



The Cornerpost

Journal of the Vermont Society of Land Surveyors
Volume 55, Number 3 | Fall 2024

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land surveyors developed
a unique form of trigonometry

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The Cornerpost

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SEND IN YOUR NEWS

The success of *The Cornerpost* depends on contributions from all of our members. Please consider submitting something for an upcoming issue. Send your articles, news and photographs to birgit@vsls.org. All ideas are welcome!



ON THE COVER

This month's cover photo comes from Daniel Boone Meeden, a land surveyor and project manager with Day Land Surveying. Boone says he took this photo in early October on the north side of Malletts Bay, as he watched the summer fade away.

Send your photo for the cover. If you've snapped a photo in your travels that you think would look good for the cover of *The Cornerpost*, please send it to birgit@vsls.org. We're always happy to feature scenes from different parts of the state.



PRESIDENT'S CORNER

FALL HAS ARRIVED IN FULL FORCE, and the business of surveying continues as I witness the first snowfall of the year at my house in Vermont. The seasons change, but the challenges of surveying and the profession of surveying remain somewhat the same even as technology changes how we perform the task.

I suppose much the same way as carpenter's job is still to build a house, even though they may be running an air nailer more than a hammer these days. Surveying is still surveying, even as the tools have become more sophisticated.

I was recently involved in measuring a bridge for clearance to pass a barge through the opening under it. This was a tight fit, and we decided to scan the bridge with a high-end Leica P series stationary scanner with a long range. As we worked through the problems associated with the scanner, it got me wondering how this task would have been accomplished before the scanner was invented. Modern technology like the scanner has made things easier as well as harder.

I talk often of the struggles to hire in the survey profession, as there aren't enough people going into the industry. I've tried to encourage younger people to get involved and to explore surveying as a profession. One of the rewarding aspects of surveying that I often talk about is all the cool places I've been and seen in the pursuit of measuring stuff. What I haven't talked about as much is all the cool people I've crossed paths with in this profession.

I work for a larger company now and I've been exposed to survey offices in other states, and I recently did some training with the field staff out of our NYC area. I found myself standing in a parking garage running a traverse with two Egyptians, a Polish man, and an Italian, among others. The Italian was speaking to me in his native

language about the figure of the traverse that a college had laid out; I don't understand a word of Italian, but the hand motions seemed clear. "Google Translate" to the rescue and by God the art of surveying is the same in Italy as it is in Vermont, which put a smile on my face.

"One of the rewarding aspects of surveying that I often talk about is all the cool places I have been and seen in the pursuit of measuring stuff. What I haven't talked about as much is all the cool people I have crossed paths with in this profession."

The struggle to hire has brought me to experience new pieces of equipment from survey rods that don't need to be level, to mobile scanners. As people failed to go into the industry, technology filled the gap, leaving us as professionals to learn the technology as well as put on classes to pass on the knowledge that we have. Much of the experience we learned surveying with old fashioned total stations holds true even with newer technologies like the scanner.

With that in mind, it was good to get together with other surveyors at the Fireside Inn in West Leeb for our September conference. I look forward to the upcoming virtual webinar in December as well. Stay safe over the winter and, please, pass on the art of surveying! 🌲

Randy Otis, LS

VSLs PRESIDENT

**thank
you!**

I would like to extend a heartfelt thanks to **Becky Gilson, LS**, for serving on the VSLs Executive Committee for many, many years. Becky's work and home life are demanding more of her time these days, so she will be stepping down in December. Luckily, **Chris Haggerty, LS**, will be stepping up to fill her position. Thank you both for serving!



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NSPS News



Gayle Burchard, left, at New Mexico's Petroglyph National Monument. Above, a few petroglyphs she saw on her hike.

THE NSPS FALL BUSINESS MEETING

was held October 21–23 in Albuquerque, New Mexico. Committees met on Monday and Tuesday, and the Board of Directors meetings were Tuesday afternoon and Wednesday morning. Below are some of the highlights of NSPS's work from April to October 2024, as reported by Tim Burch, our Executive Director.

NSPS participated in a number of professional conferences, including: Esri online seminar series; Esri user conference in San Diego; NCEES annual meeting in Chicago; GeoGov conference in Sterling, Md.; FSMS annual conference in Orlando; and TSPS annual convention in The Woodlands, Tex. Tim Burch and Linda Foster (NSPS president-elect) attended the Senior Executive Summit and were panelists for the NGS modernization briefing. Linda Foster hosted several webinars on several GIS and surveying topics.

On the workforce development front, NSPS exhibited at the ASCA Annual Conference in Kansas City, and the NSPS Military Committee exhibited at several career fairs.

Government Affairs reviewed several lawsuits challenging changes to Davis-Bacon Act, along with proposed federal legislation to ban DJI UAV equipment and software. They also looked at licensing lawsuits that may be headed to the US Supreme Court and coordinated with NGS for the NSRS modernization program in 2025.

The NSPS Foundation is currently forming new funds for student and young surveyor scholarship and grant opportunities, along with creating opportunities for project grants. On the financial side, NSPS expanded its sponsorship program to include state associations and individuals, and they've looked to streamline budgeting and reporting.

NSPS Education provided a four hour webinar on ethics for the Texas Society of Professional Surveyors and a one hour webinar on the CST Program for the Pennsylvania society. They participated in forming an NSPS Speaker's Academy subcommittee, and they're drafting content to assist developing new speakers. They also coordinated with Consulting Surveyors NSW in Australia to develop a business academy, established a new partnership with Geo-Learn to cross-promote courses and professional topics, and Land Surveyors United to promote online courses and tools. They are continuing a course review service to endorse surveying-based sessions for CEUs at Trimble Dimensions.

NSPS Social Media produced Episodes 181-200 of "Surveyor Says! The NSPS Podcast," created a CST program page on LinkedIn for targeted content, and met with USACE Baltimore District for an update on surveying efforts at Key Bridge. 🌐



Next Up for NSPS

- National Surveyors Week
March 16-22, 2025
- Spring Business Meeting
March 17-21, 2025
Silver Spring, MD

How ancient Babylonian land surveyors developed a unique form of trigonometry — 1,000 years before the Greeks.



