

General Definition of California Professional Land Surveying Practices:

The practice of land surveying in the State of California consists of determining, establishing, reporting and mapping the positions, contours and/or geospatial configuration of points, physical features, property interests, boundary and/or property lines by applying the principles of surveying, mathematics, measurement and law to meet the distinctive requirements of the State of California to protect the health, safety and welfare of the public.

I. Project Management (13%)

Project Management includes assessing needs of clients, gathering and analyzing data from public and private sources to define project scope of services, negotiating and preparing the final contract, supervising resources necessary to meet contractual obligations, and exercising independent control and direction of land surveying work.

Job Tasks

- 01 Communicate survey practice to the public and potential clients
- 02 Negotiate and secure a written contract with client
- 03 Offer land surveying services
- 04 Procure land surveying services
- 05 Direct personnel for office and field survey tasks
- 06 Coordinate projects with third parties (e.g., agencies, consultants)
- 07 Identify project standards (e.g., mapping, accuracy requirements, client needs, methodology, quality assurance)
- 08 Develop project standards (e.g., mapping, accuracy requirements, client needs, methodology, quality assurance)
- 09 Prepare proposals (e.g., scope, schedule, budget)
- 10 Preserve monuments in accordance with State law
- 11 Manage a land surveying business, organization or department
- 12 Establish and maintain GPS real-time network
- 13 Make survey records available to the public
- 14 Maintain an index for survey records available to the public
- 15 Utilize the Subdivision Map Act
- 16 Utilize the Professional Land Surveyors Act
- 17 Assess project needs (e.g., legal requirements, client needs, local ordinance requirements)

Knowledge Areas

Knowledge of:

- K01 Professional Land Surveyors' (PLS) Act
- K02 Subdivision Map Act (SMA)
- K03 impact of local ordinances
- K04 project requirements

I. Project Management (Continued)

- K05 laws and ordinances pertaining to setting of monuments (e.g., PLS Act § 8771-8772, SMA § 66495-66498, local ordinances)
- K06 right of entry laws, rules and regulations
- K07 capabilities and limitations of current technologies (e.g., GPS, laser scanning, levels, total stations)
- K08 interpretation of elements in construction plans and specifications pertaining to staking
- K09 elements required for an aerial flight plan (e.g., photogrammetric, LiDAR)
- K10 procedures for preparation for aerial mapping and contouring
- K11 procedures for preparation for terrestrial mapping and contouring (e.g., total station, GPS, LiDAR)
- K12 National Standard for Spatial Data Accuracy (NSSDA)
- K13 when records of survey are required
- K14 when corner records are required
- K15 when parcel maps are required
- K16 when final maps are required
- K17 when tentative maps are required
- K18 map waivers (e.g., SMA § 66428)
- K19 exceptions to SMA (e.g., § 66412)
- K20 state and local agency processing requirements for maps and related documents (e.g., submittal, review, filing)
- K21 methods to identify mapping requirements and criteria
- K22 project location, objectives and constraints
- K23 appropriate types of data required
- K24 contractual agreements (e.g., cost estimates, scope of services, limitations)
- K25 appropriate communication methods (e.g., verbal and written)
- K26 project constraints and objectives (e.g., location, physical, regulatory, environmental, legal, political)

II. Research, Pre and Post Field Analysis (25%)

Research, Pre and Post Field Analysis includes determining, evaluating, analyzing, reducing and adjusting field collection data in accordance with accepted standards of practice and in compliance with all applicable statutes, rules and regulations and to meet accuracy standards for design of improvements.

