

**Land Records Management Program  
North Carolina Secretary of State  
Spring 2016 Land Records Workshop**

**“The GIS PLS -The Who, Where,  
When, Why, How & What”**

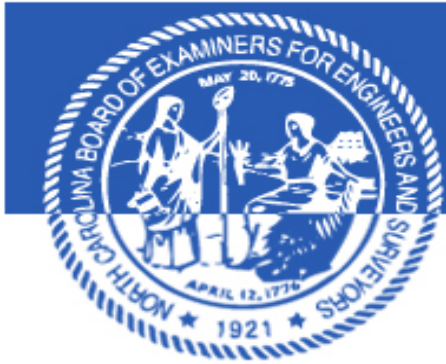
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# Where are we going?

- Evolution of Regulation of Mapping Science (GIS) Surveys
- Licensing of GIS practitioners as Professional Land Surveyors (PLS)
  - Grandfathering
  - By exam
- When does a GIS survey require a PLS?
- What about a government employee exemption?
- What are the standards that apply to a GIS survey?

# Where are we going?

- Continuing Professional Competency (CPC)
- Mini-Brooks Act
- Business firm license
- Disciplinary Process



North Carolina Board of Examiners *for* Engineers & Surveyors

## Evolution of Regulation of GIS

- Board Statute G.S. 89C-3(7) Definition of Land Surveying was revised to align with NCEES Model Law
- Board Rules in Title 21 Chapter 56 of the NC Administrative Code were revised to add section .1608 for GIS survey standards
- Board Issued GIS Inclusions/Exclusion Guidelines
- Board Statute G.S. 89C- Licensing revised to address GIS practitioners and other geomatics practice

# Board Statute G.S. 89C-3(7)

## Definition of Land Surveying

- 89C-3(7)(a)
  2. Locating, relocating, establishing, or laying out the alignment or elevation of any of the fixed works embraced within the practice of professional engineering;
  7. Creating, preparing, or modifying electronic or computerized data, including land information systems and geographic information systems relative to the performance of the practice of land surveying.

# Where will this impact GIS practitioners?

This presentation is for North Carolina, but other states are considering similar requirements.

Gary Thompson, PLS, and Andrew Ritter, Executive Director, as Representatives of the NC Board made a presentation to the Oklahoma Board and have shared information with other states.

# Licensing of GIS practitioners as Professional Land Surveyors (PLS)

- Grandfathering – deadline for application was July 31, 2014. (45 were licensed)
- By exam

# Grandfathering of GIS practitioners as Professional Land Surveyors (PLS)

- Deadline for application was July 1, 2014.
- Requirements were:
  - Any person performing activities described in G.S. 89C-3(7)a.2. and 7.
  - With at least seven years of experience in performing mapping science surveys,
  - Two or more of which have been in responsible charge of mapping science projects that meet the requirements of 21 NCAC 56 .1608



# Grandfathering of GIS practitioners as Professional Land Surveyors (PLS)

- Application Requirements were:

1. The applicant submits certified proof of graduation from high school, high school equivalency, or higher degree.
2. The applicant submits proof of employment in responsible charge of mapping science projects within the State of North Carolina, including itemized reports detailing methods, procedures, amount of applicant's personal involvement, and the name, address, and telephone numbers of the client for five projects completed by the applicant within the State. The applicant shall also submit a final map, report, or digital product for one of the five projects.
3. Five references as to the applicant's character and quality of work, three of which shall be from professional land surveyors, are submitted to the Board.

# Example of required project info

- **Exhibits/Reports/Map Submittals:** Proof of employment in responsible charge of mapping science projects within the State of North Carolina, including:
  - Itemized reports detailing methods and procedures used (to include, but not limited to, equipment used and the metadata to indicate level of accuracy and compliance with Board Rule .1608).
  - Equipment Examples:
    - Traditional surveying equipment (total station)
    - GPS or GNSS satellite positioning equipment (surveyor or mapping grade)
    - Mobile or aerial LiDAR sensors
    - Other positioning or measuring tools
  - Metadata for how stated accuracy was obtained:
    - Closed traverse with least square adjustment (total station)
    - Post processed or real time correction of data collected with GPS or GNSS equipment
  - Stated accuracy of final work product:
    - Class AA. A. B. C or D
    - Quality control methods (how did they test the collected data so they could report an accuracy)