Above, this stone tablet records the restoration of certain lands by the Babylonian king Nabu-apla-iddina to a priest. Babylonian, circa 870 BCE. — *Sippar (Tell Abu Habbah)* Wikipedia

Our modern understanding of trigonometry harks back to ancient Greek astronomers studying the movement of celestial bodies through the night sky. But in 2017, I showed the ancient Babylonians likely developed their own kind of “proto-trigonometry” more than 1,000 years before the Greeks. **So why were the Babylonians interested in right-angled triangles? What did they use them for?** I have spent the past few years trying to find out. My research, published today in *Foundations of Science*, shows the answer was hiding in plain sight.

The nature of land ownership changed during the Old Babylonian period, between 1900 and 1600 BCE. Rather than large institutional fields, smaller fields could now be owned by regular people.

Si.427

Many thousands of clay tablets have been retrieved from the lost cities of ancient Babylon, in present-day Iraq. These documents were preserved beneath the desert through millennia. Once uncovered they found their way into museums, libraries and private collections.

One example is the approximately 3,700-year-old cadastral survey Si.427, which depicts a surveyor's plan of a field. It was excavated by Father Jean-Vincent Scheil during an 1894 French archaeological expedition at Sippar, southwest of Baghdad. But its significance was not understood at the time.

It turns out that Si.427 — which has been in Turkey's İstanbul Arkeoloji Müzeleri (İstanbul Archaeological Museums) for several decades and is currently on display — is in fact one of the oldest examples of applied geometry from the ancient world. Let's look at what makes it so special.

A brief history of Babylonian surveying

The ancient Babylonians valued land, much as we do today. Early on, large swathes of agricultural land were owned by institutions such as temples or palaces. Professional surveyors would measure these fields to estimate the size of the harvest. But they did not establish field boundaries. It seems those powerful institutions did not need a surveyor, or anyone else, to tell them what they owned.

The nature of land ownership changed during the Old Babylonian period, between 1900 and 1600 BCE. Rather than large institutional fields, smaller fields could now be owned by regular people.

This change had an impact on the way land was measured. Unlike institutions, private landowners needed surveyors to establish boundaries and resolve disputes. The need for accurate surveying is apparent from an Old Babylonian poem about quarrelling students learning to become surveyors. The older student admonishes the younger student, saying:

“Go to divide a plot, and you are not able to divide the plot; go to apportion a field, and you cannot even hold the tape and rod properly. The field pegs you are unable to place; you cannot figure out its shape, so that when wronged men have a quarrel you are not able to bring peace, but you allow brother to attack brother. Among the scribes, you (alone) are unfit for the clay.”

This poem mentions the tape and rod, which are references to the standard Babylonian surveying tools: the measuring rope and unit rod. These were revered symbols of fairness and justice in ancient Babylon and were often seen in the hands of goddesses and kings. Babylonian surveyors would use these tools to divide land into manageable shapes: rectangles, right-angled triangles and right trapezoids.

Earlier on, before surveyors needed to establish boundaries, they would simply make agricultural estimates. So 90° angles back then were good approximations, but they were never quite right.

Above, Si.427 shows a surveyor's plan of a field. Provided by the author.





Plimpton 322, a 3,700-year-old Babylonian tablet held in the Rare Book and Manuscript Library at Columbia University in New York.

The Old Babylonian

cadastral survey Si.427

shows the boundaries

of a small parcel of land

purchased from an individual

known as Sîn-bêl-apli.

Right angles done right

The Old Babylonian cadastral survey Si.427 shows the boundaries of a small parcel of land purchased from an individual known as Sîn-bêl-apli.

There are some marshy regions which must have been important since they are measured very carefully. Sounds like a normal day at work for a Babylonian surveyor, right? But there is something very distinct about Si.427.

In earlier surveys, the 90° angles are just approximations, but in Si.427 the corners are exactly 90° . How could someone with just a measuring rope and unit rod make such accurate right angles? Well, by making a Pythagorean triple.

A Pythagorean triple is a special kind of right-angled triangle (or rectangle) with simple measurements that satisfy Pythagoras's theorem. They are easy to construct and have theoretically perfect right angles.

Pythagorean triples were used in ancient India to make rectangular fire altars, potentially as far back as 800 BCE. Through Si.427, we now know ancient Babylonians used them to make accurate land measurements as far back as 1900 BCE.

Si.427 contains not one, but three Pythagorean triples.

Crib notes for surveyors

Si.427 has also helped us understand other tablets from the Old Babylonian era.

Not all Pythagorean triples were useful to Babylonian surveyors. What makes a Pythagorean triple useful are its sides. Specifically, the sides have to be “regular”, which means they can be scaled up or down to any length. Regular numbers have no prime factors apart from 2, 3 and 5.

Plimpton 322 is another ancient Babylonian tablet, with a list of Pythagorean triples that look similar to a modern trigonometric table. Modern trigonometric tables list the ratios of sides (sin, cos and tan anyone?).

But instead of these ratios, Plimpton 322 tells us which sides of a Pythagorean triple are regular and therefore useful in surveying. It is easy to imagine it was made by a pure mathematician who wanted to know why some Pythagorean triples were usable while others were not.

Alternatively, Plimpton 322 could have been made to solve some specific practical problem. While we will never know the author's true intentions, it is probably somewhere between these two possibilities. What we do know is the Babylonians developed their own unique understanding of Pythagorean triples.

This “proto-trigonometry” is equivalent to the trigonometry developed by ancient Greek astronomers. Yet it is different because it was developed in response to the problems faced by Babylonian surveyors looking not at the night sky — but at the land. 🌍



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SURVEYORS IN DEMAND

An exercise in public relations

BY TIM BURCH, NSPS
EXECUTIVE DIRECTOR

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WE LIVE IN AN AGE where everything is expected to be instantaneous and have our needs met within our short attention span of self-gratification. Because of technological advances borne from measuring and positioning systems surveyors use every day, the world around us has brought literally everything to our fingertips.

Groceries and household goods? Instacart. Takeout food? DoorDash. Need a ride? Uber. Handyman services? Angi. Everything else? Amazon. All these companies/apps share a common bond of location-based services, and they put the power of summoning them to your door within the confines of your cellphone.

The lack of flying cars aside, have we truly reached the age where civilization looks like “The Jetsons” cartoon from the early 1960s? (The show is supposed to take place in 2062, so flying cars could still happen.) The advancement of technology has placed an expectation of nearly every service into one’s immediate availability and need, with an added twist of non-

personal communication as the conduit for establishing your service request.

