



# GEM STATE SURVEYOR



FALL | 2022



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## CALENDAR OF EVENTS

2022

October 12-15	NSPS Annual Meeting, Tulsa OK
November 17-18	IBPEPLS Board Meeting
December 3	ISPLS BOG Meeting, Boise
December 31	Annual ISPLS membership fees are due
March 13-15	2023 ISPLS Annual Conference

**EDITOR: Hagen Beckstead**

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## EDITOR'S MESSAGE

It must be autumn because I am in the mood for early mornings on the mountain, long days on the hunt, and late nights back to camp. I cannot believe how swiftly this year has passed. After several years of lockdowns, isolation, and solitude I find myself regularly meeting with and enjoying the company of other surveyors at our Eastern Section meetings. It has been a great experience, and I hope all of you have found more opportunities to network with your fellow professionals.

Along these lines, I have had numerous reasons to reflect on the importance of maintaining good relationships and working together as a professional community in recent months. It is too much to expect everyone to see eye to eye, but I believe it is possible to overcome many differences and find common ground worth protecting. As some of you may recall, I took a new position at Idaho State University, and this opportunity has allowed me to work with members of the ISPLS I have never had the privilege of working with before. I am very grateful for the learning experience this has provided, and I am very humbled by many of the people I have come to know.

We have been very fortunate to have articles (aside from the regular letters and updates) submitted by Idaho surveyors in virtually all of our recent publications. This publication almost proved the exception, though I decided to contribute one myself. I would like to thank all of you who have written and sent in articles in the past, and I would encourage you to do so again. If you are working on an interesting or important survey this summer, or if you have an important message you would like to share with the ISPLS, please consider telling us about it in the Winter 2022 Gem State Surveyor. For this publication, we have some excellent articles touching on subjects near and dear to my heart. I hope you will enjoy them as much as I did.

Finally, thank you to our readers and our advertisers, and thank you to those who have given me feedback on previous publications. I welcome your input and your suggestions. May your autumn be as good as mine is shaping up to be! See you again this winter!

Hagen Beckstead,  
Editor, Gem State Surveyor



## PRESIDENT'S MESSAGE

Hello Fellow Professionals,

Are we truly Professionals in the truest sense of the word? What does it mean to be "Professional"? Are we setting a higher standard of Professionalism for our workplace, our employees, our clients, our employers, and our communities?

This has been a major focus for the ISPLS Board the past several years. "What are we doing to better the Profession of Surveying"? Our first step was preparing the Standards of Practice document; second, we hired a lobbyist familiar with our needs and interests; third, we hired a staff that could project our image more on social media; and fourth, we created a five year plan with goals to move toward.

One of these goals included having a proactive approach to working more closely with our Idaho Colleges to give better insight to what industry sees as a need. To better our Profession we must get more involved with the preparation of our current and future employees educational pursuits. Are we offering mentoring opportunities? What realistic expectations should we have for someone coming into the work field after college, and how can we as employers help them become more successful? Some colleges have an advisory committee to whom industry can give input, but for far too long the ISPLS has not been very active within these committees and we feel that the education committee within ISPLS needs to work more closely in partnership with these advisory committees. We are extremely grateful for all the educators that give their time and passion to educating our future Professionals, and we value the opportunity to always work side by side with them.

We need to take an active role with the ISPLS future leadership and Professionals now. Not tomorrow, but now. Sometimes, I think that I'm still the young buck in the room, but every conference I start to see that I'm becoming one of the gray beards. Let's stand up and help out our young up-and-coming professionals. Get them involved, get them interested in becoming licensed, put that fire within them, be a mentor to all, and be a friend to them.

Thank you

Jeremy Fielding, PLS

President ISPLS

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## LEGISLATIVE UPDATE

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By Tom Judge

The law changes from the 2022 session have been in effect for three months now. Two issues have become apparent in that time. During the last review of the basis of bearing legislation an 'unfortunate language edit' was made. The bill was intended to provide a second option for stating the basis of bearing on plats, records of survey, and corner records. The word "or" was removed from between the options creating a list of requirements. This issue was discussed at length with the Board and DOPL. The Board stated they will not attempt to enforce the law as a list but will treat it as intended. Practitioners are perfectly fine to use either the traditional or new method of expressing a basis of bearing.

A second issue has come up with ties to public land survey monuments. In order to use a 16th corner as a PLSS tie it must be shown on a corner record meeting the current standard. That means it must have all elements of the current law. Many are not including at

least three accessories (with bearings) or a complete history of remonumentation. A note that the history is too long for the form does not suffice.

The next legislative session is now less than two months away. There are no legislative proposals coming forward from the Board through DOPL. DOPL has committed to fixing the error in the basis of bearing law but has not communicated how they intend to do so.

### DOPL transition:

We continue to experience difficulty getting information to or from the Board, especially agency guidance. DOPL leadership has all but eliminated our ability to obtain information on what the Board expects. We have lost a primary source of answers to standard of care questions. It is critical that ISPLS bring the standards of practice committee fully on-line immediately. The alternative is to return to the days of surveying by old wives tales and rumors.



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## LAND SURVEYING - IN DEFENSE OF THE PROFESSION

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By Hagen Beckstead, GSS Editor

There is a poster on the wall where I work. The image is a familiar one: it is the silhouette of a man with a hard hat peering through the lens of a total station and comes complete with a catchy phrase about good measurements. The iconic representation of the Land Surveyor as a man or woman with precise measuring technology exists for good reason; not only is this how surveyors are usually seen by the public, but it would be very difficult to depict the other tasks surveyors perform on a poster. How would one portray the application of boundary law principles? Would the image of a person reading documents, sitting at a computer, or holding a map adequately capture the essence of the surveyor? Obviously not.

Since ancient times surveyors have used specialized equipment and techniques to take measurements, and we are most readily identifiable by the tools we use. This representation of the surveyor is the most frequent because it is the best, but it is not without flaws. This particular icon also serves to reinforce a common misunderstanding about the professional land surveyor which has been detrimental to the profession as a whole. Over the course of my education and career, I have been party to many discussions concerning the future of the surveying

profession. A number of these discussions have focused on potential threats to the surveying profession which are posed by other professions and occupations such as GIS and engineering. Many others have focused on the shortage of students enrolled in academic programs and the shortage of qualified applicants for job openings. Suggested solutions to these challenges range from expanding the products which require a surveying license to provide to making it easier to get a surveying license, or from lowering the educational requirements for licensure to abolishing the experience requirements for licensure. Underlying these discussions are questions about what land surveying is. It is this more foundational issue that I want to look at here. First, we will consider some of the reasons land surveying is, rightly, classified as a profession, and then we will consider how this analysis can inform some of the discussions taking place about the future of the surveying profession and how it relates to other occupations.

Perhaps a good place to start is by considering the difference between a trade and a profession. A trade is a specialized job, often of a manual nature, which requires skills and training. Tradesmen are, accordingly, skilled workers who have developed the knowledge and skills to perform the tasks and use the technology specific to their trade. The required knowledge and skills of a trade are acquired through a combination of experience and training or education.