# Licensing by Exam of GIS practitioners as Professional Land Surveyors (PLS)

- Applicants must pass the NCEES (National Council of Examiners for Engineering and Surveying) FS (Fundamentals of Surveying) Exam.
- Can then apply for Surveyor Intern Certification
- Applicants must Pass the NCEES PS (Principles and Practices of Surveying) Exam.
  - Mapping Science Exam (Part A )
  - State Specific Exam (Parts B and C)
- Must then apply and meet all requirements for licensing – education, experience, references, etc.
- Licensed as Professional Land Surveyor (PLS)



Home > Exams > FS exam

FS Reference Handbook

Testing center locations

NCEES Examinee Guide

Exam-day experience

Exam prep material

Scoring

## FS exam

The Fundamentals of Surveying (FS) exam is typically the first step in the process leading to the P.S. license. It is designed for recent graduates and students who are close to finishing an undergraduate degree. The FS is a computer-based exam that is administered year-round in testing windows at NCEES-approved Pearson VUE test centers.

The FS contains 110 multiple-choice questions. The exam appointment time is 6 hours long, which includes a nondisclosure agreement, tutorial (8 minutes), the exam (5 hours and 20 minutes), and a scheduled break (25 minutes). Learn more at our YouTube channel.

To register for an FS exam, log in to your [MyNCEES account](#), select the REGISTER button, and follow the onscreen instructions. Learn more about the exam and the exam environment by reading the rules and policies in your [NCEES Examinee Guide](#).

### FS exam specifications

Specifications for the FS exam (PDF)

### Exam fees and requirements

An exam fee of \$225 is payable directly to NCEES during the registration process. Some licensing boards may require examinees to file a separate application and pay an application fee as part of their approval process in order to be qualified for seating for an NCEES exam. Your licensing board may have additional requirements. Click on the drop-down list on the right and select your board for more information.

### Reference materials

NCEES offers an [FS Reference Handbook](#) for free download.

### Scoring and reporting

Exam results for computer-based exams are typically available 7–10 days after you take the exam. You will receive an email notification from NCEES with instructions to view your results in your [MyNCEES account](#). Results will include information specific to your licensing board regarding how you should proceed based on your performance.

### Practice exams

Evaluate your readiness for the FS exam by testing your knowledge with the most



## Exam registration

Registration for the October 2015 PE, PS, and SE will close at 3:00 p.m. EDT on September 3.

Registration for the FE and FS is open year-round.

Select a state for instructions.

Change State:

Select a State or Country ▼



Home > Exams > PS exam

Computer-based testing  
Scoring

## PS exam

The PS exam tests your ability to practice the surveying profession competently. It is designed for surveyors who have gained at least four years' experience.

### PS exam transitions to a computer-based format

Registration and scheduling opens June 2016 for the new computer-based testing (CBT) PS exam with first testing appointments available in October 2016. The new computer-based PS exam will allow for year-round testing at approved Pearson VUE test centers. This gives examinees the freedom to pick the exam time, date, and location. The new format will include a digital *PS Reference Handbook*. Examinees will receive their results 7–10 days after the exam. [Learn more about the transition.](#)

### PS exam specifications

The CBT PS exam contains 100 questions. The total appointment time is 7 hours—2 minutes for nondisclosure agreement, 8 minutes for a tutorial, and 6 hours for the actual exam. There are two sections of the exam that are approximately 50 questions each with an optional 50-minute scheduled break offered at the end of the first section. The PS exam uses USCS measurements.

[View the PS exam specification \(PDF\)](#)

The computer-based PS exam also introduces a new testing component: alternative item types (AIT). AITs are items other than traditional multiple-choice questions. [Learn more about AITs.](#)

### Reference materials

The PS exam is a closed-book exam. Examinees will be provided with a *PS Reference Handbook (PDF)* on exam day.

### Scoring and reporting

Exam results are typically released to the licensing boards 8–10 weeks after the exam. However, with the new computer-based exam, you should receive your results in 7–10 days. Depending on your state, you will be notified of your exam results online through your MyNCEES account or via postal mail from your state licensing board. [Learn more about how NCEES exams are scored.](#)

### PS pass rates

Pass rates are from the October 2015 exam administration.



