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## Minimum Standards of Accuracy, Content and Certification for Surveys and Maps

### Article I

#### Types of Surveys

##### Sec. 20-300b-1. General

There are many types of surveys. Choice of a *survey type* is made relative to the intent and purpose for which the survey is to be used. The *survey type* is intended to classify these criteria. When a map is prepared, the *survey type* shall be stated in the title of the map and, in order to reflect the scope of service, may be clarified within the notes on the map.

(Adopted, effective June 21, 1996)

##### Sec. 20-300b-2. Property/boundary and limited property/boundary surveys

(a) Property/Boundary and Limited Property/Boundary Surveys require sufficient investigation, study, field measurement and evaluation of factors affecting boundaries, real property interests and other relevant matters with respect to the subject real estate to enable the surveyor to render a professional opinion as to boundary locations and any conflicts therewith.

These surveys require the preparation of a detailed field survey and are intended to present the surveyor's property/boundary opinion. It is recognized that certain factors pertaining to boundary line determination are beyond the surveyor's purview and may require agreements between abutting property owners or action by the courts. Facts surrounding such circumstances shall be noted.

###### (b) Types of Property/Boundary Surveys

###### (1) Property Survey

A Property Survey is a type of survey which depicts or notes the position of boundaries with respect to:

(A) locations of all boundary monumentation found or set;

(B) apparent improvements and features, including as a minimum: dwellings, barns, garages, sheds, driveways, roadways, surface utilities, visible bodies of water and swimming pools;

(C) record easements and visible evidence of the use thereof;

(D) record and apparent means of ingress and egress;

(E) lines of occupation, including as a minimum: fences, walls, hedges and yards;

(F) deed restrictions pertaining to the location of buildings or other apparent improvements;

(G) unresolved conflicts with record deed descriptions and maps;

(H) all apparent boundary encroachments; and

(I) monumentation required to be set at all corners created by a deflection angle of not less than 70 degrees between two consecutive courses and at intervals not to exceed 600 feet (180 meters) along the boundaries between said corners, except where natural or man-made monumentation defines or occupies the line. Refer to Section 20-300b-14 of these regulations for a description of acceptable monuments. Except when intended for use for Subdivision or Resubdivision applications, this requirement may be waived only through written agreement between surveyor and client and with a notation on the map that all monumentation found or set has been depicted.

###### (2) Perimeter Survey

A Perimeter Survey is a type of survey which maps a strip along the boundaries, the minimum width of which shall be 15 feet (5 meters), oriented 10 feet (3 meters) within and 5 feet (2 meters) beyond the parcel limits. The purpose of this type of survey is to document the boundary locations by depicting and noting their position with respect to:

- (A) locations of all boundary monumentation found or set;
- (B) apparent improvements and features, including as a minimum: dwellings, barns, garages, sheds, driveways, roadways, surface utilities, visible bodies of water and swimming pools;
- (C) record easements and visible evidence of the use thereof;
- (D) record and visible means of ingress and egress;
- (E) lines of occupation, including as a minimum: fences, walls, hedges and yards;
- (F) unresolved conflicts with existing deed descriptions and maps;
- (G) deed restrictions pertaining to the location of buildings or other apparent improvements;
- (H) apparent boundary encroachments; and
- (I) monumentation required to be set at all corners created by a deflection angle of not less than 70 degrees between two consecutive courses and at intervals not to exceed 600 feet (180 meters) along the boundaries between said corners, except where natural or man-made monumentation defines or occupies the line. Refer to Section 20-300b-14 of these regulations for a description of acceptable monuments. This requirement may be waived only through written agreement between surveyor and client and with a notation on the map that all monumentation found or set has been depicted.

(c) **Types of Limited Property/Boundary Surveys**

(1) Existing Building Location Survey

An Existing Building Location Survey is a type of survey which depicts or notes the position of all buildings on the property with respect to boundaries, record easement lines and pertinent municipal setback requirements and deed restrictions. No other improvements or features need be depicted.

(2) Zoning Location Survey

A Zoning Location Survey is a type of survey which depicts or notes the position of existing or proposed improvements with respect to applicable municipal setback requirements. The purpose of this type of survey is to enable determination of compliance with said requirements. Only those portions of the property pertinent to the issues being addressed must be depicted. No other improvements or features need be depicted.

