

THE FLORIDA SURVEYOR

June 2023

Volume XXXI, Issue 6



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Surveying Pioneer Chappy Young
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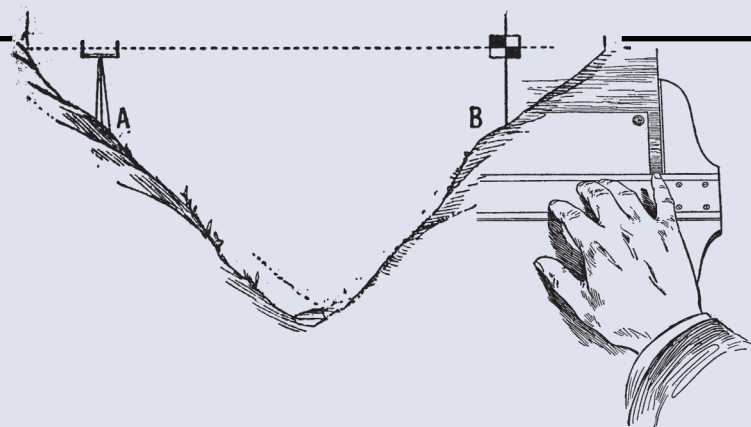
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THE FLORIDA SURVEYOR is the official publication of the Florida Surveying and Mapping Society, also known as FSMS. It is published monthly for the purpose of communicating with the professional surveying community and related professions who are members of FSMS. Our award winning publication informs members eleven months out of the year about national, state, and district events and accomplishments, as well as articles relevant to the surveying profession. In addition, continuing educational courses are also available.

PRESIDENT'S Message

June 5, 2023

The tools that a land surveyor uses have changed drastically, from Gunter's chain and compass to GNSS, Robotic Total Stations, Lidar and UAV's. The tools and their accuracies have also changed, but Land Surveying is still an art and the knowledge that comes with years of experience cannot be replaced with books or technology. Our profession was founded on the master/apprentice relationship and that principal remains to this day. The single master has evolved to many specialized masters that teach us our niche in the profession. Whether it is Retracement, land boundaries, hydrographic or topographic we still rely on the experience and background of the individual Surveyor to make the final determination.

The surveyor is compelled to find the true boundaries of the property. Remember we are fact finders and not advocates for our clients. As hard a concept as that may seem, do not fall into that trap, because your responsibilities lie with protection of the public as a whole when determining boundaries and measurements.

The [Annual Conference](#) is just around the corner. Find a [Seminar](#) at the conference that will advance your knowledge in your niche of the profession or one that fills in the missing gaps.

Respectfully submitted.

Howard J. Ehmke II



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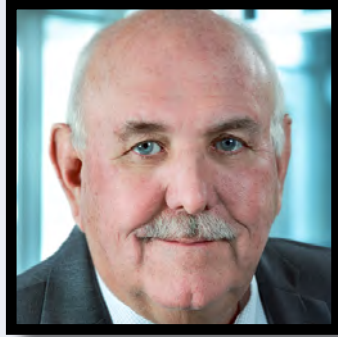


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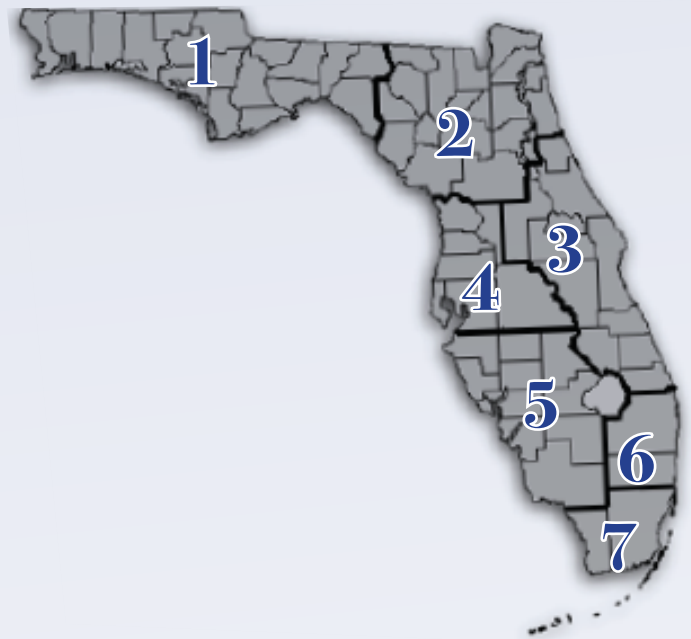
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FSMS Pioneers