## Exam registration

Registration for the October PE and SE will open on June 20.

Registration for the new, computer-based PS will open on June 20.

Registration for the FE and FS is open year-round.

Select a state for instructions.

Change State:

**Mapping Sciences/Photogrammetry Exam Specification**

**Knowledge Domains/Sub-domains**

**I. Standards and Specifications**

**I.A. Statutes and Rules (8% of total exam)**

|  |   |
|--|---|
|  | determine levels of precision and order of accuracy |
|  | determine applicable laws, ordinances and standards |

**I.B. Standards – (what the standard says) (11% of total exam)**

|  |   |
|--|---|
|  | select appropriate vertical and horizontal datum    |
|  | determine levels of precision and order of accuracy |
|  | determine applicable laws, ordinances and standards |

**II. Professional Practices and Procedures -- Photogrammetry**

**II. A. Project Planning (13% of total exam)**

|  |   |
|--|---|
|  | select appropriate vertical and horizontal datum                        |
|  | determine levels of precision and order of accuracy                     |
|  | consult with and advise clients and/or agents                           |
|  | plan control, method of data acquisition, integration and documentation |
|  | research and evaluate geodetic control                                  |
|  | research and evaluate maps, images and photography                      |
|  | research and evaluate geographic information                            |

**II. B. Geodesy and Map Projections (7% of total exam)**

|  |  |
|--|--|
|  | select appropriate vertical and horizontal datum |
|  | research and evaluate geodetic control           |

**II. C. Data Acquisition (16% of total exam)**

|  |   |
|--|---|
|  | perform reconnaissance of physical features ( eg. Monuments, topography etc.                                |
|  | recover horizontal/vertical control   |
|  | establish network/framework for control ( eg. Aerotriangulation, satellite obstruction, strength of figure) |
|  | Adjust/calibrate instruments  |
|  | Measure using photogrammetric methods   |
|  | Measure using GPS ( exposure station)   |
|  | Measure using LIDAR, digital laser scanning   |

**II. D. Data Reduction and Analysis (16% of total exam)**

|  |                                      |
|--|--------------------------------------|
|  | Adjust/calibrate instruments         |
|  | Reduce measurements                  |
|  | Analyze and adjust measurements      |
|  | Compute areas and volumes            |
|  | Convert data to an appropriate datum |

**II. E. Documentation and Map Presentation (9% of total exam)**

|  |   |
|--|---|
|  | select appropriate vertical and horizontal datum      |
|  | Convert data to an appropriate datum                  |
|  | Prepare maps, plats and reports ( hard copy/ digital) |
|  | Develop and/or provide data for GIS                   |

**III. Business/ Professional Practices**

**III. A. Business Principles and Communication (10% of total exam)**

|  |   |
|--|---|
|  | consult with and advise clients and/or agents   |
|  | determine staffing levels and capabilities  |
|  | prepare and negotiate proposals and/or contracts  |
|  | Facilitate, consult, coordinate, and manage projects with allied professionals and/or regulatory agencies |

**III. B. Quality Assurance – (how to apply standard to job) (10% of total exam)**

|  |   |
|--|---|
|  | determine applicable laws, ordinances and standards |
|  | determine levels of precision and order of accuracy |
|  | perform visual inspection to verify mapped features |
|  | Field verify map accuracy                           |

There are a total of 100 questions. Examinee is to answer all questions. The length of the exam is 6 hours.

## PRINCIPLES AND PRACTICE OF SURVEYING

### CBT Exam Specifications

Effective beginning October 1, 2016

- The exam topics have not changed since April 2013 when originally published. The number of questions and the order in which the topics appear on the exam is effective with computer-based testing (CBT) beginning October 1, 2016.
- The PS exam is computer-based. It is closed book with an electronic reference.
- Examinees have 7 hours to complete the exam, which contains 100 multiple-choice questions. The 7-hour time also includes a tutorial and an optional scheduled break.
- The exam uses the U.S. Customary System (USCS) of units.
- The exam is developed with questions that will require a variety of approaches and methodologies, including design, analysis, and application.
- The knowledge areas specified as examples of kinds of knowledge are not exclusive or exhaustive categories.