(3) Improvement Location Survey

An Improvement Location Survey is a type of survey which depicts or notes the position, horizontally and, where required, vertically, between particular existing or proposed improvements with respect to the applicable municipal or statutory requirements. The purpose of this type of survey is to enable determination of compliance with said requirements. No other improvements or features need be depicted.

(4) Subdivision or Resubdivision Map

A Subdivision or Resubdivision Map is a map of a type of survey which depicts or notes the layout of lots and the associated public or private highways, easements and lands and is intended for submission to applicable regulatory entities. This map shall conform to the requirements of a Property Survey or be submitted along

with a Property Survey. The monumentation requirements of Article III of these regulations do not apply to the Original Survey portions.

(5) Easement Map

An Easement Map is a map of a type of survey which depicts and notes the position of an existing or proposed easement with respect to:

(A) boundary monumentation found or set;

(B) improvements and features, including as a minimum: dwellings, barns, garages, sheds, driveways, roadways, surface utilities, visible bodies of water, fences, walls, hedges, yards and swimming pools;

(C) other record easements and visible evidence of the use thereof; and

(D) unresolved conflicts with record deed descriptions and maps.

All visible encroachments shall be depicted or noted thereon. For boundaries intersected by the easement lines, the surveyor shall indicate the Boundary Determination Category used.

(6) Boundary Stake-Out

A Boundary Stake-Out is a type of survey which marks or monuments the physical position of property corners or lines. The surveyor shall issue a signed and sealed letter or sketch indicating the monuments or markers set and indicating the Boundary Determination Category used. No other features need be depicted.

(d) **Additional Requirements**

All survey types listed in subsections (b) and (c) of this section shall comply with the following:

(1) AA, A-1 or A-2 Classes of Horizontal Accuracy as defined in subsection (b) of Section 20-300b-11 of these regulations.

(2) monumentation or marker Location Requirements as defined in Section 20-300b-13 of these regulations;

(3) research requirements defined in Article IV of these regulations;

(4) distances along boundary or easement lines expressed to the nearest .01 of a foot (.003 meters), except where said lines are irregular and constantly changing, as along a body of water;

(5) directions, defined by angles, bearings or azimuths, along boundary or easement lines expressed to the nearest 10 seconds for Class A-2 and to the nearest 1 second for Class AA and A-1, except where said lines are irregular and constantly changing, as along a body of water;

(6) curved lines defined with the central angle, radius, arc length and tangent. For curves which are not tangent to an adjoining course, the information required to reproduce them shall be indicated. Lines which are radial shall be so noted;

(7) in areas where lines are irregular and constantly changing, as along a body of water, meander, tie or reference lines shall depict or note the position of points located along said lines and allow for a mathematical closure of the map;

(8) adjoining properties shall be identified by most recently published owners' names (N/F, now or formerly) or by subdivision map and lot numbers;

(9) areas noted in acres (hectares) or square feet (square meters);

(10) all monuments or markers set or found depicted and adequately described. When reference markers have been used, their position with respect to the boundary shall be indicated; and

(11) a north arrow shall be shown on every sheet. The reference to grid, magnetic or north from another map, shall be noted. If magnetic, the date of the reading shall be noted.

(e) **Boundary Determination Categories**

The category used in determining property/boundary opinions for all survey types listed in subsections (b) and (c) of this section shall be identified within the title or notes on the map, and shall be one of the following:

(1) **First Survey:**

A First Survey is a survey of existing property lines made when the surveyor has not found a map or other document of the subject property, such as a metes and bounds description which represents a previous surveyor's professional opinion. If the surveyor has found a prior survey, the current survey is by definition, a Resurvey.

(2) **Resurvey:**

A Resurvey is a survey of property lines made when the surveyor has found a prior survey of the subject property. After evaluation of the prior survey, within the context of field and record information, the Resurvey is prepared. The Resurvey may or may not agree with the prior survey.

If the surveyor has found a prior survey of the subject property and, in the surveyor's professional opinion, determines it to be sufficient for reliance and update, the term Dependent Resurvey shall be used. The Dependent Resurvey places reliance on the prior survey while updating same to reflect current conditions.

(3) **Original Survey:**

An Original Survey is a survey indicating proposed property lines or parcels of land. The Boundary Determination Category of existing boundaries shall be indicated.

(Adopted, effective June 21, 1996)

### **Sec. 20-300b-3. Control surveys**

(a) **Horizontal Control Survey**

A Horizontal Control Survey is a type of survey which establishes points on a horizontal coordinate system, such as latitude and longitude, state, municipal, or arbitrary coordinates. The horizontal control net shall comply with one of the Classes of Horizontal Accuracy defined in Section 20-300b-11 of these regulations.

