a). Such notation may be the deed book and page of the record title description, recorded plats, and other documents or surveys that were obtained through the course of the survey. In cases where the adjacent property is a recorded subdivision, it is sufficient to state the name, phase if applicable, and recording information of the subdivision plat, along with lot lines and lot numbers. (A title search is not required for this.);

15. All water boundaries or similar irregular boundaries shown in sufficient detail to clearly identify the surveyed tract and the adjoining tract;

16. The character of any and all evidence of possession along or related to boundary lines clearly depicted and stated, and overlaps and gores in property lines along or within the surveyed property in compliance with Rule 180-7-.02;

17. Any features within or along the boundary located as requested by the client, or in conformity with the rules or requirements of any mortgagor or insurer, provided the technical standards of such rules or requirements are not less than those provided for by this chapter;

18. The surveyor shall state the type of survey depicted, whether it is a retracement survey of an existing tract (or combination of tracts), a subdivision plat, a division from a parent tract, a depiction of a disputed area or other special purpose limited survey, a utility or easement survey, or other classification of land survey as may be deemed necessary. The source of title description of the property depicted shall be stated, along with the name of the current owner(s) as indicated by the tax records or deeds.

Rule 180-7-.08 Violations

The Board may initiate action in cases where a person's actions are in violation of the law beyond reasonable doubt.

Rule 180-7-.09 Global Positioning Systems

It shall be acceptable practice to incorporate the use of Global Positioning Systems (commonly known as GPS) equipment into any survey. The precision of all measurements made with such equipment must, at a

b. The type of GPS equipment used, including manufacturer and model number, and whether single or dual frequency receivers were used.

c. The type of GPS survey that was performed, such as static, real time kinemeatic ("RTK"), network adjusted real time kinematic, etc.

d. A note that discloses the precision of the GPS work done, either in relative positional accuracy, vector closure, or other mathematical expression chosen by the Land Surveyor.