A series that honors the legends of surveying in the state of Florida

PIONEER SURVEYOR

George Chapman (Chappy) Young, Jr., PSM
President of GCY, Inc., Professional Surveyors and Mappers

PROLOGUE:

FIRST, I would like to say that being considered a “Pioneer” in the surveying profession is a privilege! If I would ever be asked if I would ‘do it over again’ ... my career with all the challenges, suffering and difficulties, I would answer without hesitation, **ABSOLUTELY!**
“Success is not measured by money, but by happiness!”

SECOND, I believe that the reader is expecting “stories of old” from a Pioneer. So here they come. *“It is not what you gather, but what you scatter that tells what kind of life you have had!”*

MY STORY:

I was born in Bradenton, Florida, on April 2, 1947, at Dr. Sugg’s private Hospital. It’s my understanding that it was the only hospital in Bradenton at that time. Dr. Suggs was a family friend. Dad told me that he and Dr. Suggs were setting on the second story fire escape smoking cigarettes as Mom was in labor with me.
Who does that anymore?

At the age of three, my family moved to Belle Glade, Florida where my father George C. Young (RIP) became the manager of the newly created Glades Livestock Market, a cooperative market owned by local ranchers and Dad managed the market’s construction.

My mother (RIP Mom) had the highest IQ in our family and her score was deemed a genius. (Dad



Chappy Young Jr., PSM

and I, not so much). She constantly read books, at least one a day usually, and her love of books led to her career as a librarian, from which she retired.

My only sibling and older sister, Edwina Jane retired from AT&T Long Lines. She was another family genius and worked for AT&T at the home office directly under one of the VPs. Jane, among other significant accomplishments, led a team of accountants and attorneys to submit AT&T's annual *long distance fees* submittal to be approved by the FCC. One package was delivered to the FCC in DC by Rail, and another (backup) was delivered by Truck, to ensure delivery on time. Later, Jane was tasked to develop early retirement packages with another team of accountants and attorneys, for the firm's employees. This was because of the federally mandated decentralization of the communication giant, AT&T. She finally created a retirement package she liked and retired at the age of 55. After retiring, Jane travelled extensively throughout the United States, Canada in her RV and hosted many Jeep 4x4 camporees leading Jeep drivers through many canyons and mountain trails throughout Colorado and the west. My family and I were privileged to have Jane with us at our home for her final two years. After a long illness, Jane passed away at the age of 72 (RIP Jane).

I attended school in Belle Glade, FL from kindergarten through junior high school. After junior high, my parents sent me to Battle Ground Academy (BGA), a non-military private school, in Franklin, Tennessee where I succeeded as a *poor student*. It was an expensive private school where my only success was football, playing defensive tackle. After two years at BGA, I transferred to Gainesville High School, living with my sister while she attended the University of Florida in Gainesville. There, too, I excelled as a *poor student*. However, ultimately, I graduated from West Palm Beach High School during their summer term with a GED (did I mention I was a *poor student?*).

My introduction to surveying began in the winter of 1964 while working for Hutcheon Engineers, Inc. (HEI) at their Belle Glade, FL office. I started as a "green" rodman surveying 40,000 acres in the sawgrass of the Everglades, south of South Bay, Florida. This project lasted for several years as all work was done with a one minute mountain transit and a 200-foot chain in the soft muck of the Everglades. We retraced every exterior and interior section line, and the HEI engineers designed the drainage/irrigation infrastructure for its water management. Surveying the boundary, running profiles of the muck and the subsurface rock, and "as built" of all the contractors' work, was the survey involvement for this job. This project was to become Big B Ranch, owned by King Ranch out of Texas. Of course, this project was conducted when it was deemed 'OK' to develop the raw Everglades into agricultural use as

it was considered within their "Property Rights" ... not so much anymore. This job meant miles and miles of walking in the sawgrass in calf deep water, measuring behind an especially equipped D-6 dozer, killing water moccasins, and encountering alligators daily. Over the next few years, we surveyed other large acreages in the Everglades, and I rose to the level of Party Chief within HEI. In the meantime, the owner of HEI, Bob Hutcheon (Hutch) took a "shine" to me. We became personal friends and I got to know his family. I also worked under Norman Gimpel, PSM, the



Senior Surveyor and a Partner in HEI as well as Pedro Gonzalez, PSM and Office Manager in the Belle Glade office of HEI.