(b) **Vertical Control Survey**

A Vertical Control Survey is a type of survey which establishes bench marks in relation to an appropriate vertical datum. Vertical measurements shall comply with one of the Classes of Vertical Accuracy defined in Section 20-300b-11 of these regulations.

(Adopted, effective June 21, 1996)

### **Sec. 20-300b-4. Topographic survey**

(a) A Topographic Survey is a type of survey which depicts the configuration (relief) of the earth's surface (ground) and the location of natural and artificial objects thereon. The Topographic and Vertical Classes of Accuracy, as defined in Section 20-300b-11 of these regulations, shall be noted. Bench marks shall be depicted or noted on all Class T-1, T-2 and T-3 Surveys. Survey datum and contour interval shall be depicted or noted.

(b) If property lines depicted do not present a surveyor's property/boundary opinion, there shall be a note clearly indicating this fact.

(Adopted, effective June 21, 1996)

### **Sec. 20-300b-5. Right of way survey**

(a) A Right of Way Survey is a type of survey which maps the limits of existing or proposed highways or public utility transmission easements, including the mapping of parcels to be acquired for such purpose(s), as referenced to an established

baseline. The baseline to which the highway, easement or acquisition lines are referenced shall be a traverse line, project centerline or construction baseline, any of which shall be monumented or specifically tied to permanent reference markers and shall comply at a minimum with Horizontal Accuracy Class A-2 as defined in Section 20-300b-11 of these regulations and monumentation requirements defined in Article III of these regulations.

(b) Highway or easement lines may be deed, occupation, notification or acquisition lines; shall be noted accordingly; and may be monumented.

(c) The features depicted on the mapping may be the result of aerial photogrammetric or field location surveys performed for project planning purposes or may be compiled from various sources. All pertinent sources shall be noted. The method of determining the position of property lines depicted shall be noted as shall the appropriate Horizontal Accuracy Class.

(Adopted, effective June 21, 1996)

#### **Sec. 20-300b-6. General location survey**

(a) A General Location Survey is a type of survey which roughly depicts a parcel of land and particular improvements based on record research and compilation of data supplemented by limited field measurements. The specific content is a matter to be agreed upon between the client and the surveyor and clearly noted on the map.

(b) This type of survey shall not be used to prepare property descriptions for conveyance.

(c) If property lines depicted do not present a surveyor's property/boundary opinion, there shall be a note clearly indicating this fact.

(d) Note #1 on the map shall include: "This map was prepared from record research, other maps, limited field measurements and other sources. It is not to be construed as a Property/Boundary or Limited Property/Boundary Survey and is subject to such facts as said surveys may disclose."

(Adopted, effective June 21, 1996)

#### **Sec. 20-300b-7. Data accumulation plan**

(a) A Data Accumulation Plan is a type of plan which depicts collected and correlated data of a particular type (or types) within a given area. Data Accumulation Plans may be depicted on a previously prepared map. The horizontal or vertical accuracy classes used in the preparation shall be noted.

(b) If property lines depicted do not present a surveyor's property/boundary opinion, there shall be a note clearly indicating this fact.

(Adopted, effective June 21, 1996)

#### **Sec. 20-300b-8. Compilation plan**

(a) A Compilation Plan is a type of plan based on land record research and other sources of information which depicts the approximate size and shape of a parcel of land. This plan may be derived from records only and not as a result of a field survey or measurements by the surveyor. The accuracy of this plan may vary with the quality of the data from which it has been compiled. All pertinent sources utilized shall be noted on the plan. Where said plan is created for a specific purpose, that purpose shall be noted.

(b) Note #1 on this plan shall include: "This plan was compiled from other maps, record research or other sources of information. It is not to be construed as having been obtained as the result of a field survey, and is subject to such change as an accurate field survey may disclose."

(Adopted, effective June 21, 1996)

**Sec. 20-300b-9. Construction stake-out services**

Construction Stake-Out Services are types of surveys which control the horizontal or vertical positions of proposed improvements. No plan need be prepared; however, documentation with respect to the position of points placed shall be maintained as a permanent record.

(Adopted, effective June 21, 1996)

**Sec. 20-300b-10. Geographic information system (GIS) land information system (LIS)**

(a) Types of systems used for information data banks based on spatial requirements. Reference is made to a publication by the Federal Geodetic Control Committee titled *Multipurpose Land Information Systems: The Guide Book*.

