

# Types and Uses of Surveys

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## Types and Uses of Surveys

For the purpose of this white paper nine types of surveys will be defined:

1. **Boundary Surveys:** Boundary surveys are also known as land, property, or cadastral surveys. “[M]ade to establish or to retrace a boundary line on the ground, or to obtain data for constructing a map or plat showing a boundary line.” “[T]he term refers to all surveys ...which involve the determination or depiction of property lines.” (*Definitions of Surveying and Associated Terms*, American Congress on Surveying and Mapping and the American Society of Civil Engineers, 1978). As such, many surveys include the fundamental elements of a boundary survey.

2. **Topographic Surveys:** A topographic survey’s purpose is “the determination of the configuration of the earth and the location of natural or artificial objects thereon.” 21 NCAC 56.1606. Such objects might include buildings, improvements, fences, trees, and streams. A topographic survey, also known as a “topo,” expresses a three-dimensional concept within two-dimensional limits. This type of survey is accomplished by using spot elevations and contour lines (lines of equal elevation), and need not be necessarily be a boundary survey. Topo surveys are useful for the design and construction of improvements or developments on land, such as roads, bridges, railroads, buildings, drainage systems, and water and sewer systems, as well as for forestry management.

3. ALTA/NSPS Survey (American Land Title Association & National Society of Professional Surveyors): “ALTA” surveys are made to provide the lender and the title insurer with survey and location data pertinent to title insurance coverage, including the location of existing improvements on the land relative to the parcel boundaries. While ALTA surveys are generally considered a breed of boundary survey, it is important to note that the standards and implemented by ALTA/NSPS (which can be found at <https://www.nsps.us.com/page/2021ALTA>) must be viewed within the context of state and local regulations governing surveying practices. In some cases, ALTA standards may be greater or lesser than those instituted by state and local governing agencies, and the higher standard must apply. For example, ALTA Table A, “Optional Survey Responsibilities and Specifications” lists monumentation of corners as an optional survey service; however, most, if not all, state laws requires monumentation of all corners except in limited circumstances.

4. As-built Surveys: A hybrid of boundary and topographic survey, as-built surveys document the final or current location and layout of structures on a tract of land, showing the physical characteristics of the structure (usually length and width, although sometimes the height) and the relationship between the structure’s location and the boundary line. This type of survey is commonly required by a lender who has financed the construction of improvements and be utilized in complex construction projects where the placement of features is dependent upon the precise location of previously-placed features.

5. Easement Surveys: This survey shows the location of an easement across public or private property. The most common easement surveys are those for roads, waterlines, sanitary sewer lines, storm drainage lines, and power, telephone, and cable lines. Usually, these surveys are of a constant width with the particular structure being located in the middle of the easement. An easement survey can be a boundary survey (easement area being acquired) or an as-built survey (completed installed improvements).

6. Construction Surveys: These surveys are performed to layout design locations prior to construction. The most common construction surveying involves laying out buildings, curb and gutter, sanitary sewer, and storm sewer structures. Reference points are set on the site that aids the construction company in building the project. Generally, a drawing as the final product is not generated from construction surveys.

7. Aerial Surveys: Also known as photogrammetric surveys, these surveys are prepared using aerial photography. These surveys generally show topographic and planimetric features in combination with a boundary survey. A boundary survey cannot be performed by use of the aerial photography only, but this type of survey method is a useful tool in certain boundary surveys, as well as in fishery surveys, mining applications, archaeology, monitoring wildlife and insect populations (aerial census), and monitoring ground cover and vegetation.

8. Hydrographic Surveys: The purpose of this type of survey is to measure and describe features affecting and



composing bodies of water. Hydrographic data is collected and reported under various regulations depending upon the collecting authority. In the US, hydrographic surveys of territorial waters are governed by the National Oceanographic and Atmospheric Administration (NOAA), which maintains a fleet of survey vessels. Inland surface waters such as lakes, rivers, and streams fall under the authority of the US Geological Survey (USGS). Other organizations conducting hydrographic surveys include the US Coast Guard, the National Geospace Agency (oversees charting of international waters for the Dept. of Defense), the Naval Oceanographic Office, and the US Army Corps of Engineers (in connection with authority over major waterway projects). Some military combat units, such as the Navy's SEAL and engineering units perform hydrographic reconnaissance survey work. Private commercial entities perform a large segment of hydrographic surveys, especially in relation to dredging, marine construction, oil & gas exploration and drilling, and placement of submarine communication and power cables.