Other than the location-based information, what does this have to do with surveying? Everything, so let’s dive a bit deeper into today’s business environment.

At left, you’ll see a box that details the “problems we face” as land surveyors — that is, the preconceived notions held by the public about our work. Before diving into what the typical NSPS staff rebuttal is to these notions, let’s examine a few other professional services and businesses for reference to our situation. When is the last time you cold called a personal service provider (doctor/dentist/optometrist/attorney) to inquire about an appointment? Do they return your calls and/or emails?

If you are fortunate enough to have them pick up the call, what are their timeframes? Do you get a range of fees? How do you know if the fees are competitive? Same goes for an architect or engineer; how do you evaluate their cost estimates and lead times?

How about a contractor for a non-emergency service or project? If they give you a reasonable timeframe, how do you evaluate their cost estimates for your project? They might not have professional licenses or certifications, but they do perform a service that involves significant cost and coordinated timeframes.

The simple answer is the public does not place the professional surveyor in the same high standing as these services. Each of these professions are seen through the eyes of the public as professionals, whereas the professional surveyor is still seen as a tradesman who performs a menial service typically required by necessity.

“By increasing our communication with the public and helping them to understand the impact of surveying on the world around us, we can raise the professional profile of the surveyor.”



PROBLEMS WE FACE

Here at the National Society of Professional Surveyors (NSPS), we constantly field calls, emails, and social media messages from potential surveying clients who think we are going to put them in touch with someone to serve their needs. The general context of the message goes like this:

- I only need a “simple” land survey.
- Why do I need the survey anyway?
- Most surveyors will not answer a phone call or return email.
- If they do, the time frames are “outrageous” (ranging from four weeks to six months).
- The fees are ridiculous and many times what my attorney or realtor says they should be.
- Is there any way I can do this myself?

The common ground

What do all these professional and construction services have in common? They all lack the necessary number of workers to meet the demands of the public, who have become accustomed to instantaneous response and satisfaction, all at reasonable pricing. In many places throughout the U.S., the scarcity of a professional surveyor is obvious.

The surveying profession has also been afflicted with several factors that has set it back for decades. For example, surveying practitioners who have provided their services with low profit margins have kept the normal standard of price expectancy below the actual value of the service rendered. Also, attorneys and real estate agents have provided opinions of survey pricing to prospective clients that establish an artificially low value of our services. Finally, there is a lack of professionalism by some surveyors in conducting their services, which reflects poorly on us all.

Another factor that has influenced (and lowered) the importance of the professional surveyor is the decreased cost for purchasing equipment and software for performing survey-related tasks. This situation has led to expanded usage of GNSS through handheld devices and cellphone technology by non-surveyors. The public's perception is that anyone can find property markers with a low-cost metal detector in conjunction with publicly available GIS information to perform their "survey," so why pay a professional to do it?

By increasing our communication with the public and helping them to understand the impact of surveying on the world around us, we can raise the professional profile of the surveyor. The goal of our practitioners should be to elevate the value and respect of the profession, but we must do our part to earn those characteristics from the public we serve. While the surveyor might not be seen as a potential lifesaver like a medical professional, the services we provide do directly affect how our clients interact and function in their daily lives. We simply need to become better storytellers of who we are and be greater advocates for our professional services.

There is an adage that states: "The best time to plant a tree was 20 years ago. The second best is now." If we start planting those survey "trees" now, the sooner we can become the trusted profession the public needs us to be. 🌳



Keith Van Iderstine, LS, talks to students about surveying at the Crossett Brook Middle School Career Fair in 2023.

EDUCATING THE PUBLIC

Rather than continuing with the status quo of blindly turning our clients away with unexpected timeframes and costs, we need to build upon a forward-thinking strategy of educating them on the value of surveying by a professional. Here are some key strategies to consider when corresponding with clients:

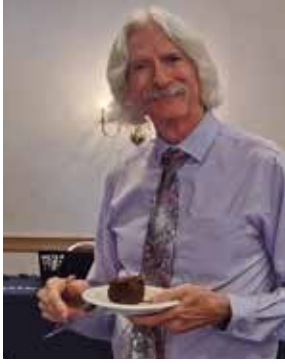
- Create a compelling narrative: develop a story that highlights the value and impact of the profession.
- Understand their needs: why do they need a survey? what information are they seeking? what are their pain points?
- Interact with your audience: respond to comments and messages promptly.
- Address misconceptions: correct inaccurate information about the field.
- Consistent messaging: ensure all communication aligns with the brand identity.
- Identify key demographics: who needs to know about your profession? students, job seekers, potential clients, or the public?
- Tailor your message: create content and messaging that resonates with your target audience.
- Highlight success stories: showcase the positive impact of the profession.
- Open houses: invite the public to learn about the profession firsthand.
- Webinars and workshops: offer online and in-person events to share knowledge about our profession.
- Collaborate with other professionals: build partnerships within the industry.
- Offer mentorship opportunities: connect experienced professionals with aspiring ones.
- Leverage employee advocacy: encourage employees to share their experiences.




VSLs FALL CONFERENCE 2024

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A man in a black jacket is standing in a forest, looking down at a surveying instrument mounted on a tripod. He is holding a smartphone in his left hand. The background is a dense forest with tall trees and green foliage.

Why professional surveyors should have a role in reviewing the courses and content for surveying education programs.

Professional Partnering with Surveying Programs

BY KNUD HERMANSEN, PLS, PE, PHD, ESQ.

THIS IS THE TENTH ARTICLE I have prepared in the series offering thoughts on professional practice and education. In this article I advocate for a close partnership between professional members and the regional or state surveying programs.

In preparing this article, I draw on over 30 years of teaching in surveying studies. I have taught at Penn State University, University of Maine, Florida Atlantic University, and Florida State University. Each is different. All have strengths and weaknesses. With more than 50 years of practice, I have been a member of several state professional societies and national professional societies. I have maintained active professional consultation throughout my careers as an educator and military member.

I begin with the premise that I believe a surveying program should be a professional program. By professional program I mean a program that offers a focused education providing graduates with skills that are both practical and applicable - a program that pointedly leads to a career as a licensed professional. Examples of other professional programs at the bachelor of science degree level include nursing, accounting, and engineering.