Job Tasks

- 18 Ensure use of proper control datums and epochs (e.g., plane coordinates, NAVD88 / NGVD29, epoch 1991.35 / 2007.00)
- 19 Analyze project data (e.g., recorded maps, deeds, control data, title data, land planning requirements)
- 20 Identify conflicts within the drawing set
- 21 Conduct project research
- 22 Prepare construction staking layout and drawings
- 23 Perform surveying calculations (e.g., boundary, construction staking, control, topographic)
- 24 Analyze field evidence together with recorded and unrecorded documentation to determine boundaries, easements, and possible encroachments
- 25 Identify conflicts between project drawings and existing field conditions (e.g., construction plans, condo plans)
- 26 Determine accuracies of maps and measured survey data
- 27 Evaluate relevance and spatial relationships of maps and measured survey data
- 28 Identify boundary conflicts
- 29 Compile and provide geographic information system (GIS) data

Knowledge Areas

Knowledge of:

- K08 interpretation of elements in construction plans and specifications pertaining to staking.
- K09 elements required for an aerial flight plan (e.g., photogrammetric, LiDAR)
- K10 procedures for preparation for aerial mapping and contouring
- K11 procedures for preparation for terrestrial mapping and contouring (e.g., total station, GPS, LiDAR)
- K13 when records of survey are required
- K14 when corner records are required
- K27 public lands survey system
- K28 sequential conveyances (e.g., senior, junior rights)
- K29 simultaneous conveyances

II. Research, Pre and Post Field Analysis (Continued)

- K30 water boundaries
- K31 hierarchy of evidence (e.g., CCP 2077)
- K32 relationship of land grants between private, state and federal (e.g., Rancho)
- K33 effects of unwritten rights on boundaries
- K34 boundary resolution
- K35 evaluation of field evidence
- K36 methods of establishing boundaries
- K37 types and components of title documents (e.g., title report, chain of title, lot and block report)
- K38 types of conveyances and their effects of ownership on property (e.g., fee vs. easement, grant deed, quitclaim deed)
- K39 effect of riparian and littoral rights on boundaries
- K40 effect of cloud on title
- K41 methods for calculating and adjusting boundary surveys
- K42 error analysis
- K43 monument recovery and re-establishment procedures
- K44 effect of ground movement on boundaries (e.g., earthquakes, subsidence, slides)
- K45 procedures, standards and requirements for ALTA/ACSM surveys
- K46 easements, rights-of-way and other encumbrances
- K47 effects of leases
- K48 methods and procedures for retracement and re-establishment of railroads rights-of-way
- K49 criteria for acceptance or rejection of monuments
- K50 tidal cycles and datums
- K51 physical evidence that may indicate unwritten rights (e.g., adverse possession, prescriptive rights)
- K52 controlling elements of legal descriptions
- K53 types of legal descriptions (e.g., strip, metes and bounds, lot and block, aliquot)
- K54 exceptions and reservations of legal descriptions
- K55 horizontal and vertical control
- K56 projections, datums and epoch dates
- K57 transformation between epoch dates
- K58 transformation between datums and projections

II. Research, Pre and Post Field Analysis (Continued)

- K59 geoid, ellipsoid and orthometric heights
- K60 conversion between grid and ground distances
- K61 error sources (e.g., multipath, data input, instrument calibration)
- K62 calculating and analyzing errors
- K63 California Coordinate Systems
- K64 real-time-networks (e.g., processes, redundancy, accessibility, accuracy)
- K65 methods and procedures to produce control networks within accuracy standards (e.g. Public Resources Code, NGS Standards, FGCS Standards)
- K66 procedures for analysis, reduction, and adjustment of raw data to obtain coordinate values
- K67 requirements for aerial survey data collection
- K68 methods to obtain bearings or azimuths related to geodetic, magnetic, grid or astronomic north
- K69 survey calculations (e.g., horizontal and vertical alignments, volumes, grade)
- K70 mathematics (e.g., algebra, trigonometry, geometry)
- K71 accuracy required for construction staking
- K72 field notes and staking reports
- K73 basis of control values and their relation to maps and construction plans (e.g., basis of bearing, benchmark)
- K74 methods to produce digital terrain models
- K75 sources of research data (e.g., public, quasi-public, private)
- K76 GIS metadata
- K77 methods for identifying and resolving errors in research data (e.g., map or deed misclosure)
- K78 source, type and accuracy of digital data (e.g., metadata, GIS)
- K79 researching relevant case law (e.g., boundary issues, liability)

III. Field Work (20%)

Field work includes the process of performing field observations by collecting field data in accordance with accepted standards of practice and in compliance with all applicable status, rules and regulations.