During this time, the war in Vietnam was heating up. Next door to our office in Belle Glade was the Selective Service Office where Mrs. Ulm worked as the secretary for the local Selective Service Board. One afternoon after work, Mrs. Ulm stopped me and advised me that my name was coming before the next board meeting and said I should expect a draft notice soon. *The military was going to knock on my door as my number was up! That certainly got my attention!* A Partner in HEI, Russ Gilbert, PE was also a Navy Lt. Commander in the West Palm Beach Reserves of the U.S. Naval Construction Battalion (CBs, aka: *Sea Bees*). Russ told me that the Sea Bees had a special enlistment program called the Direct Procurement of Petty Officers (DPPO) and were looking for experienced and skilled surveyors, together with other skilled construction tradesmen. Russ advised that if I was accepted into that program, I would receive an advanced rank of at least an E-4 (pay scale) in boot camp. I accepted and signed up, thus avoiding the draft into the Army or Marines. I became a Third-Class Engineering Aid Petty Officer (EA-3 with E-4 pay) into the United States Navy Construction Battalion 133 (NCB 133), stationed at Gulfport, Mississippi. On my initial deployment to Guam on the advance party, we began building a Sea Bee base, however I was soon redeployed to a detachment named Det Koala, to NAS MIRAMAR, the home of the Navy's "Top Gun" (*no, I never met Tom Cruise while I was there*). Det Koala was tasked to build the first "on base housing" (a trailer park) on stateside soil, a brainchild of then Chief of Naval Operations (CNO or the Senior Officer of the Navy) four-star Admiral Elmo Zumwalt who visited our detachment while I was stationed there. That was a Big Deal! During this deployment, I was the lead surveyor for the project and advanced to Second-Class Engineering Aid Petty Officer (EA-2 with E-5 pay).

After that duty, I volunteered for a 13-man Sea Bee Team (*Sea Bee Team 133-09*) to be trained as a counter insurgency team for Vietnam. We were cross trained with other construction skills, taught Vietnamese language and attended Survival, Evasion, Resistance & Escape (SERE) School in the woods of Northern Maine. We were treated as prisoners in a mock "*Hanoi Hilton*". They broke my nose in an "interrogation" and treated us like dirt for a week. We spent the week crawling on our hands and knees on cracked granite gravel with no sleep and very little food. The cadre were "psycs" (Dr. of Psychology and Psychiatry). Upon my debriefing, I was told I would have been killed within the first hour by the Northern Vietnamese Army (NVA) because I obstructed their every command. *Otherwise, I did great..., dead, but great!* One of our team "cracked" and was soon replaced. *"The sun that melts the ice is the same sun that hardens the crust"*.

Thankfully, the war was winding down and we were never deployed to Vietnam. Instead, my team was sent to Truck Lagoon (now renamed Chuuk Lagoon) in the Pacific where we worked with the native population to build tribal infrastructures such as boat docks, water catchments in Japanese bombed fuel tanks and new schoolhouses, etc. We became the Navy's Peace Corps. My Sea Bee team also taught construction skills to the native youth in Truck Lagoon. During the weekends, my leisure time on the island was spent SCUBA diving on the sunken Japanese war ships and armed freighters (full of Zero plane parts, ammunition and ordinance), that our Navy had sunk in the 40-mile diameter lagoon. I even dove on, and entered into a sunken Japanese Submarine, the I-169. You can Google it ... "*Operation Hailstorm*" and/or "*Japanese Submarine I-169*". My military experience was formable.

Upon leaving the Sea Bees in 1972, I returned home to Florida and demolished and rebuilt our family's roof on our home. Then I rejoined working for HEI as a party chief. My former buddies that I had left behind when I joined the Sea Bees, were now senior party chiefs and had begun



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taking survey courses at Lake Worth Junior College from David Gibson (prior to David founding the survey program at UF), Norman Gimpel and other volunteer “adjunct professors”. I started school again to catch up with the other chiefs and this time I excelled and graduated with an A.S. degree in Surveying. Dave Gibson also worked at HEI part time to gain his survey “experience” so that he could take the State surveyor’s license exam. Dave was an amazing and natural leader, teacher and, over time, became a good personal friend. Norman Gimpel taught Legal Aspects and Legal Descriptions at Lake Worth Junior College. Norman was revered by all who knew him and had him as a professor.