9. Control Surveys: This particular survey establishes the horizontal and vertical positions of reference points. These reference points, also known as "benchmarks," serve as a reference framework for initiating other surveys. These surveys are performed at very high accuracies, as established by government regulations. The benchmarks are usually semi-permanent monuments that often consist of brass or aluminum disks set in concrete, although other forms of monumentation, such as iron pins, are also used.

C. Land Record Systems:

Public land records were first instituted in the Plymouth and Massachusetts Bay colonies around 1640 and were a novel American undertaking. While much of our legal heritage hails from England's traditions, England had no public land records; instruments of title and conveyance were handed from owner to owner, and held by the landowner and/or his attorney. Currently, every US state mandates public maintenance of land title records.

Accurately describing a parcel of land is crucial to the public land records systems. In order to identify any given parcel of land, each parcel must be distinguishable in writing from all other parcels of land. Two basic systems of identification are generally used to describe property within the United States:

1. the "metes and bounds"
2. the United States Public Land System (aka US Government Survey)

The metes and bounds system was the first system to be employed in the United States and is the basis for property identification in most areas that were under private ownership before the Revolutionary War. This system is the most common system of land identification used in the original thirteen colonies (CT, DE, GA, MD, MS, NH, NJ, NY, NC, PA, RI, SC, VA, and MD) as well as Maine, West Virginia, Kentucky, Tennessee, Texas, Vermont, Hawaii and parts of Ohio. The metes and bounds system identifies property in reference to natural and artificial monuments, as well as adjoining property boundaries, and describes the parameters of the parcel in the direction and distance of each boundary line.

Key elements within the metes and bounds description are these:

- The beginning point of the property description (commonly known as the “Point of Beginning”)
- The bearing and distances that describe the perimeter of the property, together with reference to any natural features along the boundaries
- The description of the natural and/or artificial monuments that mark the location of the corners of the property

While not required, the area of the property and a reference to a prior survey are commonly featured within a metes and bounds description.

The metes and bounds description draws a picture. The description leads the reader from a relatively well-known landmark to and around the parcel being defined.

Historical metes & bounds surveys may feature measurements in chains (66 feet) or in poles, rods, or perches (each equivalent to 16-1/2 feet).

The U.S. Public Land System (USPLS) was inaugurated in 1784 to divide property belonging to the new nation of the United States in order for the government to sell this land and generate revenue. These lands include those turned over to the federal government by the colonial states and the larger areas acquired by purchase or treaty by the United States. Thirty states (including Alaska) constitute the public land survey states that have been or will be, subdivided into rectangular tracts.

The USPLS is essentially a grid system with a north-south reference line called a Principal Meridian and an east-west line



called a Baseline. Using these reference lines, the land was divided into quadrangles approximately 24 miles on a side. The quadrangles were further divided into "survey townships" or "congressional townships" approximately six miles wide (and are also known as 'sections'). County lines generally follow boundary lines encompassing a number of townships.

Within both the metes and bounds system and the US Public Lands System exists the platted subdivision system, which is a method used to describe property in those instances where a larger tract is divided into smaller tracts. This process usually produces a subdivision plat whereby the smaller parcels are identified by a unique identifying label. This usually takes the form of a lot "number" or "letter." Lots may also be called "parcels," "plots," or "tracts." If the parent parcel produces a large number of lots, the individual lots may be grouped into blocks and identified by a block number in conjunction with a lot number. The distinguishing feature that denotes a platted subdivision is the creation of two or more parcels of a specific size from one or more existing parcels where the division is based upon a drawing of the parent tract.

This platted subdivision system has many advantages. The primary advantage is that considerably less verbiage is needed to describe any particular lot than that which is required for a metes and bounds description. Title transfers can be described using the subdivision name and lot number, rather than the more lengthy metes and bounds description. If used as the basis for property transfer, the subdivision plat is recorded in the public land records. Deeds that refer to the lot and block

identifiers may be supplemented by a metes and bounds description.



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