

# State Regulation of GIS

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## Implementing the Surveyors' and GIS Professionals' Task Force Recommendations

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**URISA Board of Directors**

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# What are the Legal Responsibilities of Professional Land Surveyors ? (and Civil Engineers)

## **NCEES**

National Council of Examiners  
for Engineers and Surveyors

**Model Law**

one state's example

## **BORPELS**

California Board of Registration  
for Professional Engineers and Land Surveyors

**California Business & Professional Codes**

# What are the Legal Responsibilities of Professional Land Surveyors ? (and Civil Engineers)

## California Professional Land Surveyors Act, § 8726

- a) Locates, establishes ... alignment or elevation for any **fixed works** ...
- b) Determines configuration of Earth's surface, or the **position of fixed objects** thereon ....
- c) Locates ... establishes ... any **property line** or **boundary of any parcel of land**, right-of-way, easement, or alignment
- e) Determines the position for any **monument or reference point** which marks a ... **boundary**, or **corner** ...
- g) Determines the information ... to be **shown on any map** or document prepared ... for functions described [above] ...
- m) Creates, ... or modifies ... **computerized data** in performance of the activities described [above] ....

# Does This Mean Only Land Surveyors Can Create or Use GIS Data?

Does GIS data “locate” or “establish” fixed works, boundary lines, etc.?

## BORPELS

California Board of Registration  
for Professional Engineers and Land Surveyors

### Resolution # 98-03

- " All of the electronic or computerized data **created, prepared, or modified** in connection with those subdivisions exhibited within Geographic Information Systems (GIS) and/or Land Information Systems (LIS) **require licensure** as a professional land surveyor or registration as a professional civil engineer authorized to practice land surveying. "

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require licensure as a professional land surveyor or  
registrant as a professional civil engineer authorized  
to practice land surveying.

**RESCINDED**  
**WITHDRAWN**

# Surveying Meets GIS

- Mapping traditionally done by Surveyors
- High skill and knowledge of **measurement and error adjustment**
- GIS maps have low accuracy, little control, **subject to inappropriate usage**
- **Health, Safety, & Welfare** of public in danger from misuse of GIS or bad GIS data
- GIS Professionals are practicing survey/mapping without a license
- Surveyor's professional codes **overreach** by including all manner of mapping, regardless of **purpose or use of GIS**
- No distinction between **original measurement** documentation and **representational, referential spatial diagrams**
- Criteria needed to distinguish Survey from other mapping
- "Surveyors' Full Employment Act"

# GIS – Surveyor Task Force

- **ASPRS** – Photogrammetry & Remote Sensing
- **MAPPS** – Photogrammetry & Mapping
- **ACSM** – Survey & Mapping
- **ASCE** – Civil Engineers
- **NSPS** – Professional Surveyors
- **URISA** – GIS Professionals
- **NSGIC** – State GIS Councils

# Task Force Review of NCEES Model Law

- ✓ **Modify Preamble**
- ✓ **Modify Sub Paragraphs**
- ✓ **Add Exclusion & Inclusion Examples**
- △ **Approve Modification to NCEES Model Law**
- △ **Each State to Modify its Professional Laws**

**NCEES TF Final Report**

**[http://www.asprs.org/asprs/news/ncees\\_frame.html](http://www.asprs.org/asprs/news/ncees_frame.html)**

**Report Title: "GIS/LIS Addendum to the Report of the  
Task Force on the NCEES Model Law for Surveying"**



# Criteria for Distinguishing Survey Practice Using GIS from Other Uses of GIS

## REPRESENTATION

A distinction must be made in the use of electronic systems **between** making or **documenting original measurements** in the creation of survey products, **versus** the copying, interpretation, or **representation of those measurements** in such systems.

## USE

Further, a distinction must be made according to the **intent, use, or purpose** of measurement products in electronic systems **to determine definitive location versus** the use of those products as a **locational reference for planning, infrastructure management, and general information.**

# NCEES Model Law

## REVISED PREAMBLE

The term “**Practice of Surveying or Land Surveying**” within the intent of this Act shall mean providing, or offering to provide, professional services involving **both** (1) the **making of geometric measurements** of, and gathering related information pertaining to, the physical or legal features of the earth, improvements on the earth, the space above the earth, or any part of the earth; **and** (2) utilization and/or **development of these facts into survey products** such as graphics, digital data, maps, plans, reports, descriptions, and/or projects. Professional services include acts of consultation, investigation, testimony evaluation, expert technical testimony, planning, mapping, assembling, and interpreting gathered measurements and information related to any one or more of the following:

# NCEES Model Law

## Sub-Paragraphs - modified

(d) Creating, preparing, or modifying electronic or computerized data, **including land information systems, and geographic information systems**, relative to the performance of the activities in the above described items (a) through (c).