(b) If the information in the GIS/LIS is intended to relate to the surface of the earth, a surveyor shall establish such positional relationship. The surveyor’s professional judgment shall be used in determining all appropriate Classes of Accuracy.

(Adopted, effective June 21, 1996)

**Article II**

**Classes of Accuracy**

**Sec. 20-300b-11. Classes of accuracy**

(a) All surveys prepared in metric format shall use: 1 meter = 3.28083333 U.S. Survey feet.

**(b) Horizontal Accuracy**

Each survey depicting horizontal locations shall conform to a Horizontal Accuracy Class the tolerance of which is defined as follows:

Class	Positional	Linear			Angular
		Feet	Meters	(Use the ratio for D>...)	
AA	1:15,000	±0.01'	±.003m	(1:22,500 @ D>225'(69m))	±8"
A-1	1:10,000	±0.01'	±.003m	(1:15,000 @ D>150'(46m))	±10"
A-2	1:5,000	±0.02'	±.006m	(1:7,500 @ D>150'(46m))	±20"
B	1:1,000	±0.5'	±.15m	(1:1,500 @ D>750'(229m))	±2'
C	±2'	±2'	±.6m		±30'
D	compilation of existing data-NOT A FIELD SURVEY				

Linear accuracies expressed as “±” apply to distances less than (<) those prescribed as a ratio.

**(c) Vertical Accuracy**

Each survey depicting vertical location shall conform to a Vertical Accuracy Class the tolerance of which is defined as follows:

Class	Level Loop Closure Greater Than One Mile		Level Loop Closure Less Than One Mile	
	Feet	Meters	Feet	Meters
V-1	±.02√M	±.005√K	±.006√N	±.002√N
V-2	±.035√M	±.008√K	±.010√N	±.003√N
V-3	±.05√M	±.012√K	±.020√N	±.006√N

M or K = The length of the level loop in miles/kilometers

N = The number of instrument setups in the level loop

**(d) Topographic Survey Accuracy**

Each Topographic Survey shall conform to a Topographic Accuracy Class the tolerance of which is defined as follows:

Class	Horizontal Position		Contour Interval Test
	Feet	Meters	
T-1	1/40 of map scale	1/1500 of map scale	90% within 1/2 contour interval
T-2	1/40 of map scale	1/1500 of map scale	80% within 1/2 contour interval

Classes T-1 and T-2 are to be used for ground survey procedures.

- T-3 This class of topographic map applies to photogrammetric maps for which the surveyor provides the horizontal and vertical control. Refer to the "National Map Standards for Photogrammetric Mapping" for requirements.
- T-D This class of map standard applies to a topographic map compiled from various sources of information not necessarily verified by the surveyor.

In using Topographic Accuracy Class T-1 or T-2, the surveyor is expressing confidence that should a test profile be run in the field, a plotted comparison with a profile scaled from the map shall be in agreement within the above criteria and the remainder shall be within the contour interval.

(Adopted, effective June 21, 1996)

**Article III**

**Monumentation**

**Sec. 20-300b-12. Boundary monuments and reference markers**

(a) A Boundary Monument is an object found or set on a boundary line which preserves and identifies the location of the boundary line on the ground.

(b) A Reference Marker is a permanent supplementary marker found or set close to a boundary with its position with respect thereto indicated.

(Adopted, effective June 21, 1996)

**Sec. 20-300b-13. Location requirements**

The following standards shall apply to location requirements:

- (1) There shall be a minimum of three monuments, markers or a combination thereof.
- (2) Each monument or marker found or set shall be adequately described and noted.
- (3) Of the three minimum monuments or markers, two shall be within 600 feet (180 meters) of the boundary and each other.
- (4) Every point along the boundary, with the exception of meander lines, shall be within 600 feet (180 meters) of a monument or marker.