Job Tasks

- 30 Perform topographic surveys
- 31 Perform control surveys
- 32 Perform boundary surveys
- 33 Perform as-built surveys
- 34 Perform PLSS surveys
- 35 Perform monitoring surveys
- 36 Perform cadastral surveys
- 37 Recognize and locate field features relevant to the survey (e.g., boundary evidence, topographic features)
- 38 Perform construction staking
- 39 Set, replace or remove monuments
- 40 Verify character and position of given horizontal and vertical control points
- 41 Perform hydrographic survey (e.g., bathymetric, tidal datum, riparian boundary)
- 42 Communicate with clients and contractors while in the field
- 43 Communicate with the general public while in the field

Knowledge Areas

Knowledge of:

- K06 right of entry laws, rules and regulations
- K07 capabilities and limitations of current technologies (e.g., GPS, laser scanning, levels, total stations)
- K08 interpretation of elements in construction plans and specifications pertaining to staking
- K25 appropriate communication methods (e.g., verbal and written)
- K27 public lands survey system
- K43 monument recovery and re-establishment procedures
- K45 procedures, standards and requirements for ALTA/ACSM surveys
- K48 methods and procedures for retracement and re-establishment of railroads rights-of-way.

III. Field Work (Continued)

- K51 physical evidence that may indicate unwritten rights (e.g., adverse possession, prescriptive rights)
- K55 horizontal and vertical control
- K61 error sources (e.g., multipath, data input, instrument calibration)
- K63 California Coordinate Systems
- K64 real-time-networks (e.g., processes, redundancy, accessibility, accuracy)
- K65 methods and procedures to produce control networks within accuracy standards (e.g. Public Resources Code, NGS Standards, FGCS Standards)
- K68 methods to obtain bearings or azimuths related to geodetic, magnetic, grid or astronomic north
- K69 survey calculations (e.g., horizontal and vertical alignments, volumes, grade)
- K70 mathematics (e.g., algebra, trigonometry, geometry)
- K71 accuracy required for construction staking
- K72 field notes and staking reports
- K73 basis of control values and their relation to maps and construction plans (e.g., basis of bearing, benchmark)
- K80 types, uses, capabilities of survey equipment
- K81 parcel evidence (e.g., use, methods to document, and effects of)
- K82 procedures to recover and perpetuate control monuments
- K83 methods and requirements for collecting field positions and attributes
- K84 methods and requirements for performing as-built surveys
- K85 field procedures for photogrammetric control layout
- K86 field survey methods, procedures and standards
- K87 field practices and procedures for construction staking.
- K88 methods to maintain and calibrate equipment

IV. Mapping and Document Preparation (28%)

Mapping includes meeting specified accuracy standards and collecting, analyzing, interpreting developing, reducing, and adjusting data (e.g., Control, Geodetic, Topographic, Photogrammetric, California Coordinate System, horizontal and vertical datums) for the purpose of preparing graphic and/or mathematic representations of existing physical features, terrain, monuments, and geospatial positions. Document Preparation includes preparing necessary documents, legal descriptions, maps and exhibits based on clients' needs and contractual obligations and providing documentation of surveys based on all applicable statutes, rules and regulations.

Job Tasks

- 44 Perform FEMA flood certification
- 45 Prepare legal descriptions (e.g., easements, lot line adjustments, other interests in real property)
- 46 Ensure survey documents comply with State law, local ordinance and the appropriate standard of care prior to execution
- 47 Prepare ALTA/ACSM surveys
- 48 Create digital terrain model (DTM)
- 49 Create topographic map from various sources (e.g., photogrammetric, field survey, LiDAR, GIS)
- 50 Create control maps or reports
- 51 Create boundary maps
- 52 Create exhibit maps (e.g., court, easement, aerial)
- 53 Prepare maps, plats, exhibits and documents for filing and/or recordation (e.g., records of survey, corner records, lot line adjustment, subdivision map, condo documents)
- 54 Prepare staking reports (e.g., cut-sheets, plots)
- 55 Compile and provide geographic information system (GIS) data
- 56 Establish and maintain a geographic information system (GIS) land cadastre
- 57 Provide geodetic control (e.g., GIS, preliminary, design)
- 58 Provide mapping services (e.g., GIS, topographic, hydrographic, photogrammetric)