I believe the focus of a survey program is to provide skilled graduates able and willing to enter the profession of surveying and take on typical surveying services soon after graduation. I strongly believe the graduate of a surveying program should be knowledgeable enough to begin practicing with competency in the profession of surveying upon graduation. The graduate should have the skill set to provide an employer with knowledge and efforts that will be profitable for the employer's business.

In previous articles, I have spoken about faculty qualifications so I will not speak in depth on that topic in this article. Suffice to say that knowledgeable, experienced, and qualified faculty are not always able to stay abreast of what an employer would prefer that a graduate should know and possess. Many faculty lack practical knowledge while often excelling in research knowledge. Yet, it is the practical knowledge that is much more important to the employer than cutting edge research knowledge. The reason for this disparity in faculty focus is not necessarily the faculty member's fault. University administrators are apt to focus their attention and efforts on increasing the money flowing into the university rather than upgrading the knowledge of graduates leaving the university. For state institutions, much emphasis is placed on obtaining

research grants. Faculty promotion and tenure is often tied to research dollars. Hence, faculty focus their efforts on research rather than practice.

In order that students be taught practical and applicable knowledge, there should be a consistent and constant assessment of program courses, course content, and suggested course requirements. This assessment should be done by knowledgeable practitioners of the surveying profession. For ABET accredited programs, this is often done by an advisory committee mandated by ABET continuous assessment requirements.

Participation in this advisory committee is usually done by invitation of the program faculty. I will suggest that faculty invitations are not always sent to practitioners best able to assess or improve the program content for practical, relevance, and current knowledge. Many are the committees I have seen that seem to be composed of mostly alumni and retired faculty from the program. This makeup of an advisory committee is like asking grandparents, cousins, nieces, and nephews to look for faults in the family tree that are to be made public.

In my experience, an advisory committee composed of practical and knowledgeable members usually provides a great deal of good, practical advice. The added bonus is that members can be strong outside advocates of the surveying program when the program seeks donations or is thwarting attempts by the university administration to eliminate or modify the program into something useful for the administration but not necessarily for the program, the profession, or employers.

A second method of assuring relevant and practical education of the surveying student is to assess and improve the success rate of students and graduates that take the fundamentals of surveying exam. I believe NCEES does a credible job of keeping the contents of the exam consistent with current practice due in large part by relying on licensing board members and professional input. However, if a program does not require students take the fundamentals of survey exam or use the exam scores for program assessment, this valuable source of assessment is wasted.

A much less effective manner of assuring relevant and practical education of the surveying graduate is through ABET program accreditation. By not fully lauding and embracing this avenue, I do not wish to discourage a program from seeking and obtaining accreditation or disparage ABET accreditation. The program content guidance available under common disciplines listed within ABET looks at a macro view of the surveying studies rather than a micro view of professional needs. As an aside, I am not going to argue or encourage ABET take on a micro view by discipline. Rather, I wish to make a point that ABET accreditation does not ensure the program necessarily offers a relevant and practical education sought by the typical employer within the profession. The criteria that ABET accredited programs undergo continuous

improvement and periodic assessment, often with the aid of an advisory committee, can help considerably with relevant and current knowledge if the assessment is taken seriously and aid sought from the profession through advisory committee members. I hope to write more about the benefits and limitations of ABET accreditation in another article.

Having given my opinion, I would suggest that yearly evaluation of program courses and course content be done by a committee composed of members of the profession. The committee should take on the role of friendly guidance – much like the bride's mother for her daughter's wedding. Then again, I may have used the wrong example given stories I have heard about the weddings of others where mothers went way beyond friendly guidance. I shall refine my parallel by adding so long as the bride's mother is not allowed to take over the planning of the wedding itself.



"I strongly believe the graduate of a surveying program should be knowledgeable enough to begin practicing with competency in the profession of surveying upon graduation."

Let me give some advice in detail. I think a committee is best composed of at least one active member of the state surveying profession that is supporting the program such as the immediate past president of the state society. If the surveying program is a regional program, a member from each state should be sought. Another member should be a current licensed member of the state surveyor licensing board.

All other members of the advisory committee should be employers or likely employers of the graduates from the program. Large multi-disciplinary firms and small firms should be well represented. Public and private sector employers should be represented as well. Donors or potential donors to the program should be welcomed as members. Someone that is willing to back their advice with donations are to be actively sought. For example, including a member that is an equipment supplier that generously donates up-to-date equipment to the program would be wise.

Some may fault the perception I have just 'painted' that membership on the committee can be bought. I would wink and nod while countering with a Jewish saying that: "Life's not as good with money as it is bad without it." Let me state the intention of this Jewish saying in other terms, "A program that brings money to the university is less likely to be eliminated than a program that costs the university money." 🕍

Some Land Records Research Aspects of Vermont Land Surveying

BY PAUL BIGELOW, 1973

For 200 years, farmers, storekeepers, lumberjacks, lawyers and other equally unqualified persons have been filling Vermont land records with incomplete descriptions of land being transferred.



Paul Bigelow, VT LS #24, was a land surveyor, a professional engineer, and an active member of our Society. This is the second of two articles he wrote in the 1970s for the benefit of his fellow surveyors.

George Butts, VT LS #11, provided comments at the time these were published, and these are indicated with bracketed numbers and can be found on page 21.

Many of these transfers, including ones representing new subdivisions, were made without benefit of any survey or durable monuments or measurements of distances and directions between corners. This means that a long monotonous record search is apt to result in a vague and almost useless (occasionally completely useless) description.

This is not to deny the necessity and importance of record searching as part of a survey, rather it is to emphasize that extra work and patience will be required of the Vermont land surveyor in attempting to determine the intent of the parties who originally established the subdivision or subdivisions which are the subject of the research.

For the purpose of this discussion an “original subdivision” will mean the first separation from an identifiable larger parcel (often an original town lot) of the whole or any part of the land which is the subject of the research. The intent of the parties, the parties being the grantor and grantee involved in the “original subdivision,” is very important; it is in fact what you are attempting to determine by your record research.

If the description is ambiguous as to the intent, the ambiguity can sometimes be resolved by evidence found on the ground and sometimes by a record search of adjoining subdivisions, or both. [1] Such a search of adjoining should always be made whenever the description of a boundary is in substantial conflict with evidence on the ground or whenever there is a probability of a lawsuit.