All of this will sound very familiar to professional surveyors. There can be no doubt that land surveying requires such specialized knowledge and skill. There are many "tools of the trade" a surveyor must learn to use,

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such as levels, total stations, GNSS receivers, and data collectors. Much of the work performed by surveyors might itself be seen as being similar to the work performed by a tradesman. Is staking a line of curb and gutter relevantly different to installing plumbing? It is not clear how. Furthermore, have not surveyors followed a model very similar to apprenticeship? Many surveyors begin working as a rodman under the supervision of a crew chief, advance to the level of a crew chief under the supervision of a licensed surveyor, and then begin to seek licensure themselves. Many employers argue that their crew chiefs should qualify for licensure based on their extensive experience. How does this differ from a trade? Perhaps the more important question is, if the definition of a trade seems to fit surveying so well, does that mean that surveying is a trade? Well, as the saying goes, the definition is good as far as it goes. There are important differences, however, between a profession and a trade which land the surveyor squarely in the latter category.

Many definitions of “professional” focus on the educational requirements typical of professional occupations, and it is true that professionals must generally meet academic standards above and beyond those required of a tradesman. The reason for this is the professional’s work often requires a level of theoretical and academic knowledge beyond what is typical in a trade. The professional does not merely use technology, but must often understand the inner-workings of that technology and/or have a deeper understanding of what the data gathered using technology means. Contrasted to the tradesman, the professional must often use judgement to navigate complex problems and make decisions which directly affect the health and safety of the public. With the power to make decisions which affect the public comes the responsibility to acquire the skills, knowledge, and expertise to make such decisions within defined ethical standards. Professionals are simultaneously subject to strict codes of conduct and granted a great level of autonomy, in recognition of both their responsibility to the public and the status they have gained by demonstrating the level of expertise required for licensure.

As should be evident from the preceding paragraph, the justification for having educational requirements for licensure as a surveyor hinges on whether the surveyor needs this level of knowledge and expertise to perform the tasks required of him. That is not to say that this level of knowledge and expertise must be required for every task performed by the surveyor. We expect expertise of doctors, not so they can use stethoscopes or take temperatures, but because in addition to these kinds of tasks they must be

able to identify and properly deal with situations of concern to the good of their patient and the public. Similarly, it would not matter whether some or even many of the tasks performed by surveyors do not require a high level of expertise to be performed. What matters is whether the surveyor will be, as a regular part of his duties as a surveyor, making decisions and performing tasks which do.

That the work performed by a surveyor has a direct affect on public health and safety cannot be doubted. The consequences of surveying mistakes to those who depend upon surveyors in construction, engineering, boundary determination, and data acquisition are numerous and evident. Similarly, there can be no doubt that surveyors are relied upon by non-surveyors to be offering results and products which are believed to be true, reliable, and safe for use. The surveyor must not only have the ability to perform required tasks, but also to certify the correctness of the product. The surveyor must have a level of proficiency which gives the public confidence those tasks were performed correctly. The surveyor cannot be a “button pusher”, as those who use technology without understanding it are often called by those who work in my locale.

It is sometimes suggested that advancements in technology have reduced this need for proficiency. It is suggested that computers have simplified the work performed such that one need not have as deep a knowledge of the underlying theory and mathematics as those surveyors who had to manually perform the calculations. I posit that the opposite is true. The convenience of an automated process comes with the risk of unintended (and unrecognized) results. The use of new, complicated technology such as GNSS expands the bounds of what the surveyor must know and understand. In a field such as surveying where data is often the product, it is of the utmost importance that someone has the ability to verify and certify the data. This responsibility falls on the surveyor with responsible charge, and this is why experience alone does not provide assurance to the public that the individual seeking licensure has gained the required level of expertise. A proficient user of technology may be able to blindly follow a consistent process and achieve correct results 99 times out of 100, but the professional must have the ability to know when the process must be changed for the 100th. Similarly, a boundary surveyor need not only have a demonstrated proficiency in the use of the tools, he must also show a proficiency in the more difficult and unclear matter of applying laws

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## LAND SURVEYING - IN DEFENSE OF THE PROFESSION

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and principles to specific and varying circumstances. The boundary surveyor is not an expert measurer but an expert problem solver, and no amount of experience at the former will equip him with the knowledge and principles he needs to become the latter.

As was alluded to at the beginning of this article, there has been a great deal of discussion about the future of the surveying profession. I think the foregoing analysis can help shed some light on these issues and provide a path forward for the surveying community. I cannot look at all, or even many of these issues, but I would like to consider the problem generally. I first heard the joke that GIS stands for "get it surveyed" some 10 years ago and I have heard it repeatedly as recently as this year. The joke refers to the fact that Geographic Information Systems (GIS) depict property lines and are sometimes misunderstood by the public to be accurate depictions of boundary line locations. Some surveyors lament that GIS was not adopted by the surveying community early on and its success demonstrates a missed opportunity for the surveying profession. Others lament that GIS professionals are encroaching on territory that already was and should remain the proper domain of the surveyor. This is just one frequent example of a general concern I have heard raised in numerous contexts over the years: that the surveying profession will be carved up and distributed among other disciplines. A few other examples of such threats include machine control replacing construction staking, engineering firms collecting their own topography, and title companies writing legal descriptions of property.

The concern does not appear to be unfounded, and the demand for surveying tasks to be performed by others has only increased where there is a shortage of surveyors available to provide these products. Two solutions are often proposed: increase the number of surveyors by simplifying the path to licensure, or allow others to offer these same products in order to meet demand. Neither of these would be good for the surveying profession, but more importantly, neither would be good for the public.

Fortunately, I think there is some check against this risk. If a surveyor were just a precise measurer, the surveying profession would be in deep trouble. Developments in technology are making it very easy to be a precise measurer. But, as I hope the analysis above makes clear, the point and purpose for survey licensure is to protect the public by ensuring that these products are provided by experts who have the ability to create and certify the correctness of the product, and as long as surveyors insist

on rigorous proficiency-based standards for licensure they will be uniquely equipped to meet this need. It is hard to see how other professionals could replace surveyors in this capacity without first acquiring the skills and knowledge of the professional surveyor. Surveyors should understand that this is the role they are uniquely equipped to take and insist on protecting the rigorous licensure requirements which allow them to take it. On the other hand, if surveyors begin to regard themselves as users of technology, it is difficult to see why other users of the technology should be excluded from providing the same products.

This brings me to my final point. One of the chief reasons that is raised for reducing the licensing requirements is the shortage of qualified applicants for licensure. Are we setting the standard too high and thereby excluding too many from joining the profession? To the contrary, it seems clear to me that the shortage of people joining the profession is to some extent a result of valuing ourselves too low. As I have worked with individuals from the engineering, medical, and legal professions I have been found myself continuously surprised by how differently surveyors regard their time and products. Whereas other professionals often regard themselves as experts with unique skillsets who offer needed and important products which must be held to the highest of standards (and themselves compensated accordingly), many surveyors focus on doing more work than they can, in less time than they need, and for less compensation than they deserve. I am sure that many of my readers will object at this point and say that they have to keep their prices low to remain competitive. This has not been my experience. I know many surveyors who are "competing" for work they do not need and do not even want. The price for surveying products has not been set by the market, but by the professional surveyors themselves.