|   | <b>Number of Questions</b> |
|---|----------------------------|
| <b>1. Legal Principles</b>  | <b>22–33</b>               |
| A. Common/case law boundary principles  |                            |
| B. Sequential and simultaneous conveyances  |                            |
| C. U.S. Public Land Survey System   |                            |
| D. Controlling elements in legal descriptions   |                            |
| E. Riparian and littoral rights   |                            |
| F. Property title issues (e.g., encumbrances, interpretation, deficiencies)   |                            |
| G. Sovereign land rights (e.g., navigable waters, eminent domain)   |                            |
| H. Prescriptive rights/adverse possession   |                            |
| I. Easement rights  |                            |
| J. Parol evidence   |                            |
| <b>2. Professional Survey Practices</b>   | <b>22–33</b>               |
| A. Public/private record sources  |                            |
| B. Project planning (e.g., photogrammetric, geodetic, boundary)   |                            |
| C. Control datums   |                            |
| D. Encumbrances (e.g., easements, rights of way, mineral rights, subsurface rights)                                       |                            |
| E. Control network accuracy standards   |                            |
| F. Supervision of and responsibility for field procedures   |                            |
| 1. Instrument operations and usage  |                            |
| 2. Monumentation (e.g., identification, classification, perpetuation)   |                            |
| 3. Vegetation identification (e.g., wetlands, bearing/corner trees, first line of vegetation, aquatic and upland species) |                            |
| 4. Survey control (e.g., boundary, topographic, photogrammetric)  |                            |

- 5. GPS operations
  - 6. Construction surveying
  - G. Supervision of and responsibility for the application of surveying principles and computations
    - 1. Mapping methods and/or projections
    - 2. Graphical terrain representations
    - 3. Geoid, ellipsoid, and orthometric heights
    - 4. State plane or other coordinate systems
    - 5. GPS data reduction and analysis
    - 6. Control network calculations, analysis, and adjustments
    - 7. Bearings/azimuths
    - 8. Area/volume calculations
    - 9. Horizontal and vertical alignment calculations
    - 10. Construction surveying calculations (e.g., plan interpretation)
    - 11. Data preparation for importation into geographical information systems (GIS)
  - H. Grading and site preparation
  - I. Survey maps/plats
  - J. Survey report
  - K. Descriptions
- 3. Standards and Specifications 10–15**
- A. Federal statutes, laws, rules and regulations
  - B. State/local statutes, laws, rules and regulations
  - C. Monumentation laws and ordinances
  - D. U.S. Public Land Survey System
  - E. American Land Title Association/American Congress on Surveying and Mapping (ALTA/ACSM) surveys
  - F. Geodetic control network accuracy standards
  - G. Federal Geographic Data Committee (FGDC) standards (digital mapping)
  - H. U.S. National Map Accuracy Standards (analog mapping)
  - I. Federal Emergency Management Agency (FEMA)
- 4. Business/Professional Practices 17–25**
- A. Project planning (e.g., parameters, costs, budgeting)
  - B. Contracts
  - C. Risk management (e.g., liability, safety procedures, insurance)
  - D. Ethics
  - E. Communications (oral, written, graphical)
  - F. Quality assurance procedures
  - G. Activities, background, and skills of related professions (e.g., engineers, lawyers, architects, planners)



## 5. Types of Surveys

14-21

- A. American Land Title Association/American Congress on Surveying and Mapping (ALTA/ACSM) surveys
- B. Control and geodetic surveys
- C. Construction surveys (e.g., construction calculations and staking)
- D. Hydrographic surveys (e.g., elevations of submerged surfaces)
- E. Boundary surveys
- F. Route and right-of-way surveys
- G. Topographic surveys (e.g., scanning, photogrammetry, LiDAR, field)
- H. Condominium surveys
- I. Subdivision surveys
- J. Record drawing (as-built) surveys

# When does GIS require a PLS?

- GIS Inclusions/Exclusions Guidelines
  - Board website under Rules/Guidelines
- Requires a PLS if the location or measurement data is issued for an authoritative purpose. Authoritative shall mean presented as trustworthy and competent for reliance upon by the public or if provided to a stated accuracy.

