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 parol 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 mathematical 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