One result of this under-valuing of our product, I believe, has been that intelligent people who may have become excellent surveyors have chosen professions that offer more by way of opportunity and compensation. As long as surveying is seen as a trade which has all the licensing, education requirements, and liability of a profession but providing neither the status nor the pay, it will be difficult to attract qualified applicants to the profession. Such an occupation is relatively unappealing both to those who are looking for an easier career to get into, and to those who are willing to put the time and effort into pursuing such a career but expect to achieve the status and pay of other professionals.

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# COORDINATING SURVEYORS ON WHERE WE DRAW THE LINES

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September 7, 2022 - by Tim Burch  
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Technology changes the rules of the game, and surveying may be more in its crosshairs than the profession will admit

Maps have existed for centuries. The lines on maps indicating the boundaries of political and administrative units — cities, counties, states, and countries — are graphic representations of the limits of those entities. These lines don't, however, typically exist in real life. There isn't a large line between the United States and Canada stretching from the Pacific Ocean, through the Great Lakes, and onto the Atlantic Ocean.

The same goes for latitude and longitude lines on maps and globes. The public generally accepts the various delineations on maps as being somewhat accurate with an unwritten level of trust in those who have produced these maps.

## Definition:

*trust: assured reliance on the character, ability, strength, or truth of someone or something.*

Here are the guidelines surveyors use for determining surveys.

1. Lines physically verified in the field and proven from evidence
2. Monuments and/or boundaries set and called for within legal descriptions
  1. Natural monuments
  2. Artificial monuments
3. Adjoiners (to determine junior/senior rights)
4. Courses
  1. Bearings, then distances (metes and bounds states)
  2. Distances, then bearings (public land survey states)
5. Recitation of area
  1. Controlling description
  2. Evidentiary description
6. Coordinates: local and/or geodetic

Surveyors rely on physical monuments, title documents and evidence of occupation to assist with the establishment of not just major dividing lines, but all lines of property, public or private. Finding, setting and honoring physical monuments has been a significant character trait of the surveyor for as long as maps have existed.

Monuments are placed to determine the endpoints of these lines as depicted on maps or plats, but what happens when technology introduces new ways to re-establish these lines? What will happen to our monuments when technology — more specifically those who utilize them — deems them obsolete?

The guidelines above are known as “priority of calls” or “rules of construction” by the surveying community. These items have provided the instructions for surveyors to follow in retracement of lines for many years. However, like nearly everything else in our modern world, technology has a hand in modernizing even this time-honored “surveyor’s code of retracement.”

Who would have guessed that the rotary phone dial would give way to touch-tone buttons, that the system would jump from landlines to cellular and satellite signals to remote handsets, then progress to receivers evolving away from physical buttons to touchscreens?

Technology changes the rules of the game, and surveying may be more in its crosshairs than the profession will admit.

## Here come the numbers

Note that the last entry in the above guidelines for survey retracement is “coordinates.” In accordance with most accepted lists, coordinates can be local or geodetic. These coordinate values are generated by surveyors, geodesists and public agencies; they can be found on plats, and in records and websites kept by government agencies.

Now that we are more than two decades into the 21st Century, it would be safe to say that most of the surveying profession uses an established geodetic coordinate system. The use of GNSS receivers is widely accepted as normal practice by many surveyors because these systems are much more user friendly than in years past. Additional constellations have added to the availability and accuracy of GNSS positional values, so utilizing state plane coordinates has become the norm.

We are now surrounded by something that has an incredible impact on our profession and the world around us. We are placing trust in a georeferenced coordinate system that cannot be identified by any of our senses, like we can with a physical monument.

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## COORDINATING SURVEYORS ON WHERE WE DRAW THE LINES

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A coordinate cannot be seen, touched, tasted, heard or smelled.

We are placing our full trust in a reliable position on earth as determined by our GNSS receiver working within a published coordinate system. Because of these advancements in technology, a new generation of geospatialists is insisting we should revise the way we survey, because technology provides much higher precision and accuracy.

Just like lines on a map or plat, coordinates only exist as a calculation of a position on the face of earth. So why is there animosity in trusting coordinates over the more traditional items on the list of retracement guidelines? It may have to do with the fact that the ground we are surveying is not in the same place it was a short time ago. Depending on where you live, it may have moved more than you think. For more information on the shifting ground we live on, let us dig into some research about our continents.

### **Pangea: Description of moving land masses**

(Text from USGS.Gov)

From about 300-200 million years ago (late Paleozoic Era until the very late Triassic), the continent we now know as North America was continuous with Africa, South America and Europe. They all existed as a single continent called Pangea. Pangea first began to be torn apart when a three-pronged fissure grew between Africa, South America and North America. Rifting began as magma welled up through the weakness in the crust, creating a volcanic rift zone. Volcanic eruptions spewed ash and volcanic debris across the landscape as these severed continent-sized fragments of Pangea diverged. The gash between the spreading continents gradually grew to form a new ocean basin, the Atlantic. The rift zone known as the mid-Atlantic ridge continued to provide the raw volcanic materials for the expanding ocean basin.

Meanwhile, North America was slowly pushed westward away from the rift zone. The thick continental crust that made up the new east coast collapsed into a series of down-dropped fault blocks that roughly parallel today's coastline. At first, the hot, faulted edge of the continent was high and buoyant relative to the new ocean basin. As the edge of North America moved away from the hot rift zone, it began to cool and

subside beneath the new Atlantic ocean. This once-active divergent plate boundary became the passive, trailing edge of westward moving North America. In plate tectonic terms, the Atlantic plain is known as a classic example of a passive continental margin.

Today, the Mesozoic and Cenozoic sedimentary rock layers that lie beneath much of the coastal plain and fringing continental shelf remain nearly horizontal.