Most record searches involve several original subdivisions and each subdivision may have been transferred intact several times, sometimes with the description repeated each time. Many times mistakes were made in copying or words were added or omitted which changed the meaning. Thus the desirability of going back to the original subdivision description.

To cite an extreme case: A description called for the northerly one-half of a certain original town lot. Ninety-nine times out of a hundred this would have meant the town lot had been divided into approximately equal parts by a line parallel with original lot lines. There was no evidence on the ground in this case to support that supposition and a search of the previous transaction disclosed that the original subdivision was all of the lot northerly of a brook, which happened to involve approximately one-half of the lot area.

Another reason for getting back to the original subdivision description exists whenever a magnetic bearing is involved because the necessary correction for change in declination is dependent on the date of the original subdivision survey. [2]

Many descriptions, old and new, contain glaring technical errors due to ignorance by the writers of what is actually on the ground or of

elementary geometry or both. Any two lines which visibly intersect are often described as forming right angles and any two lines which do not are called parallel. Angles are often not specified as to interior, exterior, or deflection. One lawyer, writing a deed description, called for turning “interior angles to the right” and “alternate angles to the left.” The basis of bearings is seldom noted, even by surveyors.

The novice record searcher will need to familiarize himself with the history of the lotting subdivisions of Vermont towns and with terms used in early descriptions. Some of these terms and their meanings follow. A compass bearing followed by the phrase “as the needle now points” indicates that the bearing was magnetic as of the time of survey and was read on a compass which did not have a declination correction set off on its declination vernier. [3]

“In the range with” means in the projected line of. “East 32° South” is the same as “South 58° East.” A moosewood is a striped maple. A saddle is a small tree. “First division,” “second division,” etc.; “after division”; “undivided land”; “pitched land”; “pitching rights”; “survey bill”; “original rights”; “public lot”; “lease lot”; “governor’s right” are terms which will be explained in the following discussion of the typical original surveys of a Vermont town, being especially typical of a Hampshire Grant made by Governor Benning Wentworth before Vermont became an independent country.

The typical grant was made to approximately sixty original grantees and called for “six miles square and no more” as per charter but as surveyed was seldom square and usually exceeded six miles on each side. [4]

The original grantees, or original proprietors as they were called after the

grant was made, held proprietors meetings in Massachusetts or Connecticut or wherever they lived and organized their Vermont town by electing officials and then collected taxes and eventually sent a party of surveyors to lay out the town boundaries and the first division of lots, which might typically consist of 65 lots of 100 acres each. They also laid out 500 acres in one corner for the “Governor’s Right”, said right having been reserved for himself by Governor Benning Wentworth in his original charter to the proprietors.

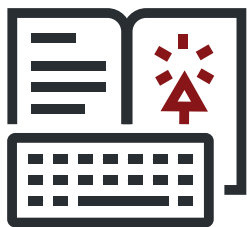
If a river formed one boundary of a town, the first division of lots usually fronted on the river. The surveyors numbered the lots and presented a map of them to the proprietors. Each proprietor and a representative of each “public right” drew a lot number by lot to determine who got which lot in the first division.

The public rights usually consisted of some combination of the following: a school right, meaning a town graded school; a grammar school right, meaning a county school which would now be called a high school; a college right; a glebe right, glebe meaning church land; a right for the first settled minister and a right for the missionary branch of the Church of England called “The Society for the Propagation of the Gospel in Foreign Parts” and whose rights were later transferred to the Episcopal Diocese of Vermont and some of whose lands were later sold outright to the lease holders. [5][6]

Representatives of the public rights sold, or gave, perpetual leases to their so-called “lease lots,” subject to an annual rent. For many years the lease holder paid no tax on the lease or the



Benning Wentworth was the governor of New Hampshire from 1741 to 1766. He is known for issuing several land grants in territory claimed by the Province of New Hampshire west of the Connecticut River, which led to disputes with the neighboring colony of New York and the eventual founding of Vermont.



“Most record searches involve several original subdivisions, and each subdivision may have been transferred intact several times, sometimes with the description repeated each time. Many times mistakes were made in copying, or words were added or omitted which changed the meaning. Thus the desirability of going back to the original subdivision description.”

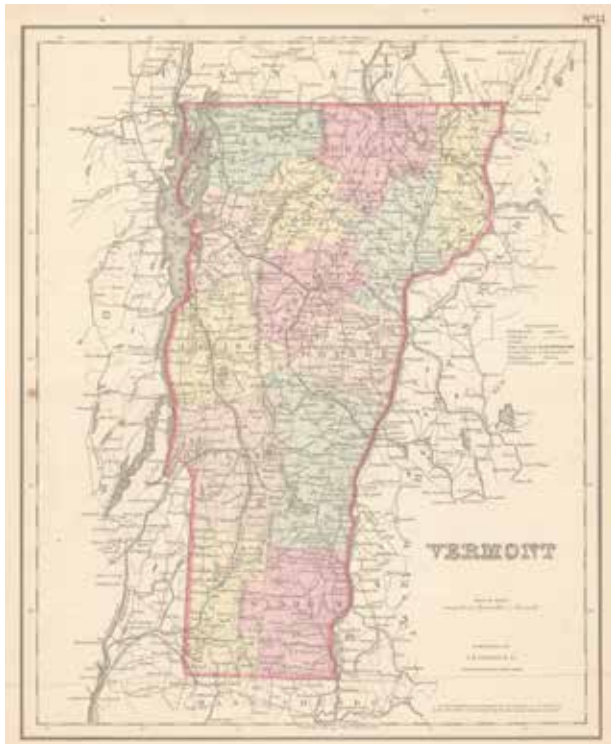


“Every record search should include a review for thirty to fifty years back of all transactions by all parties in the line of title during the period of their ownerships of the subject land, to see if parcels or easements were acquired or sold without its being mentioned in subsequent transactions.”

leased land but now the lease is taxed according to the appraised value of the land and the town handles the lease rents. Technically lease land should not be conveyed by warranty deed. [6]

At later intervals the proprietors had second and third divisions surveyed and the lots distributed to the original proprietors and public corporations in the same manner as the first division. The surveyor, in choosing the locations for the three divisions, often deliberately avoided the most mountainous and therefore the least desirable land. These lands, sometimes contiguous and sometimes scattered, were known variously as the “after division,” “undivided land,” or “pitched land.”