(d) Creating, preparing, or modifying electronic or computerized data relative to the performance of the activities in the above described items (a) through (c).

# **NCEES Model Law INCLUSIONS** **in the Practice of Surveying**

**Activities that must be accomplished under the responsible charge of a Professional Surveyor or Land Surveyor (unless specifically exempted in Section B, below) include, but are not limited to the following:**

# NCEES Model Law INCLUSIONS .1

## in the Practice of Surveying

The creation of maps and geo-referenced databases **representing authoritative locations** for boundaries, the location of fixed works, or topography, by either terrestrial surveying methods, photogrammetric or GPS locations. This includes maps and geo-referenced databases prepared by any person, firm, or government agency **where that data is provided to the public as a survey product.**

# NCEES Model Law INCLUSIONS .2

## in the Practice of Surveying

Original data acquisition, or the **resolution of conflicts** between multiple authoritative data sources, **when used for the authoritative location** of features within the following data themes: geodetic control, orthoimagery, elevation and bathymetry, fixed works, government boundaries, and cadastral information.

# NCEES Model Law INCLUSIONS .3 in the Practice of Surveying

**Certification of positional accuracy** of maps or measured survey data.

# NCEES Model Law INCLUSIONS .4 in the Practice of Surveying

Measurement, adjustment, and **authoritative interpretation** of raw survey data.



# NCEES Model Law **INCLUSIONS .5** in the Practice of Surveying

GIS-based parcel or cadastral mapping **used for authoritative boundary definition purposes** wherein land title or **development rights** for individual parcels **are, or may be, affected.**

# NCEES Model Law INCLUSIONS .6 in the Practice of Surveying

Interpretation of maps, deeds, or other land title documents to resolve conflicting data elements within **cadastral documents of record**.

# NCEES Model Law INCLUSIONS .7 in the Practice of Surveying

Acquisition of field data required to **authoritatively position** fixed works or cadastral data to **geodetic control**.

# NCEES Model Law **INCLUSIONS .8** in the Practice of Surveying

Adjustment or transformation of cadastral data to **improve the positional accuracy** of the parcel layer(s) with respect to the geodetic control layer within a GIS **for purposes of affirming positional accuracy.**

# NCEES Model Law **EXCLUSIONS .1** from the Practice of Surveying

The following items are **not** to be included as activities within the definition of surveying:

The creation of **general maps**:

- a) Prepared by private firms or government agencies **for use as guides** to motorists, boaters, aviators or pedestrians;
- b) Prepared for publication in a gazetteer or atlas as an **educational tool or reference publication**.
- c) Prepared for or by education institutions for use in the **curriculum of any course of study**.
- d) Produced by any electronic or print media firm as an **illustrative guide** to the geographic location of any event.
- e) Prepared by lay persons for conversational or **illustrative purposes**. This includes **advertising material and users guides**.

# NCEES Model Law **EXCLUSIONS .2** from the Practice of Surveying

The **transcription** of geo-referenced data into a GIS or LIS by manual or electronic means, and the **maintenance** thereof, **provided the data are clearly not** intended to indicate the **authoritative location** of property boundaries, the **precise definition** of the shape or contour of the earth, and/or the **precise location** of fixed works of humans.

# NCEES Model Law **EXCLUSIONS** .3

## from the Practice of Surveying

The **transcription** of public record data, **without legal modification except for graphical purposes**, into a GIS- or LIS-based **cadastre** (tax maps and associated records) by manual or electronic means, and the **maintenance** of that cadastre, **provided the data are clearly **not** intended to **authoritatively represent** property boundaries**. This includes **tax maps and zoning maps**.