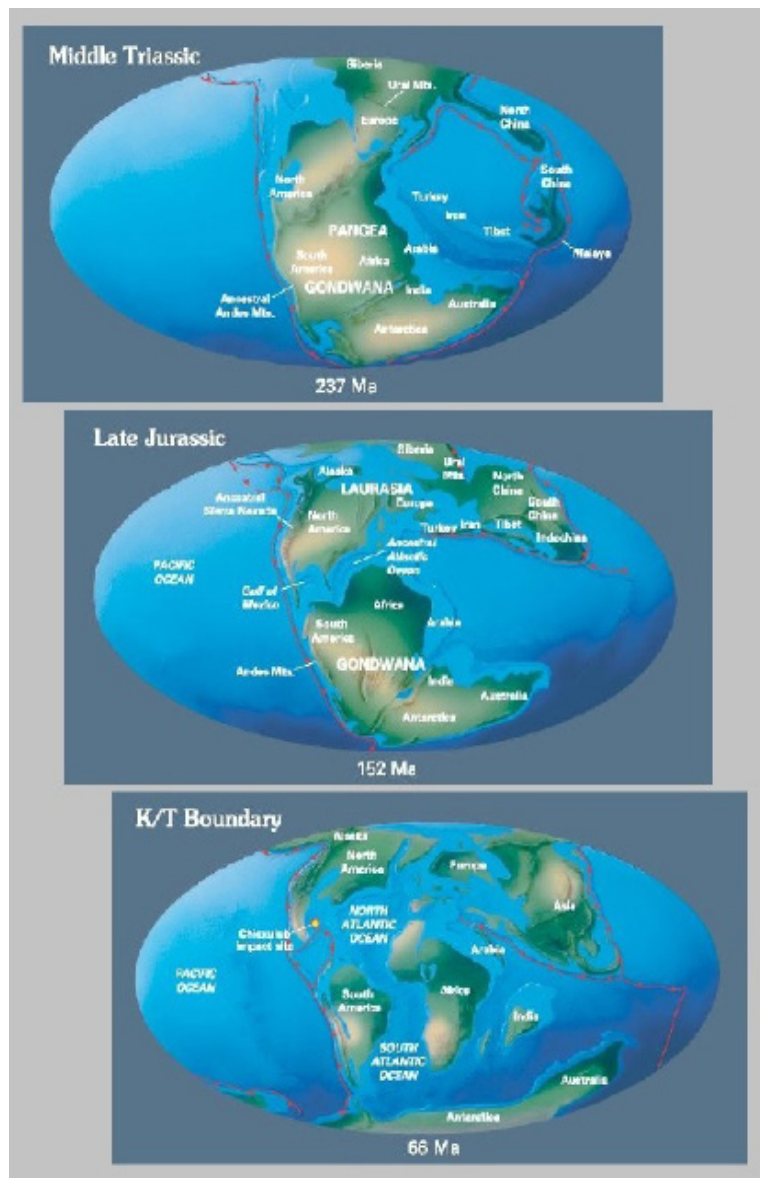


Image: USGS

## COORDINATING SURVEYORS ON WHERE WE DRAW THE LINES

In geologic terms, a plate is a large, rigid slab of solid rock. The word *tectonics* comes from the Greek root “to build.” Putting these two words together, we get the term *plate tectonics*, which refers to how the earth’s surface is built of plates.

The theory of plate tectonics states that the earth’s outermost layer is fragmented into a dozen or more large and small plates that are moving relative to one another as they ride atop hotter, more mobile material. Before the advent of plate *tectonics*, however, some people already believed that the present-day continents were the fragmented pieces of pre-existing larger landmasses (“supercontinents”).

The diagrams below show the break-up of the supercontinent Pangea (meaning “all lands” in Greek), which figured prominently in the theory of continental drift — the forerunner to the theory of plate tectonics.

### Continental drift, plate tectonics and prime meridians

Historians and other scientists have theorized about Pangea for centuries. Common soil types, fossils, and other evidence found on different continents help to solidify the concept of Pangea. Items discovered on the west coast of Africa have many similarities with those found on eastern South America. The physical evidence is quite convincing that an earlier supercontinent existed millions of years ago.

Now, let’s apply a fixed measurement system with lines upon earth that defines latitude and longitude. In the past, geodesists, geographers and mathematicians established various “prime meridians” around the world to serve as a basis for maps. Locations and cities used included Amsterdam, Antwerp, the Bering Strait, Bern, Brussels, Copenhagen, Florence, Giza, Jerusalem, Kyoto, Lisbon, Madrid, Naples, Oslo, Paris, Philadelphia, Pisa, Rio de Janeiro, Rome, Stockholm, Warsaw and Washington, D.C. (in four different places!), just to name a few.

Thankfully, scientists gathered in the 19th century to agree upon a singular “initial meridian” that would pass through Greenwich, England, and was based upon several centuries of astronomical observations at the nearby Royal Observatory.

For approximately 100 years, mapmakers (and geodesists) used the new prime meridian at Greenwich as the beginning baseline for longitude determination around the world. After all, it was based upon years of astronomical observations and solved the age-old problem of where longitude starts. (Latitude was a much easier calculation for astronomers and geodesists, but that story is for another day.)

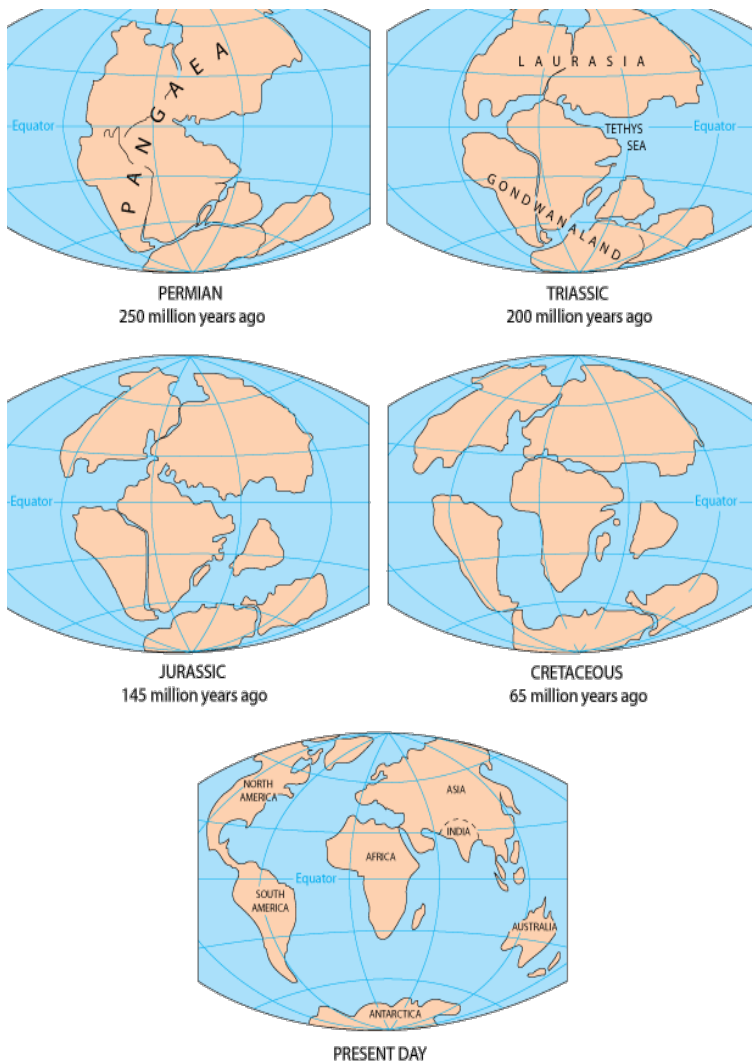


Image: USGS



Image: Majaiva/iStock/Getty Images Plus/Getty Images

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## COORDINATING SURVEYORS ON WHERE WE DRAW THE LINES

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### The late 20th Century and the fourth industrial revolution

Technology, once again, provides us with conflicting results. While most technological advancements are game-changing improvements to mankind, they also tend to shake up information and standards that have existed for many generations. Like the previously discussed advancements in telephones, technology makes us change the way we look at things and how we go about our lives.

Mapping has become a central part of our everyday lives. Georeferenced positions for literally everything is now a standard characteristic of many functions within our environment, especially in our surveying world. Most of these improvements are due to GPS, which was originally developed for the U.S. Military to guide and assist with positional location of our defense systems in relation to our enemies. We use this same precise technology to establish positional locations for boundary points, infrastructure and topographic information.