**GIS Inclusions/Exclusions Guidelines - April 2008, Revised October 2011**  
**North Carolina Board of Examiners for Engineers and Surveyors**

This chart, while not all inclusive, assists in determining items of GIS data that are included or excluded from the definition of Land Surveying in G.S. 89C-3(7). The definition includes all location data that is issued for an authoritative purpose. Authoritative shall mean presented as trustworthy and competent for reliance upon by the public or if provided to a stated accuracy.

| <u>Board Description</u>      | <u>GICC Data Layer Description</u>  | <u>Land Surveying Committee Responses</u>   |
|-------------------------------|---|---|
| <b>Orthophotography</b>       | Large-scale scanned and rectified aerial photographs  | Inclusion   |
| <b>Cadastral</b>              | County-based private and public property boundaries including easements   | Inclusion   |
| <b>Roads</b>                  | Centerlines, including rights-of-way  | Inclusion   |
| <b>Municipal Boundaries</b>   | City/town boundaries  | Inclusion   |
| <b>County Boundaries</b>      | County borders  | Inclusion   |
| <b>ETJs</b>                   | Extra-territorial jurisdictions – areas not in a municipality, but under authority of the city or town                              | Inclusion   |
| <b>Surface Waters</b>         | Locations and names of streams, rivers, lakes, ponds, etc., including mean high water marks   | Inclusion - Locations and names of streams, rivers, lakes, ponds, etc., including mean high water marks and when the survey is done to determine authoritative location of stream, waterway or location of mean high water. |
| <b>Geodetic Control</b>       | Horizontal and vertical survey control locations  | Inclusion   |
| <b>Elevation</b>              | Ground elevations (depicted as contours, XYZ points, elevation models, TINs?)   | Inclusion   |
| <b>Land Use</b>               | Cadastral-based land use  | Exclusion   |
| <b>Land Cover</b>             | Statewide land cover - 1996   | Exclusion   |
| <b>Flood Zones</b>            | Areas inundated by flood waters (1% annual chance, .2% annual chance, flood ways)   | Inclusion   |
| <b>Soils</b>                  | Soil Survey Geographic (SSURGO) database produced by US Dept. of Agriculture, Natural Resources Conservation Service                | Inclusion if used to determine authoritative location of soils. Determination of soils to be done by Soil Scientists.   |
| <b>Public Lands</b>           | Non-taxable lands maintained in county cadastral databases  | Inclusion   |
| <b>Railroads</b>              | Locations of railroad lines including rights-of-way   | Inclusion   |
| <b>Airports</b>               | Airport/airfield property boundaries and easements  | Inclusion   |
| <b>Schools</b>                | Point locations of public and non-public grade schools  | Exclusion   |
| <b>Colleges/Universities</b>  | Point locations of state universities and private colleges and universities   | Exclusion   |
| <b>Hospitals</b>              | Point locations of hospitals  | Exclusion   |
| <b>Storm Surge Inundation</b> | Estimated coastal areas inundated by hurricane storm surge  | Inclusion for PEs and PLSSs. Models are developed by PEs using data collected by PLS.   |
| <b>Surface Water Intakes</b>  | Point locations where communities draw raw water from a lake, river, or stream, treat it, and distribute treated water to customers | Exclusion   |
| <b>NPDES</b>                  | National Pollutant Discharge Elimination System -locations of individually permitted wastewater discharged into surface waters      | Exclusion unless federal, state or local authority requires survey.   |