(Adopted, effective June 21, 1996)

**Sec. 20-300b-14. Acceptable monuments and markers**

The following shall be acceptable forms of Monuments and Markers:

- (1) disks or plugs, made of durable material set in ledge or concrete and marked with a hole or cross;
- (2) monuments 4" (10cm) square by 30" (.75m) long (minimum) of stone or reinforced concrete and marked with a hole or a cross. Some ferrous material shall be placed adjacent to the stone monuments as an aid to recovery;
- (3) drill holes 3/8" (10mm) diameter by 1/2" (13mm) deep (minimum) or cross cuts 3/8" (10mm) deep (minimum) in ledge, concrete or the base stones of walls;

(4) metal rods  $\frac{1}{2}$ " (13mm) O.D. (minimum) or metal pipes  $\frac{1}{2}$ " (13mm) I.D. (minimum) or bar stock of equivalent cross sectional area, having sufficient length to be deemed permanent;

(5) nails and spikes that are sufficient in size and are set in pavement in a manner so as to be deemed permanent;

(6) foundation corners; and

(7) other materials or objects deemed permanent by the surveyor.

(Adopted, effective June 21, 1996)

## Article IV

### Research

#### Sec. 20-300b-15. General

On surveys where the surveyor expresses a property/boundary opinion, the surveyor assumes responsibility for appropriate research. An appropriate examination of the land records and other sources is one which, in the surveyor's professional opinion, reveals the intended boundary locations and other related matters.

(Adopted, effective June 21, 1996)

#### Sec. 20-300b-16. Land records research

(a) Land Records Research shall include, but not be limited to, the following:

(1) an examination of the record descriptions of the property being surveyed;

(2) an examination of the record descriptions of the adjoining parcels;

(3) an examination of record surveys and subdivision maps of the land being surveyed and of adjoining parcels;

(4) an examination of tax assessor's plats and records;

(5) an examination of pertinent easements and other documents; and

(6) an examination of Probate Court records, when applicable.

(b) All surveys presenting the surveyor's property/boundary opinion, except Dependent Resurveys, shall include a record search of the surveyed property's chain of title, with deeds going back not less than 40 years. Dependent Resurveys shall include a record search of the surveyed property's chain of title with deeds going back at least as old as the date of the survey relied upon.

(c) The 40-year minimum requirement is not to be construed as a flat period of time to search a title. To determine the original intended boundary locations, most surveys require research well beyond the statutory 40-year period.

(d) Identifying the owner of the property on the survey shall not constitute a certification as to the absolute ownership of the property. It shall however, indicate a record name or names in which the property stood at the time of the survey, without stating all the other interests which may pertain to the ownership of the property.

(Adopted, effective June 21, 1996)

#### Sec. 20-300b-17. Additional research

(a) In cases where the surveyor finds: 1) evidence of an unrecorded map; 2) vagueness or conflict of boundary location; or 3) physical evidence of easements not found of record, the surveyor shall pursue such additional sources of information as the surveyor considers appropriate.

(b) The additional research required is that which, in the surveyor's professional opinion, is sufficient to reveal the location of the boundaries of the subject property and other related matters pertaining to the land. Where properties are poorly described or where the location of the boundaries has become lost or uncertain, the surveyor

may contact adjacent owners or other persons for their knowledge as to the locations of boundary lines.

(Adopted, effective June 21, 1996)

## Article V

### Map Drafting and Records

#### Sec. 20-300b-18. Map drafting standards

The following standards shall apply to all survey maps and plans:

- (1) the surveyor shall use map-making materials of a durable nature;
- (2) all lettering shall be legible when reproduced;
- (3) whenever more than one sheet is used, each sheet shall contain clearly labeled match lines and indicate both the number of each sheet and the total number of sheets;
- (4) both a word scale and a graphic scale shall be depicted;
- (5) a North arrow (with appropriate source reference) shall be depicted on every sheet;
- (6) the first note shall state the standards to which the survey was prepared, the applicable Class or Classes of Accuracy, the Type of Survey and the Boundary Determination Category;
- (7) when applicable, horizontal datum and vertical datum shall be noted;
- (8) mapped features shall be depicted to an accuracy of 1/40 of map scale for surveys in feet and 1/1500 of map scale for surveys performed in metric measure; and
- (9) when applicable, documents used in preparation shall be noted.

(Adopted, effective June 21, 1996)

#### Sec. 20-300b-19. Field and office records

The field notes, original maps, research material and computations shall be retained as a permanent record.

(Adopted, effective June 21, 1996)

## Article VI

### Signing and Sealing

#### Sec. 20-300b-20. Signing and Sealing

(a) The signature and embossed seal of the surveyor shall be placed in accordance with Section 20-300-10 of The Regulations of Connecticut State Agencies.

(b) Maps and plans shall include the statement: "To my knowledge and belief this map is substantially correct as noted hereon" above the signature and the printed name and license number of the surveyor below the signature.

(Adopted, effective June 21, 1996)