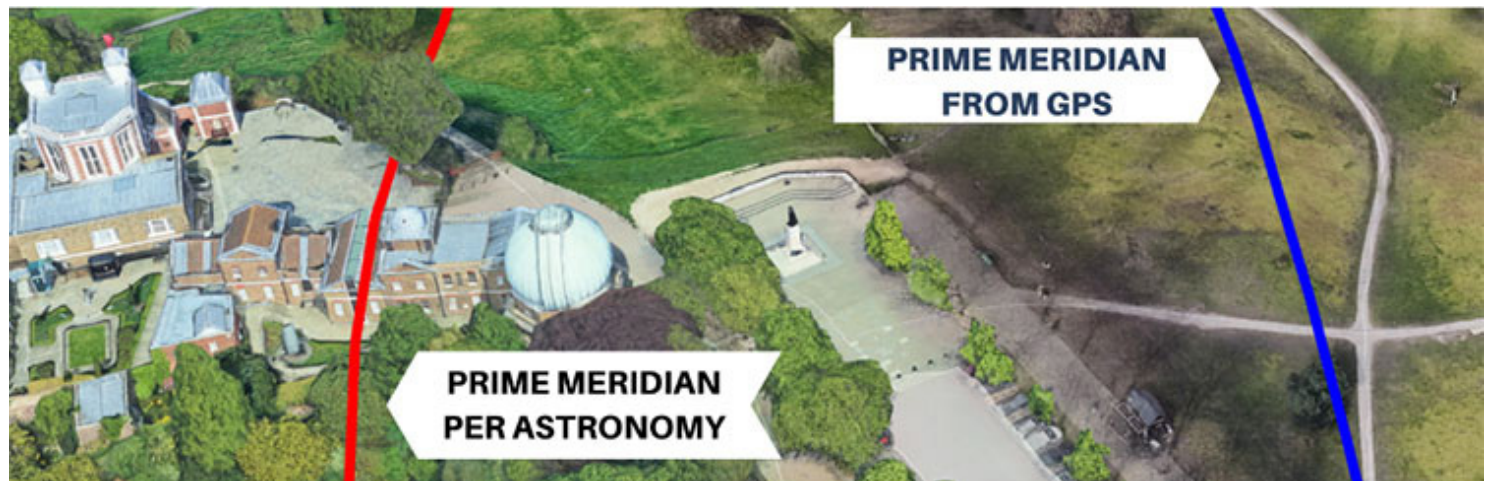


Image: Tim Burch

We have also used GPS to learn much about our tectonic plates and varying movement of the continents. The first thing we learned is that the Prime Meridian established in 1884 does not fall in the same place as our  $0^\circ$  latitude designation as determined by GPS/GNSS calculations.

This finding, however, is not the telling item within our adaptation of GPS data; it came when various agencies established the continuously operating reference system (CORS), composed of static GPS base stations. CORS stations, while used to help establish new survey positions in relation to a known reference location, also measure a continuous drift of latitude and longitude positions over time.

The National Geodetic Survey (NGS) is in the process of

finalizing a new reference framework for establishing coordinate values that utilize time as a core component. Future implementation of the new National Spatial Reference System (NSRS) will require the additional attribute of time within the metadata of any new values.

### The reality of 'moving' monuments

So how does this affect surveying and the monuments we surveyors hold on such a high pedestal? The answer varies depending on who one asks. Most surveyors will continue to hold the "priority of calls" as listed above. Several practitioners, however, want to move coordinates higher up the list because of technology, and the ability to retrace a published point because of the increase in technology and the higher accuracy and precision of today's GNSS.

This is possible if the user of the technology follows the procedures as established by NGS with metadata and accurate timing, but there are still several variables in the setting and

retracing methodologies. When was the last time the equipment was calibrated? Was adequate research performed to minimize environmental errors? Was there any interference due to solar storms or multipath? There are many potential issues a surveyor can face, but few are checking all the boxes when performing highly accurate and precise positional measurements.

Technology has brought surveying into the 21st Century with GPS/GNSS and ever-increasing accuracy and precision. It should also be the profession's goal that the technology does not override what the general public can see. They can see monuments, fence lines, buildings and other improvements, but they cannot see coordinates, which remain invisible to the naked eye. Technology may change that in the future, too, but until that time, we must rely on what we can see.

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# DID SURVEYORS MISS THE BOAT ON GIS OR WERE SOME SECRETLY GUIDING THE SHIP?

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By: Karen Zollman

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Evergreen State Surveyor, Summer 2022.

[www.LSAW.org](http://www.LSAW.org)

In the early days of Geographic Information Systems (GIS), the late 1980s, a company recruited me to help them implement the City of Seattle's GIS. It started with a phone call from a friend, Sandy, who had been subcontracted to develop the parcel basemap database. Sandy had questions, there were terms she didn't understand. I looked over her materials and quickly concluded she didn't have the right data. I made a list of what she needed from the City. The next day Sandy took the list to the prime contractor, who immediately called me for an interview. They quickly determined that I was the expert they had been looking for. In truth, I think I was the first person they met that spoke "Land Surveying."

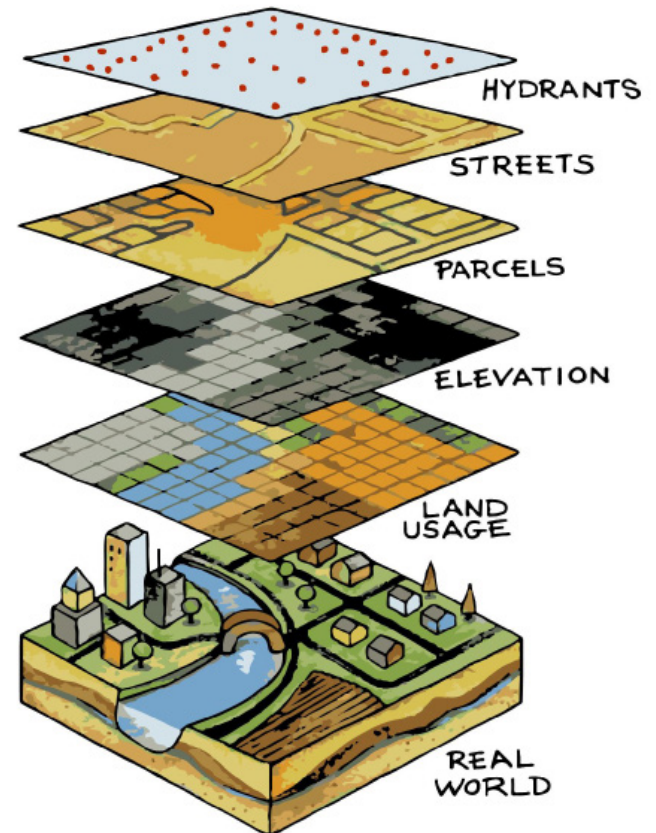
I took the job and began working with people from disciplines I had not engaged with before, including geographers, and computer programmers. Fortunately, the City had hired a Land Surveyor to work on their project team, Ken Conradi. I had one person at the City that was fluent in Land Surveying, but he too was learning GIS. Both the consultant and City teams were initially skeptical about working with us.

I conducted classes in geometry to teach the company's CAD staff (geographers) how to create the City's parcel maps from a number of data sources provided by the City, including, cadastral and street monuments, the City's hand-drawn quarter-section maps, and plat maps from a company called Kroll Maps. In one class a computer programmer challenged my "crazy methodology." I realized he thought I had invented geometry. I quickly explained that, "No, this is geometry created by a Greek named Euclid from the 6th century BCE." (I was similarly accused of "creating" cadastral mapping and the Public Land Survey System (PLSS) and had to hastily blame the French and Thomas Jefferson for that construct.)