Each original proprietor, and in some towns each public corporation, could enter this undivided land and have surveyed his proportional share of its total area. This was called a “pitch” and it could be made in any shape desired and in any part of the undivided land as long as it did not interfere with previous pitches. A proprietor who did not wish to pitch could sell to others his original right to pitch. [7]



The term, “original right of John Doe in the second division” would refer to the lot which the original proprietor, John Doe, drew by lot in the second division, whereas “the original right of John Doe” might refer to his pitching right only. There was no original deed or grant of a pitch. The pitch was recorded in the land records as a “Survey Bill” which was a description of the land pitched and usually included the date of the survey, the names of the surveyor and of the party claiming the land and the “Original Rights” used to make the pitch.

Some towns had only one division of lots and some had more than three, and original lot sizes varied in different towns and in different divisions in the same town. Different towns have different combinations of the public rights and some have none. Many towns had no undivided land and many, including of course all of the Vermont Grants (that is towns granted by Vermont during the period it was an independent country), had no Governor’s Right.

Many recorded transfers do not cite any metes and bounds but only refer to previous deeds such as “being all and the same land conveyed by John Doe to the grantor on December 12, 1872.” This situation calls for use of the general index to find the book and page of the previous description. Some records may read “all that John Doe died seized and possessed of.” This calls for use of the general index to find all of John Doe’s land transactions during his lifetime so the searcher can subtract what he sold from what he bought to determine what was left at his decease.

Extra care must always be taken when a line of title includes an estate as many administrators and executors failed to search the records carefully and either included in their sales parcels previously sold by the deceased or sometimes overlooked parcels owned by the deceased. [8]

Regarding indexing: The record of a sale or purchase of land by an executor, administrator or guardian may be indexed under the name of said agent and not indexed at all under the name of the actual owner. Church transactions may be indexed under the names of the church’s trustees and town transactions under “S” for “Selectmen of” or “T” for “town of” or according to the name of the first selectman. [9] Another stumbling block is that the land records do not reflect a change in the name of a corporation. Thus a sale by ABC Corporation might

be made of land bought by XYZ Corporation with no recorded transfer by XYZ to ABC.

Every record search should include a review for thirty to fifty years back of all transactions by all parties in the line of title during the period of their ownerships of the subject land, to see if parcels or easements were acquired or sold without its being mentioned in subsequent transactions. This is especially important whenever evidence on the ground is vague or does not reasonably conform with the recorded descriptions.

Every record searcher should keep in mind that no one can sell, even by warranty deed, land or easements he does not own. This means the searcher must attempt to determine beyond a reasonable doubt what part or parts of the land purportedly conveyed by the conveyance under investigation was actually owned by the grantor. This determination must be based ultimately upon the intent of the parties involved in each “original subdivision” as that intent is evidenced by the pertinent land record descriptions. [10] 🌐

EDITORIAL COMMENTS

Comments by George Butts, 1987

These footnotes have been added by the editor to clarify some points, to add additional information and to indicate some of Paul's practices that have been helpful to the editor.

- [1] Ambiguity may also be resolved by parole evidence, by special knowledge obtained by the investigator, and other types of extrinsic evidence.
- [2] As with most rules, there is an exception. We have seen original subdivisions where the magnetic bearings given were not referred to the needle at that date, but were referred to the record bearings of the lot and range lines.
- [3] Though this is generally true, in the words of William C. Wattles mentor of Curtis M. Brown, “the contrary may be shown.” Local custom may be such to make this otherwise. One example where this is not true is explained in No. 12 above. Other exceptions occur. “By the needle” is not the same as “as the needle now points”.
- [4] Most of the Wentworth Charters also read “...out of which an Allowance is to be made for High Ways and unimprovable Lands by Rocks, Ponds, Mountains and Rivers, One Thousand and Forty Acres free, ...”
- [5] For a complete dissertation of Vermont lease lands see *The Vermont Lease Lands*, Walter Thompson Bogart, 1950. Paul states that this book “should be required reading for every Vermont surveyor.”
- [6] Before 1935 the public corporations could not deed the fee to their lands (excepting the first settled minister). In that year 24 V.S.A. Section 2406 was passed enabling the corporations to convey the fee under certain conditions.
- [7] The early settlers had several other meanings for the word pitch. Among others, when a settler was discovered that had built the required house and had the required area cleared and under cultivation, but had no legal title to the land, the proprietors granted or ‘pitched’ him a right. Of course, this helped them perfect certain stipulations in the charter, as to buildings erected and acres under cultivation.
- [8] A very important item pointed out by Paul. If a mix-up occurred, look behind the conveyances out of an estate.
- [9] Another very important item. Peter Chase once located a key church deed indexed under L in the Grantee index for “Ladies of the Community Church.” The grantor was an officer of the corporation that actually owned the land.
- [10] Surveyors should read this paragraph very carefully and perhaps even memorize it. A majority of the boundary problems we have investigated would not have occurred if all surveyors involved understood what Paul says here.

To view “The Bigelow Papers” in their entirety, use your phone to scan the QR code.



Random Notes

MEETING SCHEDULE

DATE: December 14, 1984

PLACE: The Windjammer Restaurant, South Burlington. It is on the northerly side of Rout 2 (Williston Road) just east of the Interstate Cloverleaf.

AGENDA:

- 10:00 — Committee Meetings
- 12:00 — Lunch, open menu, (We need at least 30 people or we will have to pay a fee for the use of the meeting room.)
- 1:30 — General Meeting:
Ted Greensmith will present a suggested Public Relations program for the VSLs. The program is designed to increase public awareness of our members, as well as define and achieve the long range goals of our Society.

Guest Speaker — Dr. Fred Larsen.
Dr. Larsen is professor of Earth Sciences at Norwich University. He will be speaking on the formation of Lake Hitchcock. A prehistoric lake that geomorphologists have figured out filled the Connecticut River Valley all the way from Rocky Hill, Conn. to West Burke, VT.

*** Please bring your wives or girlfriends along. Should they not care to attend the meeting there are several shopping malls close by.