I became a Professional Land Surveyor in 1977 and over the years, rose in the ranks of HEI. I became a stockholder of the 70-man Engineering and Surveying company, a member of the 5-man Executive Committee and founded the Stuart office for HEI. Did I mention Hutch took a “shine to me” LOL? I once told him I was going to be his next partner and he replied: *“Not unless you become registered, you’re not”*. That sure put a burr under my saddle because he didn’t say NO WAY.

In 1984, Hutch retired, and the firm accepted a merger offer with Kimley Horn & Associates (KHA). HEI was the first of KHA’s many acquisitions. Later, as you may know, KHA became a nationwide engineering firm. I was crushed when I lost the family- oriented firm (HEI) that I grew up in and realized that the “bean counters” now were the new boss and that personal relationships weren’t as important and didn’t really matter. Since that kind of leadership and thinking wasn’t for me, the day after the Executive Committee voted to join KHA, I resigned and soon started my firm, GCY, Inc. in October of 1984.

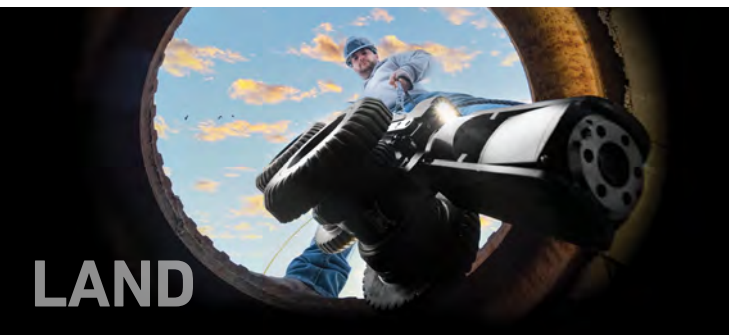
Later, I became an Adjunct Professor teaching Legal Aspects of Surveying at Florida Atlantic University for their Surveying Engineering program. During my stint as an adjunct professor, a few students approached me saying: *“We know you started your own firm. Can you give us some advice as we wish ultimately to do the same?”* That caught me by surprise, and I paused for a few moments before I responded and said: *“Well, the very best advice I could give you is seek great Mentors and KEEP YOUR STANDARDS HIGH, as you can’t put a price on integrity. Starting out, you will be priced compared against every ‘mom and pop’ small surveyor firm and keeping your standards high will result in two things: First, you will lose often in a price war; and Second, once you prove your worth by quality services to those clients that accept your proposals, they will never leave you in the future.”* That has worked for me, and I wished them success.

Over the years, since the founding of GCY, Inc., our firm has performed survey related projects of over 499,400 acres in Florida. We have had two boundary surveys with fees in excess of \$1,000,000. Most of these large surveys have been for the FDEP/DSL/BSM. (totaling over 330,000+ acres conducted over 20+ years), while the rest of the large surveys were for private clients. As a foundation to all those acres surveyed, “Retracement Surveying”, according to the *BLM’s Manual of Surveying Instructions*, was at the core. As a result of this effort, I have become a student of history, *not by choice, but by necessity*. This is a niche of surveying that because of the large acreage surveys that our firm has done. I have embraced Retracement Surveying since my earliest days as a professional. I have attended approximately 13 “Retracement Surveying Courses (CEUs)” taught by Lane Bouman (RIP) and Corwin (Corky) Rodine. These two gentlemen soon became close personal friends and later retired from a career long tenure with the Federal Bureau of Land Management (BLM) and have taught many retracement courses throughout the southeastern U.S. Lane retired as the Chief Cadastral Surveyor of the BLM’s Eastern States division. Corky retired as a senior Cadastral Surveyor for the same agency.