I explained the geometry basics to the geographers and programmers:

- points—the simplest geometric feature
- lines—a mathematical construct between two points
- triangles—the simplest polygon described by three points
- arcs—also mathematically described by three points

The programmer spent the remainder of the class drawing three points on the white board and demanding I show him how they could be connected to form a triangle or circle. That proved, he switched to drawing complex polygons that I had to prove could be divide into triangles. Finally, he was con-



vinced that Euclid, and possibly I, may be on to something. Later, he told me that GIS used the same basics—points, lines, polygons. We had stumbled upon the first shared concepts, giving us a way to bridge the chasm between our disciplines.

The first thing I learned was that GIS had been developed by people from the Planning discipline—think right brain. Land Surveying is aligned with the Engineering discipline—think left brain. We had much to teach each other, and we were thinking about mapping in fundamentally different ways—one side mathematical, the other side conceptual. Land Surveyors create maps to precisely delineate property boundaries or physical features. GIS creates maps to compare data sets to one another. Today, everyone carries a smart phone that can tell them where the nearest hardware store or Thai restaurant is located. Those locations are not precise, but are exactly what you need.



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## DID SURVEYORS MISS THE BOAT ON GIS OR WERE SOME SECRETLY GUIDING THE SHIP?

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GIS inflamed my DNA. My last name, Zollman, is German for toll- or tax- man, essentially my ancestors were assessors and possibly cadastral mappers. I threw myself into understanding this new discipline. Like any new convert I wanted to share my enthusiasm and preach to the unconverted Land Surveyors.

I vividly remember giving a talk to a chapter of the Land Surveyors Association of Washington (LSAW). It was April 1991, I remember the date because I was a week past my delivery date. Yep, I was so pregnant that I had to sit down to give my talk and warned my audience that there was a chance I might have to leave abruptly. Predictably, my lecture was not well received! I was hostilely challenged that GIS would be the ruin of us all, and further I was betraying all that was holy in the Land Surveying profession. I was shocked. I never expected this reaction—which turned out to be predominant in the United States—but interestingly not held by Canadians or Europeans.

The main objection that U.S. Land Surveyors have with GIS is accuracy. At best, GIS parcel basemaps that I have created only have a purported accuracy of +/- 1 foot. We start by surveying monuments in the Public Land Survey System (PLSS) grid—Section monuments in rural areas, Section and Quarter-section monuments in more populated areas. Then we draw and rotate each property record to match the basis of bearing of the PLSS grid datum. The County Assessor's property records represent over a hundred years of descriptions since statehood in 1889 with varying basis of bearing and levels of detail. Some describe only an aliquot parcel with no bearings or dimensions. It is a challenging puzzle to construct for an entire County. Not surprisingly, issues are identified that cannot be resolved without a Record of Survey, but conflicts can be flagged and tracked in a database. This data becomes important when a municipality is considering a project in an area flagged with poor property definitions. A GIS doesn't replace a Record of Survey, and few private Land Surveyors will have the budget to look at the vast number of property records that may be necessary to resolve conflicting issues for their client. But GIS can assemble the records to make the resolution more complete and efficient.

On average, we found 2-3 properties per Section that were missing from the tax roll—mostly owned by the County but never formerly noted; or overlapping—parcels had been divided and both the original parcel and the new parcels were listed on the tax roll. These issues were researched, resolved and corrected by County Assessor staff. Once all tax parcels are mapped, GIS software can quickly compare the geometry of each parcel's area to the County Assessor's recorded tax area, identifying any discrepancies.

For 30+ years, GIS professionals have considered me to be a subject matter expert in digital cadastral mapping, while Land Surveyors considered me to be a GIS person who knows little about mapping or surveying. There were exceptions. Land Surveyors working in the fields of Imagery technology, GPS, and Hydrography were quietly supportive. I discovered that the U.S. Land Surveying community was extremely fundamentalist in its definition of Land Surveying. As technology exploded, it was only natural that disciplines would begin to overlap, and GIS—spatial geometry was the mother of all mapping technologies.

Some Land Surveyors have told me that GIS finally realized that they needed us when NGS moved from NAD29 to NAD83. The predominant GIS company, ESRI, messed up the projection conversion. The error was caught by a Land Surveyor, Larry Signani, who provided the correction. However, I would argue that GIS knew they had an accuracy problem when orthophotography supplanted traditional 2D aerial photography. Anyone could see that the parcel geometry was terrible, but sadly, Land Surveyors were not included in the solution. Instead, GIS focused on developing complex mathematical computer programs to stretch and distort maps in an attempt to improve bad geometry.

Toward the end of the City of Seattle's initial GIS project, I began advocating to my company to emphasize cadastral mapping to GIS clients. The parcel basemap is the first map that created for a municipal GIS. All other data—utilities, soils, hydrology, etc. is anchored, constrained by a good cadastral-based map. If we could provide a better parcel basemap, all of the municipality's GIS map data would be improved.

Sadly, the company was unconvinced, but I was able to persuade an adventurous Land Surveyor, Ben Petersen, to take a chance. I worked with his company to create cadastral basemaps for several counties and cities and projects like SeaTac Airport's 3rd Runway. We partnered with other Land Surveyors that were likewise bridging the gap between other professions. We adopted Gavin Schrock's cadastral database to store our monument data in GIS. His database was later adopted by the State of Washington. We pushed back on Imagery and Aerial Photography firms to improve their Digital Elevation Models (DEMs) with more elevation data, vastly improving the Orthophotography. These other disciplines were eager to partner with us to improve their technology and deliverables. However, the Land Survey community remained reluctant to join the party.

In 2005, I was recruited by Gary Gervelis, the Land Survey

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## DID SURVEYORS MISS THE BOAT ON GIS OR WERE SOME SECRETLY GUIDING THE SHIP?

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manager for the City of Seattle, to build a GIS for Pend Oreille County. The City needed to relicense their hydroelectric facility, Boundary Dam, which was located in that County on the Canadian border. Federal agencies including Federal Energy Regulatory Commission (FERC) and Washington State Energy Facility Site Evaluation Council (EFSEC) had adopted GIS requirements for pipelines and dams, in part due to public safety concerns following disasters such as the Olympic Pipe Line Company (OPLC) explosion in Bellingham, WA in 1999.

Side note: I had worked for OPLC as a subcontractor, trying to improve their paper-based, 1960s mapping. I had given a presentation a few months before the Bellingham incident to OPLC's leadership on the cost effectiveness of better Land Surveying, and aerial and digital mapping to support their multi-state operation. I asked for \$60,000 for a pilot project to prove the value of the effort. The general manager dismissed my proposal impatiently as ridiculously expensive and unnecessary. He subsequently went to jail for maleficence, in part, for managing the pipeline with wholly inadequate mapping and staffing.

I began building the Boundary Dam GIS, as Gary Gervelis wrestled mightily with the City bureaucracy to acquire the resources I needed. Pend Oreille County had no digital mapping, and no staff to pull Assessor records so we hired a title company. I worked with Steve Ivey at the State Survey Office, and Leroy Middleton (retired) to resolve riparian boundaries for the Pend Oreille River. The project identified the only known record of private ownership of a part of a river. I worked directly with Bureau of Land Management (BLM) to get mineral records. The mineral records were poorly described narrative boundaries that had never been mapped—again, funding constraints. I discovered that BLM had licensed mineral assessments in Boundary Dam's Exclusion Area, a huge safety and environmental concern that needed to be addressed immediately. I provided my maps to BLM. I worked with Bonneville Power Association (BPA) to get their power line rights-of-way maps.