# NCEES Model Law **EXCLUSIONS** .4

## from the Practice of Surveying

The preparation of any document by any **Federal Government** agency that does **not** define **real property boundaries**. This includes civilian and military versions of **quadrangle topographic maps**, military maps, **satellite imagery**, and other such documents.



# NCEES Model Law **EXCLUSIONS .5** from the Practice of Surveying

The **incorporation or use** of documents or databases prepared by any **Federal agency** into a GIS/LIS, including but not limited to, Federal census and demographic data, quadrangle topographic maps and military maps.

# NCEES Model Law **EXCLUSIONS .6** from the Practice of Surveying

All **inventory maps** and **databases** created by any organization, in either hardcopy or electronic form, of **physical features, facilities or infrastructure** that are **wholly contained within properties** to which they have **rights** or for which they have **management responsibility**.

The **distribution** of these maps and/or data bases **outside the organization must** contain appropriate **metadata** describing, at a minimum, the **accuracy**, **method of compilation**, **data source(s)** and **date(s)**, and **disclaimers of use** clearly indicating that the data are **not intended to be used as a survey product**.

# NCEES Model Law **EXCLUSIONS .7** from the Practice of Surveying

Maps and data bases depicting the **distribution of natural resources** or **phenomena** prepared by foresters, geologists, soil scientists, geophysicists, biologists, archeologists, historians, or other **persons qualified to document such data.**

# NCEES Model Law **EXCLUSIONS .8** from the Practice of Surveying

All maps and geo-referenced databases depicting **physical features and events** prepared by any government agency **where the access to that data is restricted by statute**. This includes geo-referenced data generated by **law enforcement agencies** involving crime statistics and criminal activities.

# USAGE Should Determine When GIS Needs Surveyor Supervision

- **Surveyor Supervision for:**
  - △ Determining Property Boundaries
  - △ Engineering Design Location of Fixed Works
  - △ Locating Elevation Contours or Shape of the Earth for Engineering Design, Land Development, etc.
  - △ Creating Survey Control Information
  - △ **Determining and Certifying Basemap Accuracy**
- **Non-Survey Responsibilities include:**
  - △ Infrastructure Inventory and Maintenance
  - △ Planning and Analysis
  - △ Environmental Management
  - △ Social, Demographic, Economic, Tax Maps
  - △ Guides, Educational, Advertising maps

# The Politics of Acceptance

- This agreement is the **best** we have been able to **negotiate in good faith** with surveyor representatives.
- The Task Force recommendations represent the careful, professional analysis and negotiation by qualified representatives:  
**over 650 hours of professional effort**
- NCEES' modification of their Model Law according to these recommendations is **prerequisite** to **changing individual state's Professional Codes**.
- NCEES working sub-committee has endorsed Model Law modification. Publication is expected August 2003.

# Proposed Actions

- **Continue the Dialog** in Open-minded Good Faith
- ✓ **Organizational Support** of Recommendations to **Modify NCEES Model Law**
- ✓ **Individual Support** of Recommendations to **Modify NCEES Model Law**
- **Organizational Support** for Changing **State Professional Licensing Laws**
- **Individual Support** for Changing **State Professional Licensing Laws**

# What Can YOU Do ... NOW

- Find out what are **YOUR** state's laws **defining the practice of survey** related to **GIS data**.
- **IF** your state's laws **do** seem to **infringe** on the activities of GIS Professionals, then **support** these Task Force Recommendations for modifying the NCEES Model Law.
- **IF** your state's laws **do not** seem to infringe on the activities of GIS Professionals, then continue to monitor any future attempts to change them.
- **Work with your state's Surveyor organizations!**



# eMail Your Thoughts on the NCEES Task Force

- Members of the Task Force
- Task Force Chair, **Jim Plasker:**

**[jplasker@asprs.org](mailto:jplasker@asprs.org)**

**NCEES TF Final Report**

**[http://www.asprs.org/asprs/news/ncees\\_frame.html](http://www.asprs.org/asprs/news/ncees_frame.html)**

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Force on the NCEES Model Law for Surveying"**

# Future Directions

- **GIS Professionals** are developing their own Professional Certification Codes  
[www.URISA.org/certification](http://www.URISA.org/certification)
- **GIS Professionals** should educate **GIS Users** about the limitations of GIS data and products
- GIS Professionals need to improve GIS maps:
  - △ **Explicit References to Data Sources**
  - △ **Adequate Metadata, based upon ...**
  - △ **Responsible Accuracy Assessment** conducted by Licensed Surveyors