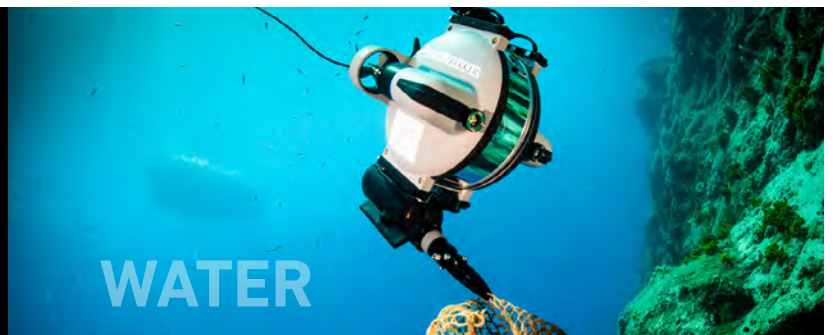
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Figure ~ Chappy & Lane

Lane, Corky, and the now Chief Cadastral Surveyor for the entire BLM, Dominica Van Koten, have been guest in my home for several days during a famous airboat journey into the Everglades. To say that my retracement surveying experiences have been a fun adventure, is an understatement. Additionally, Corky is now an employee of GCY, Inc. working remotely from his home in Arizona.

Over the past 20+ years of my now 59-year long career, I have been asked to be an “*expert witness*” for many litigation boundary disputes. (Definition of EXPERT: *X=unknown and SPIRT is a drip under pressure*) Most of these expert services have been relative to waterfront disputes, such as Riparian Rights and Sovereign Submerged Land claims. I have now developed a statement that I share with each client that I represent as an expert: “*I am your fact finder, not your advocate!*” I feel that the rightful duty of a surveyor is to present the facts to our clients so that they can apply those facts to make the best decisions for themselves. All too often, the mistaken approach I see some other surveyors make is to adopt a tactic and twist some facts to support their client’s belief, while ignoring other facts that may differ. We do not have that authority and cannot become advocates for our clients. Attorneys can be advocates, but not us! How many times have we seen attorneys representing murderers in a trial when we believe, or feel the defendant is guilty. (*OJ Simpson comes to mind*) In that case, the attorney is doing his job as an advocate for his client, as he should do.

At this point I have been involved in approximately 87 disputes, testified in some 33 depositions, and testified 18 times in court. I believe my clients have only lost once in court. *Reminder, one never knows the outcome of a court case until one hears the slap of the Judge’s gavel.* There are no guarantees. Of the 87 disputes, most never made it to court because the parties either reached a settlement agreement before a legal dispute is filed with the court, or the opposing party withdrew from the dispute after my work product was disclosed, or for some other unknown reason. GCY, Inc. has filed some 1,151 Certified Corner Records (CCRs), according to the latest available FDEP database. Now that I have had multiple “experiences” with legal disputes in depositions and in court, I can truthfully say that I have learned the very most from the most aggressive attorneys representing the opposing parties. Their tactics became a lesson each and every time. (*“Good judgement comes from Experience and Experience comes from Bad Judgements.”*) My clients in these challenges have been: Federal, State and Regional Governments, and of course, private clients, stretching from Fort Walton Beach to Key West, Florida.

Now, as the elder PSM at GCY, I like to quote the recent TV commercial by Farmers Insurance Company: “*I know a few things because I’ve seen a few things!*” I also recognize that our success is ‘*WE*’ thing, not a ‘*ME*’ thing. “*WE*” involves the entire staff at GCY ... those being long-standing and talented employees. I like to think we just don’t work together; we constantly train and lean together. We never stop learning and, if we do stop learning, we need to hang it up.

MY MENTORS:

There are three ways to learn: *First, you HAVE to learn. Second, you WANT to learn. And Third, you GET to learn.* A good mentor will excite in you the desire to GET TO LEARN.

Although the higher learning degrees mandated by Florida’s requirements to become a

Professional Surveyor and Mapper in this State is admirable, however it is not the end of one's learning. No doubt, this education requirement provides young surveyors with the foundation of knowledge to build upon. One should not discount the value of quality Mentors as these professionals can teach you what books cannot! It is my opinion that a surveyor graduate is just beginning to learn this profession. My advice upon graduation is to research the available surveying businesses and select those that excel in the type of surveying you desire to become proficient. *Seek firms that have quality mentors and discount the salary carrot!* That is where you refine your surveying skills to become the best professional you can possibly be.