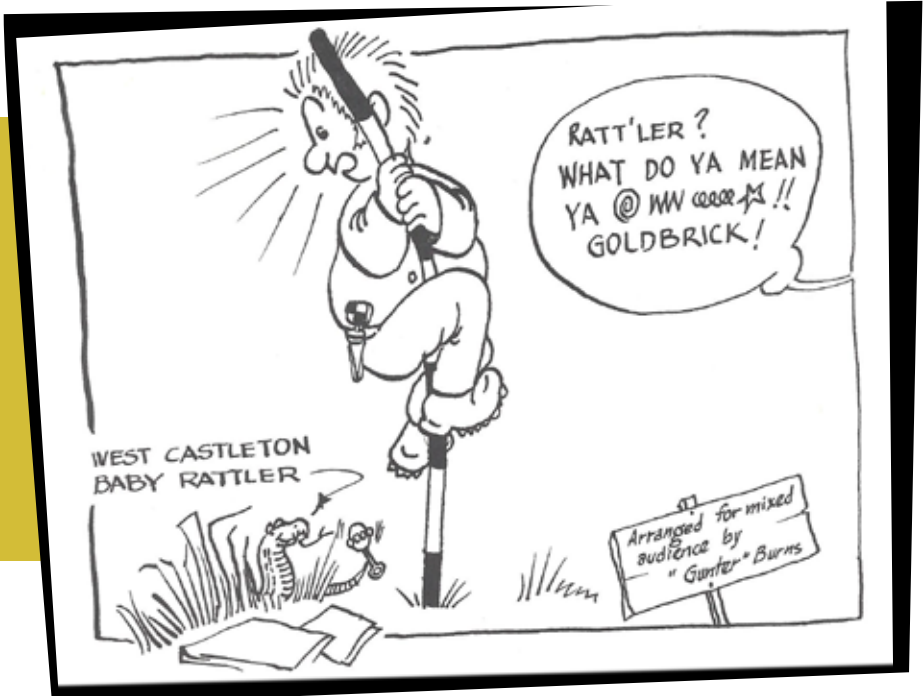


CHANGING TIMES

Mike Magoon, LS, sent in this agenda from the December 1984 VSLs conference, which was advertised in *The Cornerpost* at that time. "How 40 years just flew by," he remarked.

RATTLESNAKE IN THE GRASS

This cartoon appeared in the August 1973 issue of *The Cornerpost*: volume #3, Fall issue. Thanks to Harris Abbott, LS, for sending it in.





COLOSSAL CANOPY

This impressive oak tree was shading a meadow in Ferrisburgh when Seamus Collar, a survey technician at Latitudes Land Surveying, came upon it. Seamus saw the behemoth while wading through a beaver pond to get to Lewis Creek. "I was locating ordinary high-water on half a mile of creek, east to the Lewis Creek Fish and Game access area," he said. You never know what you'll see when you're out in the field!

July 25, 2024 • 6:00 p.m. • Google Meet

The meeting was called to order at 6:09 P.M. In attendance were Randy Otis, Lisa Ginett, Paul Hannan and our Administrator: Birgit McCall. Absent: Nate Yager, Keith Van Iderstine, Becky Gilson and Mark Day.

Secretary's Minutes

Minutes for the Executive Committee meeting for May 16, 2024 were unable to be approved due to lack of a quorum.

Treasurer's Report

The treasurer's report for the period of January 1 to July 23, 2024 was given by Birgit as Keith was unable to attend this meeting. Total income for period of the report was \$38,415.84, total expenses were \$26,788.32, for a net income of \$11,627.52. Cash on hand balance is \$19,050.53.

Administrator's Report

Birgit reports that we have received donations of \$290.00 for the Education Fund, and \$280.00 each for the General and Survey Preservation Funds. The fall conference will have seven sponsors, five of which will participate in tech time demos. Registration for the conference will open next week. The winter seminar will be in person (though it was initially agreed that the winter seminars would be online due to difficulty in travel in December) and will be held in Burlington.

The spring conference will be a two-day conference held jointly with the New Hampshire Land Surveyors Association at the Hilton Garden Inn in Lebanon, New Hampshire. Birgit informed us that two vendors — Sebago and Topcon — had dropped their in print ads in "The Cornerpost." This of course means less revenue to support the magazine. However, Topcon will be attending the fall conference. She also mentioned that it costs approximately \$ 20.00 per member to print and mail "The Cornerpost" to members annually.

Other Business

We briefly discussed the fact that no one has applied for the Education Foundation Scholarship for the past five years. Birgit sends out notices to Alfred State, ESF.edu, Orono and NJ Institute of Technology, as well as VTC through an administrative person (though that person is not in surveying). The recipient must be studying at an ABET-accredited school.

There being no other business the meeting was adjourned at 6:34 PM

Respectfully submitted,
Lisa Ginett, VSLs Secretary

August 19, 2024 • 6:00 p.m. • Google Meet

The meeting was called to order at 6:09 P.M. In attendance were Randy Otis, Keith Van Iderstine, Lisa Ginett, Becky Gilson and our Administrator: Birgit McCall. Absent: Nate Yager, Paul Hannan and Mark Day.

Secretary's Minutes

Minutes for the Executive Committee meeting for May 16, 2024 and July 25, 2024 were reviewed. The motion to approve the both sets of minutes was duly made and seconded and the vote was unanimously: to approve the minutes of the May 16, 2024 and July 15, 2024 Executive Committee meetings.

Treasurer's Report

Treasurer's report for the period of January 1 to August 18, 2024: total income for period of the report was \$46,382.24, total expenses were \$31,475.25, for a net income of \$14,906.98. Cash on hand balance is \$21,762.01.

Administrator's Report

Birgit reports that 161 members have paid their dues. Last year there were 165 people who had renewed by this time.

Plans for the fall conference are complete and Birgit has invited all presidents of neighboring states' surveying societies to attend; so far only one had responded.

The Program Committee and Birgit are working hard on the spring meeting, which will be attended jointly by both

VSLs and the New Hampshire Society. Birgit and the NH Administrator have agreed to a division of labor before and during the event, with Birgit handling all registration and NH handling all name tags and other personal issues.

The group once again discussed the winter meeting, which is still planned to be in person in the Burlington area. However, the Executive Committee members present want to respectfully ask the Program Committee to go back to doing the meeting virtually. This saves people from potentially dangerous winter travel, and the Society makes a much better return on virtual meetings.

Birgit noted that we're in a much stronger position financially than previously, but the fall meeting will be expensive.

Other Business

We briefly discussed Brad Holden's secret VSLs documents and hope to have him attend the next in person Executive Committee meeting, hopefully in October.

There being no other business the meeting was adjourned at 6:29 PM.