Knowledge Areas

Knowledge of:

- K01 Professional Land Surveyors' (PLS) Act
- K03 impact of local ordinances
- K12 National Standard for Spatial Data Accuracy (NSSDA)
- K21 methods to identify mapping requirements and criteria

IV. Mapping and Document Preparation (Continued)

- K27 public lands survey system
- K45 procedures, standards and requirements for ALTA/ACSM surveys
- K53 types of legal descriptions (e.g., strip, metes and bounds, lot and block, aliquot)
- K54 exceptions and reservations of legal descriptions
- K56 projections, datums and epoch dates
- K63 California Coordinate Systems
- K65 methods and procedures to produce control networks within accuracy standards (e.g. Public Resources Code, NGS Standards, FGCS Standards)
- K72 field notes and staking reports
- K74 methods to produce digital terrain models
- K76 GIS metadata
- K81 parol evidence (e.g., use, methods to document, and effects of)
- K89 Code of Regulations (Board Rules)
- K90 Streets and Highway Code (survey relevant sections)
- K91 signing and sealing requirements
- K92 preparation of legal descriptions
- K93 components of a legal description (e.g., preamble, body)
- K94 elements of topographic maps (e.g., contours, features, symbols, legend, metadata)
- K95 elements of corner records (legal content required)
- K96 elements of records of survey (legal content required)
- K97 methods and procedures for preparing corner records and records of survey
- K98 elements of parcel maps (legal content required)
- K99 elements of final maps (legal content required)
- K100 elements of tentative maps (legal content required)
- K101 requirements for signatures (e.g., trustee, owner, beneficiaries)
- K102 graphical methods to represent land boundaries and related information
- K103 depicting physical evidence that may indicate unwritten rights
- K104 GIS software
- K105 methods of disclosing and depicting encroachments
- K106 reports, documents and exhibits creation
- K107 evidence documentation

V. Consultation and Legal (14%)

Consultation and legal pertains to professional consultation expertise provided to the public as the practice of land surveying relates to legal and contractual obligations.

Job Tasks

- 59 Administer an oath for boundary evidence
- 60 Communicate accuracies of maps or survey data
- 61 Represent clients (e.g., depositions, public hearings)
- 62 Provide expert witness testimony
- 63 Provide professional surveying consultation
- 64 Provide litigation support (e.g., land boundary matters, datums, engineering projects)
- 65 Provide land planning services (e.g., prepare tentative maps)
- 66 Provide references for Land Surveyor candidates
- 67 Provide recommendations in accordance with the Subdivision Map Act and Professional Land Surveyors Act

Knowledge Areas

Knowledge of:

- K01 Professional Land Surveyors' (PLS) Act
- K02 Subdivision Map Act (SMA)
- K03 impact of local ordinances
- K20 state and local agency processing requirements for maps and related documents (e.g., submittal, review, filing)
- K25 appropriate communication methods (e.g., verbal and written)
- K33 effects of unwritten rights on boundaries
- K39 effect of riparian and littoral rights on boundaries
- K40 effect of cloud on title
- K44 effect of ground movement on boundaries (e.g., earthquakes, subsidence, slides)
- K47 effects of leases
- K51 physical evidence that may indicate unwritten rights (e.g., adverse possession, prescriptive rights).
- K79 researching relevant case law (e.g., boundary issues, liability)
- K89 Code of Regulations (Board Rules)
- K90 Streets and Highway Code (survey relevant sections)
- K105 methods of disclosing and depicting encroachments
- K107 evidence documentation.

V. Consultation and Legal (Continued)

K108 Public Resources Code (survey relevant sections)

K109 Civil Code (survey relevant sections)

K110 Code of Civil Procedure (survey relevant sections)

K111 Penal Code (survey relevant sections)

K112 Government Code (survey relevant sections)

K113 Health and Safety Code (survey relevant sections)

K114 Public Contract Code (survey relevant sections)

K115 Evidence Code (survey relevant sections)

K116 court decorum

K117 public meeting procedures