|                                      |   |  |
|--------------------------------------|---|--|
| <b>Police Stations</b>               | Point locations of police stations  | Exclusion  |
| <b>Fire Stations</b>                 | Point locations of fire stations  | Exclusion  |
| <b>Landfills</b>                     | Point locations of municipal/county landfills   | Exclusion  |
| <b>Watersheds</b>                    | Water supply watersheds   | Inclusion  |
| <b>Wetlands</b>                      | Wetlands areas from the US Fish and Wildlife Service, National Wetlands Inventory                   | Inclusion  |
| <b>Hazardous Disposal Sites</b>      | Areas identifying locations of uncontrolled and unregulated, hazardous waste sites (formerly called | Inclusion  |
| <b>Building Footprints</b>           | Perimeter outlines of buildings   | Inclusion when authoritative location is required, such as Land Title Surveys, Brownfield Surveys, etc.  |
| <b>Future Land Use</b>               | Cadastral-based, potential land use based on current zoning   | Exclusion  |
| <b>Water Lines</b>                   | Water pipe distribution network and accompanying  | Inclusion  |
| <b>Sewer Lines</b>                   | Sanitary sewer pipe network and accompanying features   | Inclusion  |
| <b>Stormwater Lines</b>              | Stormwater network and accompanying features  | Inclusion  |
| <b>NC House Districts</b>            | Boundaries of NC House Districts  | Exclusion  |
| <b>NC Senate Districts</b>           | Boundaries of NC Senate Districts   | Exclusion  |
| <b>US Congressional Districts</b>    | Boundaries of US Congressional Districts  | Exclusion  |
| <b>Census Boundaries</b>             | 2000 US Census boundaries for tracts, blocks, and block groups                                      | Exclusion  |
| <b>Power Transmission Lines</b>      | Transmission network and accompanying features  | Exclusion for inventory applications. Inclusion where survey is for authoritative location or a stated accuracy.   |
| <b>Natural Gas Pipelines</b>         | Transmission network and accompanying features  | Exclusion for inventory applications. Inclusion where survey is for authoritative location or a stated accuracy.   |
| <b>Septic Tanks</b>                  | Point locations of septic features  | Exclusion for inventory applications. Inclusion where survey is for authoritative location or a stated accuracy.   |
| <b>Telecommunication Lines</b>       | Telephone, cable television, and other communication features such as towers                        | Exclusion for inventory applications. Inclusion where survey is for authoritative location or a stated accuracy.   |
| <b>Wells</b>                         | Point locations   | Exclusion for inventory applications. Inclusion where survey is for authoritative location or a stated accuracy.   |
| <b>Mineral Rights Boundaries</b>     |   | Inclusion if for authoritative location or stated accuracy of the boundary.  |
| <b>Mining Resources</b>              |   | Exclusion  |
| <b>Greenways</b>                     |   | Inclusion when the survey is to determine the fee simple or easement corridor of the greenway.   |
| <b>Sidewalks</b>                     |   | Exclusion  |
| <b>Cemeteries</b>                    |   | Exclusion if general point location for inventory purpose of locating cemetery. Inclusion if the boundaries of the cemeteries are being determined or established. |
| <b>Archaeological Sites</b>          |   | Exclusion  |
| <b>Historic Sites and Structures</b> |   | Exclusion  |

# Government Employee Exemption

- **GS § 89C-19. Public works; requirements where public safety involved.**
- *The requirement: “... employees of these entities shall not engage in the practice of engineering or land surveying involving either public or private property where the safety of the public is directly involved without the project being under the direct supervision of a professional engineer for engineering projects, or a professional land surveyor for land surveying projects, as provided for the practice of the respective professions by this Chapter.”*

# Government Employee Exemption

- **GS § 89C-19.** (cont'd)
- *Specific exemptions:* “... Nothing in this section shall be construed to prohibit inspection, maintenance and service work done by employees of the State of North Carolina, any political subdivision of the State, or any municipality including construction, installation, servicing, and maintenance by regular full-time employees of, secondary roads and drawings incidental to work on secondary roads, streets, street lighting, traffic-control signals, police and fire alarm systems, waterworks, steam, electric and sewage treatment and disposal plants, the services of superintendents, inspectors or foremen regularly employed by the State of North Carolina or any political subdivision of the State, or municipal corporation.”

# Standards for GIS Work Product

- Standards of Practice for Land Surveying
  - Board Rules 21-56.1600
- Specific section for GIS
  - 21-56.1608

## 21 NCAC 56.1608 -Classification/Land Information System/Geographic Information System/Geographic Inform System Surveys

(a) General: Land Information System/Geographic Information System (LIS/GIS) surveys are defined as the measurement of existing surface and subsurface features for the purpose of determining their accurate geospatial location for inclusion in an LIS/GIS database. All LIS/GIS surveys as they relate to property lines, rights-of-way, easements, subdivisions of land, the position for any survey monument or reference point, the determination of the configuration or contour of the earth's surface or the position of fixed objects thereon, and geodetic surveying which includes surveying for determination of the size and shape of the earth both horizontally and vertically and the precise positioning of points on the earth utilizing angular and linear measurements through spatially oriented spherical geometry, shall be performed by a Land Surveyor who is a licensee of this Board unless exempt by G.S. 89C-25. For the purpose of specifying minimum allowable surveying standards, five general classifications of LIS/GIS surveys are established, any of which may be specified by the client. In the absence of a specified standard, the surveyor shall conform the survey to the requirements for a Class B survey.