Next, I discovered the property records group at Seattle City Light did not understand basic property law, and would not be persuaded by my expertise. I brought in a federally licensed mineral surveyor, Mike Mickewitz, to explain how ownership of mineral assessments vs mineral claims works—all the assessments bought by the City in the 1960s had no ownership value, only the Mineral Claims that were held in fee simple belonged to the City. The project's consulting lawyer and I discovered that the City had bought easements that they never recorded with the County Auditor. City personnel thought that a City Ordinance was all that was necessary. I explained

that an Ordinance authorized purchase but did not transfer property rights. Again, the group was not convinced and the lawyer had to pound his fist on the table and cry, "Enough! It is not a legal document unless filed with the County!" The lawyer scrambled to file documents for easements still owned by the original property owner, and the City had to repurchase easements where the property had been sold without the easement in the title.

By the way, the project's private-sector lawyer converted his firm to GIS record keeping that year after seeing my GIS in action. I could click on a survey monument or parcel and summon scanned legal documents—Land Surveys, GLO records, section breakdowns, BLM and County property records—linked to the map features. This project helped change BLM's mapping of mineral records, and the way Seattle City Light managed their property records. And through a public information request, Pend Oreille County acquired all of our data to launch their GIS—a cadastral-based system, painstakingly built by Land Surveyors that created a chain-of-title for all properties back to statehood, including associated mineral rights and riparian boundaries. In addition, FERC procedures (ISO9000) required a detailed narrative describing how the GIS was created including development procedures, data types, source document agencies, and detailed errata tracking for any issues discovered/resolved in the property records. This narrative provided a road map for the maintenance of the GIS by Pend Oreille County staff.

Several of the Land Survey technicians that worked on GIS projects with me said it was the best cadastral and property records education they could have received. Imagine reading, drafting and resolving a hundred years of property records for an entire County. The methodology we created and documented for our clients became a standard for the maintenance of their parcel maps. As Gavin Schrock was often quoted as saying, "We infected them with accuracy."

GIS projects "find" many forgotten survey records, languishing in the back of dusty storage rooms. For example, scrolls of railroad map surveys. These old documents often provide the basis of other property descriptions by referral, and allowed us to definitively describe many other properties. Once scanned, these precious documents are preserved and made available to the public, most importantly—Land Surveyors. GIS development efforts have provided an exhaustive variety of online property records, indexed for fast retrieval.

While working for the City of Seattle, I needed a railroad map located in the County records. The map was part of a huge book that had to be carefully taken apart, in order to

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## DID SURVEYORS MISS THE BOAT ON GIS OR WERE SOME SECRETLY GUIDING THE SHIP?

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copy the one page I needed. I suggested that if the maps were scanned they could be preserved and protected and would not require this laborious and damaging effort. The person helping me agreed but said there was no funding, and the County didn't have a good scanner.

I quickly calculated that it would be vastly cheaper for the City to scan the entire book than to send a person to the County once a month for a year. Gary Gervelis and I met with the person in charge and negotiated a win-win. We would take one book at a time and scan it with the City's high resolution scanner. In exchange, they would put the scans on-line. We also got access to other valuable digital records—Gary was a skillful negotiator. It was a backroom, hush-hush deal in order to circumvent months of paperwork. Six months later, I had scanned all the County's Railroad books on my lunch time. Now City Land Surveyors could easily research all railroad maps from their desks, and shortly after, so could anyone else.

I mention all of these examples, not to elevate my professional status, but to demonstrate that the mere presence of a person with Land Surveying background and knowledge of cadastral and property records substantially improves these projects, and the records and record keeping methods of the data source agencies involved. This is the impact that Land Surveyors can have on other disciplines when we artfully provide our expertise to their efforts. I can't say that I ever mastered the artful politics of maneuvering between Land Survey, Imagery, CAD, GIS, and IT departments. But when we did come together, the results for all were spectacular.

One last story. I managed the Land Survey utility mapping and monitoring work for the Hwy 99 Tunnel under Seattle, working closely with State and the tunnel consortium Land Surveyors. When the tunnel boring machine broke down after hitting a steel encased monitoring well (okay, I just have to say it—clearly shown on the surveyed basemap), a pit was dug to repair the machine. Pumps were installed to removed groundwater accumulating in the pit. This dewatering caused the surrounding old downtown area to subside. Even a 1-inch deflection of a water or sewer pipe is disastrous, and old buildings with paltry foundations set everyone's hair on fire. I got the call at 8pm one night to assemble all survey consultant and survey staff resources for a 6am meeting. We needed to quickly assess the amount of deflection caused by the dewatering. But what was the extent of the area affected—the zone of influence? I exited the meeting and called the tunnel surveyor. He precisely described the perimeter that he had determined through his surveys. He, of course, had discovered the problem! I returned to the meeting and described the zone of influence to the team. The project engineer was astounded,

"Their surveyor told you this?"

My response, "Of course! By state law, a licensed Land Surveyor's first responsibility is to the public, not an employer, not a customer. It is our duty!" And of course, this is the same for licensed engineers.

Land Surveyors are present at the beginning of a project, providing the data for design. They are involved throughout projects to layout, stake, the design, and they are hopefully around at the end to map what was actually built. Land Surveying technology has changed and the professions that we must necessarily work with have expanded. We are up to the task. We can expand our skills to engage with—infect—other professions. To meet our duty to the public trust, we need to take a seat at other professional tables.

Karen Zollman is a business owner in Edmonds, WA. She has spent her career advocating for cadastral mapping approaches to GIS, and promoting Geospatial record keeping.



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## CALL FOR COMMITTEE MEMBERS

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ISPLS is looking for members to assist on its various committees for 2022. Below is a list of our committees with descriptions on purpose. If you would like to learn more about a committee or would be interested in joining one, contact the ISPLS office at [info@idahosppls.org](mailto:info@idahosppls.org).

### ADMINISTRATIVE COMMITTEE

- Duties include maintaining the Bylaws and Articles of Incorporation, financial administration, and ethical practice.

### EXTERNAL MARKETING COMMITTEE

- Duties include lobbying and legislation on behalf of members, interaction with national professional surveying organizations, other professional organizations, and the community.

### INTERNAL MARKETING COMMITTEE

- Duties include membership benefits and recognition, professional development, election of board members, Gem State Surveyor publication, and section support.

### EDUCATION COMMITTEE

- Duties include promoting education in schools and universities and creating scholarships to promote surveying education.

### INNOVATION COMMITTEE

- Duties include researching developing technologies and next generation surveying technologies.

### CONFERENCE PLANNING COMMITTEE

- Assist with planning future ISPLS state conferences, including the selection of topics, speakers, locations and sponsors. ☎

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## ISPLS CALL FOR PICTURES

**W**e are looking for great pictures depicting surveyors and surveying situations around the state for use on both our website and the Gem State Surveyor. The pictures have to be high quality, in a tif or jpeg file, and should not be long shots of anything (close-ups are preferred). We also need permission to use them now or in the future! Please submit to the ISPLS office at [info@idahosppls.org](mailto:info@idahosppls.org). ☎

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## ISPLS CALL FOR ARTICLES

**A**nd we are in need of surveying related articles for the Gem State Surveyor! Please submit any suggestions or articles in electronic form to the ISPLS office at [info@idahosppls.org](mailto:info@idahosppls.org).