Respectfully submitted,
Lisa Ginett, VSLs Secretary

VSLS MEMBERSHIP MEETING MINUTES

Fall Conference • September 12, 2024 Fireside Inn • Lebanon, NH

The meeting was called to order at 12:49 PM. In attendance were members of the general membership along with Executive Committee members Mark Day, Becky Gilson, Paul Hannan, Randy Otis, and Keith Van Iderstine.

Randy warned about an increase in fraudulent emails and provided some tips to help stay safe. All official VSLS emails will come from birgit@vsls.org. Anything with an attachment will have a detailed description of what the file is in the email. We do not have a secure messaging server.

We will have a joint meeting with NHLA in March at the Hilton Garden Inn in Lebanon, NH.

Treasurer's Report

Keith Van Iderstine gave a quick overview of financials for the year to date. Income to date was \$64,834.84, expenses were \$52,853.24, for a net income of \$11,981.60. The cash on hand balance is \$21,643.54. The VSLS investment fund balance is \$52,612.05, and the VSLS Education Foundation investment fund balance is \$106,675.39.

Randy opened up the floor to questions from the membership, but there were no questions. There being no further business, the meeting was adjourned at 12:59 PM.

Respectfully submitted,
Birgit McCall, VSLS Administrator

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Can you name this surveyor?

This 1981 photo was taken by the late Terry Harris, LS, in Shelburne, Vermont. Do you recognize the land surveyor who's at work in the photo? Hint: he received his Vermont license in 1969 and still keeps it active today! (The answer is at the bottom of page 27.)



2025 Proposed Budget & Officers

2025 Budget

INCOME

Advertising Revenue	\$1,230.00
Donations *	\$1,000.00
Interest	\$20.00
Membership Dues	\$21,000.00
Online Payment Fees	\$1,500.00
Program Revenues	\$48,250.00

Total Income **\$73,000.00**

EXPENSES

Accountant Fees	\$525.00
Advertising Expenses	\$350.00
Association Dues	\$3,700.00
Bank and Online Payment Fees	\$1,750.00
Donation Expense	\$500.00
Insurance	\$700.00
Memorial Contributions	\$200.00
News Magazine Production	\$3,500.00
News Magazine Design	\$2,500.00
Office Supplies	\$750.00
Payroll Expenses	\$22,100.00
Postage	\$300.00
Program Expenses	\$30,000.00
Public Relations	\$1,000.00
Rent	\$1,725.00
Telephone	\$400.00
Travel	\$3,000.00

Total Expense **\$73,000.00**

2025 Slate of Officers

PRESIDENT	Randy Otis, LS
VICE PRESIDENT	Nate Yager, LS
SECRETARY	Lisa Ginett, LS
TREASURER	Keith Van Iderstine, LS
DIRECTORS	Mark Day, LS Christopher Haggerty, LS Paul Hannan, LS
NSPS DIRECTOR	Gayle Burchard, LS

2025 Program Committee

Joe Flynn, LS, Chair	Doug Henson, LS
Harris Abbott, LS	Boone Meeden
Gayle Burchard, LS	Gerald Stockman, LS

2025 Preservation Committee

Harris Abbott, LS	Eric Morse, LS
Malcolm Moore, LS	Scott Taylor, LS

2025 Education Foundation Directors

Members at Large

Ethan Gilmour, LS
Robert Holt, LS
Scott Taylor, LS

VSLs Officers

Lisa Ginett, LS
Randy Otis, LS
Keith Van Iderstine, LS
Nate Yager, LS

A word from our nominee for the VSLs Executive Committee

Christopher Haggerty
LS #741
Button Professional
Land Surveyors

"I would be honored to be considered for a position with the VSLs Executive Committee, as I've been pondering doing so for way too long. It's not that I suddenly have more time on my hands (quite the contrary), but that I share in other surveyors' pressing concerns for the longevity and proficiency in our profession. I've had the great pleasure of working with, directly and indirectly, many great surveyors in this state and consider myself to be a fairly well-rounded product of my raising, as they say. With many years of experience now (mostly good?), I finally feel qualified to help the Committee in any capacity I can. I look forward to giving back to this profession through the VSLs, whose members have treated me so well throughout the years."



Winter Webinar

FRIDAY, DECEMBER 13, 2024
PRESENTED ONLINE

4 PDH



Schedule

8:00 - 10:00 a.m.	Good Work Practices, GPS, Base Rover, and More WITH DAN MARTIN
10:00 - 11:00 a.m.	Lotting Plans WITH PAUL HANNAN
11:00 a.m. - Noon	Managing Expectations When Working With the Public WITH TIM BURCH
Noon - 12:20 p.m.	Business Meeting & Votes to Approve Budget and Executive Committee



Watch your email for more information about the webinar topics.

Registration Fees

Full member of VSLs or kindred society.....	\$50.00
Life Member, Associate Member, Technical Staff.....	\$35.00
Group Rate (3+ from same firm, with one member).....	\$35.00
Non-member.....	\$60.00
Student member	\$25.00

***Add \$15 late fee after Dec. 8**

Our Presenters



Tim Burch is executive director of the National Society of Professional Surveyors and a professional land surveyor with more than 30 years of experience.



Paul Hannan is a member of the VSLs Executive Committee and a long-time land surveyor and farmer. He was commissioner of forests, parks and recreation during the Kunin administration.



Dan Martin is the northeast regional geodetic advisor for the National Geodetic Survey. He instructs surveyors in how to use and preserve the National Spatial Reference System.

NOTE: Webinars will be recorded and can be viewed later.

To Register (Please complete and mail this form or register at vsls.org)

Name _____

Address _____

Email (required) _____

☐ Check enclosed (payable to VSLs) for \$ _____

☐ Credit card payment: ☐ VISA ☐ MC ☐ AMEX ☐ DISC

Card Number _____

Exp. Date _____ Security Code _____

Please return form with payment to: VSLs, P.O. Box 99, East Montpelier, VT 05651. Questions? birgit@vsls.org



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This is a full-time on-site role for a Project Engineer/Survey Technician at O'Leary-Burke Civil Associates, PLC in Essex Junction, VT. This role involves civil design, permitting, surveying, construction management and testing for commercial and residential development projects.

Qualifications

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- HydroCAD and WaterCAD experience a plus
- Degree in engineering or related field
- Willingness to learn

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