I must apologize that the following list will be incomplete as I feel there are far too many men and women that have significantly contributed to my career, both personally and professionally. I will surely not be able to mention them all. In addition, the list is not limited to surveyors, but to those people who have helped shape who I am today. Some are as follows:

- **Beverly**, my dear wife of 38+ years. Bev has taught me to be a "family man" and that "family comes FIRST"! Her undying love of family is the beginning and ending of everything she does. She has provided us with three wonderful children (Luke, Geordie & Noelani) who, in turn, have provided us with four beautiful grandchildren so far (Cole, Lyla, George & Benni). By the same token, nobody should ever come between Bev and our family. The results won't be pretty. Bev was with me at the beginning of GCY, Inc. and still unselfishly supports me today. She likes to say she "*will always be YOUNG*" and "*If you're going to be dumb, you better be tough!*" Bev attended Marshal University during that fateful day when university's football team crashed in an airplane returning home after an away game and killed all aboard. It was a small school, and she lost many friends that day.
- My father, **George C. Young, Sr.** was the second GCY in our family tree and I am the third (consequently one of my sons is the fourth and his son is the fifth GCY in our family tree). *Pap*, as I called Dad in his later years, was a kind man that never ever raised his voice. He secured my first job as a surveyor with HEI as he was friends with Norman Gimpel, the lead surveyor at HEI. Pap's motive was to get me out of the house to teach me to become independent. Pap instilled in me the strength of character and honesty that shaped my future. I credit Pap with the old southern saying that I often quote: "*the addem-ups gotta equal the take-aways*". He told me that mantra works for level runs, traverse closures, checking accounts and relationships! How very true. Pap lived to be 93 years "Young" (RIP PAP).
- **Robert G. Hutcheon, PE** (RIP Hutch) was a giant of a man. Not just in physical stature (he was 6'-4") but also in his strength of character and in leadership. Hutch had a unique ability of boiling down a multitude of confusing facts to the very essence, in just a few seconds. As the Town Engineer for the Town of Palm Beach for several decades, he conversed with Royalty with ease and with the common laborer, with utmost respect. Hutch was a true leader of men and women. Did I mention he was on an Gold Medal Olympic rugby team while in college? Hutch saw something in me that he nurtured and gave me my opportunities. Hutch even bonused me extra money one Christmas to purchase stock in HEI. *Who does that?*
- **Norman Gimpel, PSM** was German born immigrant and an exacting masterful surveyor. Norman was noted for serving in a multitude of court cases as a surveying Expert. Norman was a stockholder in HEI and hired me in 1964. Norman was a hard man to get to know personally, but his dedication to perfection always gave me guidance and inspiration. Norman was also selected as a "Friend of the Court" by judges to help them understand the rules that govern our profession.
- The next Mentor(s) is actually two men, **Lane Bowman (RIP) and Corky Rodine** and were both Cadastral Surveyors (later retired) for the BLM. Together they took on the task of



Corky & Lane

teaching “RETRACEMENT CAMPS” for several State Surveying Societies, including Florida and Alabama. Over the years I got to know Lane and Corky personally as I attended some 13+, four day camps in several states. On one such camp in the 1980s at the Ocala National Forest, I found a littered stump with spayed roots and put it in my truck. I took it out and secretly sat it on the ground upright nearby when Corky was explaining how he discovered original evidence of a proven corner. When he finished his spiel, I spoke up and asked: “Corky, did you consider this stump?” I can still see the puzzled look on his face wondering if he had missed it. When I picked it up, Lane

and the rest of my fellow students roared with laughter. I laughed and said that one never knows when one needs another witness tree to prove a corner. He still hasn’t forgiven me for that one. At another Camp at Fisheating Creek, a 60,000 acre retracement survey that GCY performed for the FDEP/DSL/BSM, Corky, Chip Allen and Pete Andersen, riding in a Government Suburban raced Lane and I, in my Suburban, while I was pulling my trailered Swamp Buggy, to the next corner to study prior to the event. I almost beat him there, as Lane and I took a little known short cut. There is a lot more to this story and one day, I will share a poem I wrote about it with you. Another great story that I wrote about was “JACK IN THE GLADES”. Unfortunately, I can’t share those details for several more years, for reasons I can’t disclose. Lane passed away on October 29, 2018, while retired in Ashland, Oregon. *Did I mention that Corky now works for GCY?* Although Corky lives in Arizona, we speak several times a week about several Court Cases we both serve as Experts on. I will always be proud to call Corky and Lane my friends.