# Metadata Should Contain

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- **Locational Accuracy**
- **Date of Data Capture**
- **Source Documents**
- **Method of Compilation**

# What Is Appropriate GIS Accuracy?

## What should the Locational Accuracy of GIS be?

- **Appropriate Accuracy** for Appropriate Applications
  - △ **Moderate** - used for reference
  - △ **High** - used for cadastral or engineering
  - △ **Maximum** - used for control or geodesy
- Accuracy is **Limited by the Resources Available** to Build the Map



# NSSDA accuracy example

Point #	Point description	x (independent)	x (test)	diff in x	(diff in x) <sup>2</sup>	y (independent)	y (test)	diff in y	(diff in y) <sup>2</sup>	(diff in x) <sup>2</sup> + (diff in y) <sup>2</sup>
10751	r/w & lot line (m&b)	486062.125	486061.709	0.4	0.2	168699.106	168698.974	0.1	0.0	0.2
1100	r/w & lot line (platted)	480383.263	480380.433	2.8	8.0	168103.428	168103.496	-0.1	0.0	8.0
11730	r/w & lot line (m&b)	491133.630	491133.362	0.3	0.1	153041.796	153041.828	0.0	0.0	0.1
1382	r/w & lot line (platted)	462816.265	462816.057	0.2	0.0	166767.786	166767.874	-0.1	0.0	0.1
1397	r/w & lot line (platted)	470589.879	470588.959	0.9	0.8	166326.072	166325.827	0.2	0.1	0.9
1490	r/w & lot line (m&b)	492381.275	492381.352	-0.1	0.0	166191.528	166191.305	0.2	0.0	0.1
2901	r/w & lot line (m&b)	487165.209	487165.039	0.2	0.0	159005.809	159005.818	0.0	0.0	0.0
6180	r/w & lot line (platted)	461796.422	461795.986	0.4	0.2	172592.941	172593.162	-0.2	0.0	0.2
7100	r/w & lot line (platted)	466652.141	466651.230	0.9	0.8	162901.920	162901.132	0.8	0.6	1.5
lot_1_2	r/w & lot line (platted)	481423.044	481422.194	0.8	0.7	173240.868	173240.547	0.3	0.1	0.8
11840	r/w & lot line (platted)	491813.966	491813.949	0.0	0.0	147708.306	147708.645	-0.3	0.1	0.1
3960	r/w & lot line (platted)	483922.111	483922.116	0.0	0.0	153178.492	153178.429	0.1	0.0	0.0
4041	r/w & lot line (platted)	479920.587	479920.492	0.1	0.0	152711.877	152711.858	0.0	0.0	0.0
5120	r/w & lot line (platted)	475454.065	475453.940	0.1	0.0	147133.085	147133.258	-0.2	0.0	0.0
5549	r/w & lot line (platted)	469407.975	469407.927	0.0	0.0	144480.696	144480.912	-0.2	0.0	0.0
6391	r/w & lot line (platted)	463062.352	463062.426	-0.1	0.0	143447.557	143447.761	-0.2	0.0	0.0
6576	r/w & lot line (platted)	463813.337	463813.443	-0.1	0.0	155699.943	155700.107	-0.2	0.0	0.0
8009	r/w & lot line (platted)	472135.343	472135.103	0.2	0.1	153996.576	153996.484	0.1	0.0	0.1
9336	r/w & lot line (platted)	478399.063	478399.053	0.0	0.0	157767.858	157767.940	-0.1	0.0	0.0
9378	r/w & lot line (platted)	478840.112	478839.711	0.4	0.2	148370.597	148370.816	-0.2	0.0	0.2
4786	r/w & lot line (platted)	465173.302	465173.120	0.2	0.0	148308.262	148308.520	-0.3	0.1	0.1
sum										12.5
average										0.6
RMSE										0.8
NSSDA										1.3

# A Suitable Disclaimer



CITY OF  
CHULA VISTA

GEOGRAPHIC INFORMATION SYSTEM



~~GIS~~  
OBJECTS IN ~~MIRROR~~ ARE  
CLOSER THAN THEY APPEAR



1 inch = 200 feet



0 100 200 400 feet

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