(a) (continued) The five general classifications are:

- (1) Class AA LIS/GIS Surveys. For Class AA LIS/GIS surveys in North Carolina, the relative accuracy shall be equal to or no less than 0.033 meter (0.10 feet);
- (2) Class A LIS/GIS surveys. For Class A LIS/GIS surveys in North Carolina, the relative accuracy shall be equal to or less than 0.5 meter (1.64 feet);
- (3) Class B LIS/GIS surveys. For Class B LIS/GIS surveys in North Carolina, the relative accuracy shall be equal to or less than 1.0 meter (3.28 feet);
- (4) Class C LIS/GIS surveys. For Class C LIS/GIS surveys in North Carolina, the relative accuracy shall be equal to or less than 2 meters (6.56 feet); and
- (5) Class D LIS/GIS surveys. For Class D LIS/GIS surveys in North Carolina, the relative accuracy shall be equal to or less than 5 meters (16.40 feet).

- (b) Nothing in this Rule negates or replaces the relative accuracy standards found in Rules .1601 through .1607 of this Chapter.
- (c) The Professional Land Surveyor in responsible charge of the LIS/GIS boundary or geodetic control survey shall certify to all of the following in either written or digital form:
  - (1) Class of LIS/GIS survey. Method used to evaluate the accuracy shall be described as either statistical testing or least squares adjustment results, comparison with values of higher accuracy, and repeat measurements. The reporting standard in the horizontal component is the radius of a circle of uncertainty, such that the true or theoretical location of the point falls within that circle 95 percent of the time. For vertical accuracy requirements, see 21 NCAC 56 .1605;
  - (2) Method of measurement (i.e. global navigation satellite systems, electronic scanners, theodolite and electronic distance meter, transit and tape);
  - (3) Date(s) of the survey; and
  - (4) Datum used for the survey.

(d) A certificate, substantially in the following form, shall be affixed to all maps or reports:

"I, \_\_\_\_\_, certify that this project was completed under my direct and responsible charge from an actual survey made under my supervision; that this survey was performed to meet the requirements for an LIG/GIS survey [21 NCAC 56.1608] to the accuracy of Class \_\_\_\_ and vertical accuracy, when applicable to the Class \_\_\_\_ standard; method used to evaluate the accuracy was \_\_\_\_\_; method of measurement \_\_\_\_\_; date(s) of survey \_\_\_\_\_; datum used for survey \_\_\_\_\_; and all coordinates are based on \_\_\_\_\_ ['NAD 83' and realization (date of adjustment of coordinate system) or 'NAD 27"] and all elevations are based on \_\_\_\_\_ (NGVD 29, NAVD 88, or other)."

# Continuing Professional Competency

- 15 PDHs annually
- Board Rules 21-56.1700 (under Rules/Laws at [www.ncbels.org](http://www.ncbels.org))

# Mini-Brooks (QBS)

- The practice of Land Surveying is subject to the QBS (Qualifications Based Selection) process required for Requests for Proposals of all units of state, local and federal government.
- Cannot simply submit price quotes.
- Board Rule 21-56.0701(f)(3)
- Mini-Brooks Statute G.S. 143-64.31 et seq. (under Rules/Laws – Laws on Board website)

# Company License Required

**SPECIAL NOTE: Your individual license does not entitle your company to offer services in North Carolina unless the company is licensed with our Board. Please contact Mark Mazanek at (919) 791-2000 ext. 102 or email [mmazanek@ncbels.org](mailto:mmazanek@ncbels.org) for information on company licensure.**