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**IDAHO SOCIETY OF PROFESSIONAL LAND SURVEYORS**

**Approved Minutes  
Board of Governors' Meeting  
August 20, 2022**

**ISPLS Office, 408 South Eagle Road, Eagle Idaho and  
Via Zoom**

**Present:**

**In Person: Rob Stratton, Jeremy Fielding, Adam Thayer, Steve Frisbie. Liz Conner, Staff.**

**Online: Hagen Beckstead, Freddie Garcia, Tyson Glahe, Glenn Bennett, John Elle, Stewart Ward, Brian Allen, Aaron Ballard, Jerry Hastings**

Fielding opened the meeting at 9:00 AM and asked if there were any changes to the agenda.

**Motion**

Stratton moved to approve the August 20 agenda. Seconded by Thayer. Motion approved unanimously.

**Declarations of Proxy**

There were no declarations of proxy for this meeting.

**Minutes**

Conner presented the minutes of the May 14 meeting for review. Board gave corrections to Conner. Chairman Fielding amended agenda to discuss when minutes are to be published in GSS.

**Motion:**

Stratton made the motion to request Beckstead to remove current unapproved minutes of May 14 from the GSS website. Seconded by Frisbie. Motion approved unanimously.

Conner was directed to revise May 14 minutes and distribute to BOG for approval via email. Conner was directed to also send out BOG August 20 minutes by September 10 for BOG review and approval via email.

**Conference Report:**

Thayer provided a detailed review of the 2023 conference schedule. BOG is requested to contact the conference committee directly with any comments or changes. BOG directed Conference Committee to look at possible 2024 conference locations. A Treasure Valley representative is needed on the committee. Conner is to contact Aaron Ballard for names.

**Committee Reports:**

**Internal Marketing Committee - Membership update**

Ballard reported they have been working on new membership options including:

- Company Membership for up to 3 surveyors and unlimited LSITs for \$500
- Retired Members at \$25
- Corporate Sponsorship options from title companies, etc. Need to develop promotional material to do this.



## **IDAHO SOCIETY OF PROFESSIONAL LAND SURVEYORS**

Stratton will assist on marketing efforts.

The Internal Marketing committee has three members: Aaron Ballard, Rob Stratton, and Freddie Garcia.

Fielding asked the committee to present a list of proposed membership dues options as well as options for recognition of length of memberships to the BOG at the December 3 meeting.

### Gem State Surveyor

Beckstead reported the GSS is online, and the next publication is in development.

### External Marketing Committee - Legislative Committee

Hastings reported that the Basis of Bearing needs to be updated this year. He would like to have the lawbook available on ISPLS website.

The Idaho Association of Counties may be willing to sponsor the amendment to Idaho Code 50-1310 regarding filing (2nd Mylar copy issue).

Bennett is following up regarding who can prosecute those practicing without a license and will report to the BOG in December.

With the consensus of the BOG, Fielding directed the Legislative Committee to continue to move forward on these issues.

ISPLS is on the agenda for the next technical advisory committee in February.

### ISPEPLS/IDCOPL update

There was no update.

### Education Committee

Elle will head the Education Committee for the time being and will consider other participants.

### Scholarships

Thayer reviewed scholarship winners. He thanked everyone for their assistance in applicant review. For future scholarship committees, they would like to know if there are previously awarded individuals applying again. The committee recommended moving up the schedule for the scholarship applications due date to ensure more timely distribution of funds.

### Administrative Committee

#### Treasurer's Report

Frisbie announced there is \$121,154 in checking, \$84,090 in savings and the SmithBarney (scholarship) account has \$77,000.

Frisbie has moved the money from the SmithBarney account and asked the BOG for investment ideas for these funds that will best benefit the ISPLS scholarships.



## **IDAHO SOCIETY OF PROFESSIONAL LAND SURVEYORS**

### **Motion**

Ele made the motion to set up a separate account for scholarship and establish appropriate policies to manage these funds at the BOG meeting on December 3. Hastings seconded. Motion passed unanimously.

### **Standards of Practice Committee**

Allen gave an update on the Standards of Practice (SOP) Committee.

- He requested the BOG send a postcard to all ISPLS members informing them of the new SOP email and that they should be sending all surveying questions to this email and not contacting IDOPL.
- Asked that the chair of the SOP committee be an Ex Officio on the BOG so that they get all meeting notices and information.

### **Review and Update of ISPLS Policies**

Frisbie asked members to review ISPLS Policies and By-Laws for suggestions for updates to the current policies.

Ele suggested a subcommittee to review and propose updates. The subcommittee will consist of Bennett, Ele, Frisbie, and Conner.

Ele will work on a first draft and send out mid-September with the goal to provide a draft to be reviewed at the BOG meeting December 3.

### **Update of ISPLS Budget**

Frisbie reviewed the current budget and proposed that the committee needs to clean up line-items to simplify the budget for ease of review.

### **Lunchbreak**

The committee took a one-hour break for Lunch and reconvened at 1:00 PM.

### **IDOPL and On-line Law Book**

Allen reported that the current lawbook is not on the IDOPL website. Discussion occurred. The BOG would like to send a letter to the IDOPL staff concerning the need to have the lawbook and agency guidelines available on their website. Conner was directed to draft letter and distribution to BOG for review.

### **Survey**

The education survey is on hold for the time being.

### **Young Surveyors**

There was no update at this time.

### **New Business**

The BOG discussed possible updates to ISPLS By Laws. Frisbie and Conner were directed to review the By Laws and make any suggestions for update.

Frisbie is to report on the By Laws at the December 3 BOG meeting. Any updates will be reviewed then and put before the membership to vote at the annual meeting in March 2023.





**IDAHO SOCIETY OF PROFESSIONAL LAND SURVEYORS**

**Final Point Monuments**

Ward asked the committee if ISPLS wants to continue offering Final Point Monuments to families of deceased surveyors. The BOG agreed this is something the society should continue paying for these monuments.

The BOG determined the process for the Final Point Monument: When a surveyor passes, the section head of the appropriate district should reach out to families to see if they are interested in having a monument. Needed information is the name, license number and latitude and longitude. All formal requests are to go to staff to process.

This process is to be put in updated ISPLS BOG policies.

**Clarification of Voting Members**

Conner asked for assistance understanding which members of the BOG are voting members. Discussion occurred. Frisbie will reach out to attorney for clarification of the issue of Ex Officio BOG members being able to vote or not and report back to the BOG by December 3.

**ISPLS Staff Position**

Conner submitted her resignation to the BOG on July 29. Discussion of new staff selection determined that:

- Previous hiring committee from 2020 will be utilized again {Fielding, Ballard, Hastings, Frisbie, Elle}
- Ballard will chair this committee
- Update Job Description and Duties
- Timeframes for posting of job (September 13), review of applicants (September 27) and interviews (October 1)

**Old Business**

There was no old business.

**Adjournment**

The meeting adjourned at 2:40 PM.

**Next Meeting:**

December 3, 2022, T-O Engineers in Meridian [tentative].

Respectfully submitted,

Liz Conner  
Secretary ISPLS

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