# Business Firm Entities Chart

NOTE: For Corporations and Limited Liability Companies (LLC): G.S. 55B, The Professional Corporation Act, imposes certain ownership and control requirements, as noted in the chart. There is a Grandfathering “potential” for firms that were providing GIS services prior to June 12, 2013. You can contact Mark Mazanek at (919) 791-2000 ext. 102 or email [mmazanek@ncbels.org](mailto:mmazanek@ncbels.org) for information.

|   | <b>Board License required<br/>G.S. 89C-24;<br/>Rule .0800</b>         | <b>Ownership Requirements<br/>G.S. 55B-6</b>  | <b>Business Restrictions<br/>G.S. 55B-15</b>                 | <b>Filing Requirements</b>                                      | <b>Out-of-State Requirements</b>   | <b>Other Requirements</b>  | <b>Instruction and Application Links</b>  |
|---|---|---|--|---|--|--|---|
| Professional Corporation (PC) G.S. 55B  | Yes   | Up to 1/3 by non-licensed employees and minimum 2/3 by licensees w/one NC licensee (ESOP exception) | Professional service and ancillary services only G.S. 55B-14 | Copy of proposed Articles of Incorporation                      | Copy of proposed Certificate of Authority G.S. 55B-16  | At least one director and one officer who is a shareholder must be a NC licensee (each profession) (G.S. 55B-4(3)) | <a href="#">Instructions and Application for Professional Corporate Licensure</a>                 |
| Professional Limited Liability Company (PLLC) G.S. 57D  | Yes   | Up to 1/3 by non-licensed employees and minimum 2/3 by licensees w/one NC licensee (ESOP exception) | Professional service and ancillary services only G.S. 55B-14 | Copy of proposed Articles of Organization                       | Copy of proposed Certificate of Authority G.S. 55B-16  | Operating Agreement. At least 1 member and 1 manager must be a NC licensee (each profession)                       | <a href="#">Instructions and Application for Professional Limited Liability Company Licensure</a> |
| Pre-69 Corporation incorporated prior to June 5, 1969 and exempt under G.S. 55B-15 (a)(1)       | Yes   | None  | None   | Copy of Articles of Incorporation                               | Copy of existing or proposed Certificate of Authority from NC Secretary of State             | None   | <a href="#">Instructions and Application for Business Firm Licensure</a>                          |
| Partnerships: General, Limited or Registered Limited Liability Partnership (RLLP)               | Yes   | None  | None   | Filing with Secretary of State for Limited or Limited Liability | Filing with Secretary of State for Limited or Limited Liability                              | None   | <a href="#">Instructions and Application for Partnership Licensure</a>                            |
| Sole Proprietorship   | Yes, unless under signature name                                      | None  | None   | Assumed name certificate w/Register of Deeds unless "real name" | Assumed name certificate w/Register of Deeds unless "real name"                              | None   | <a href="#">Instructions and Application for Non-Exempt Sole Proprietor Licensure</a>             |
| Chapter 87 Corporations licensed as contractor under Articles 1, 2, 4 or 5 [G.S. 55B-15 (a)(2)] | Yes, for limited professional service in connection with primary work | None  | None   | Copy of Articles of Incorporation and Contractor license number | Copy of Articles of Incorporation and Certificate of Authority and Contractor license number | None   | <a href="#">Instructions and Application for Chapter 87 Corporation Licensure</a>                 |



# Overview of Disciplinary Process

- Complaint originated or Board authorized
- N.C.G.S. 89C-21 governs discipline
  - From Reprimand to Revocation of license
- Board Rules
  - 21 - 56 .1301 IMPROPER PRACTICE BY A LICENSEE
    - Review Committee
    - Settlement Conference Committee
  - 21 NCAC 56 .1402 OPPORTUNITY FOR LICENSEE OR APPLICANT TO HAVE HEARING

# Example Charges

- Practicing outside area of competence [.0701(c)].
  - Photogrammetry
  - GIS
  - GPS
- Signing and sealing work not done under direct supervisory control or responsible charge [.0701(c)(3)].
  - <http://www.ncbels.org/newsletters/fall2004.pdf>

**QUESTIONS?**

Please contact the Board Office with questions:

David S. Tuttle, Board Counsel

NC Board of Examiners for Engineers and Surveyors

[dstuttle@ncbels.org](mailto:dstuttle@ncbels.org)

(919) 791-2000 ext. 111