- **Fred C. Elliot, PE**, the Trustees of the Internal Improvement Trust (TIIF) (Governor and Cabinet of Florida) senior staff member in the early 1900’s. Although I never met him, Fred Elliot is one of my survey Heroes. I have researched much of Fred’s work and followed his survey crews throughout the Everglades and even on Florida’s east coast. Fred was not only the State’s (TIIF) Chief Drainage Engineer, but he was also the first (to my knowledge) *State of Florida “Cadastral Surveyor”* (in those days engineers were also surveyors) creating many original surveys of townships in the Everglades. Fred was responsible for all issues of land conveyances and surveys by the TIIF. Fred was also responsible for all the surveying of the Everglades obtained from the Federal Government, by virtue of the Federal Swamp and Overflowed Lands Act of 1850. I have a copy of a written report, published in an early newspaper, in which Fred advised the TIIF to build reservoirs in the Everglades that would hold back drainage waters to rehydrate that vast region. Unfortunately, the TIIF didn’t have the funds to accomplish his plan. A true visionary no doubt, as today we are spending multiple hundreds of millions (dollars) to do just that!



During my retracement surveys in the Everglades, I have measured hundreds of miles of Fred’s surveyor’s work and can attest to his miles always being within ten feet of his record distances, when compared to today’s modern measurement devices. Don’t forget, his surveyors used dugout canoes to access their survey lines in the Everglades during the early 1900’s. Also, I have acquired several of Fred’s letters to the Grantee(s) of the TIIF DEEDS to submerged lands in Lake Worth (the body of water) in 1924 that became the pivotal clue to an important

GOLF



SADDLEBROOK RESORT

WEDNESDAY
8:00 AM
-
1:00 PM

26 JULY
2023



5700 Saddlebrook Way / Wesley Chapel, FL / 33543
(813)973-1111

\$100 PER PERSON
\$400 PER TEAM (4 PLAYERS)

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civil suit I recently worked on, and they allowed me to successfully challenge a commonly used section corner in the urban environment of today.

CONCLUSION:

As I craft this article today, I have been surveying for 59+ years and I pray for many more years yet to come. GCY has 6,000+ field books and hundreds of maps from several surveyors and firms that are no longer alive or are active. The earliest field record I have found in these records was scribed in 1900. I look forward to sharing what I know with all that ask.

Thank you,

Chappy Young

From gcyinc.com:

SURVEYING CAREER

- Began Surveying with Hutcheon Engineers, Inc. in Palm Beach County ~1964.
- Served as a surveyor in the U.S. Navy SeaBees and Honorably Discharged (Construction Battalion 133) from 1969 to 1972.
- Continued Surveying for Hutcheon Engineers, Inc. from 1972 to 1982. During that time I became the office manager of the Stuart, Florida office, a Stockholder and a member of the Corporate Executive Committee of the firm.
- In 1982 Hutcheon Engineers, Inc. was acquired by Kimley Horn & Associates, Inc. and I continued as Stockholder and Office Manager.
- In 1984, I left the employee of Kimley Horn & Associates, Inc. to establish the firm of GCY, Inc., Professional Surveyors and Mappers.
- 1984 to Present I have been the President and Chairman of the Board of Directors of GCY, Inc.
- 2010 Teaching “Legal Aspects of Land Surveying” at FAU in the Geomatics Engineering (Surveying) Department. This course is a senior level course for a four-year degree in Geomatics (Surveying).

PROFESSIONAL REGISTRATION & AFFILIATIONS

- Professional Surveyor & Mapper, State of Florida License No. 3036. Date of Registration: 1977.
- Past officer 1977-1983 (President, V. President, Secretary, Treasure and Member) of the Palm Beach Chapter of the Florida Society of Professional Surveyors (now Florida Society of Professional Surveyors and Mappers).
- Current member of Florida Society of Professional Surveyors and Mappers.
- Past member of the Alabama Society of Professional Land Surveyors.
- Past member of the American Congress of Surveying and Mapping.

CERTIFICATIONS OR CONTINUING EDUCATION CREDITS

- Retracement and Restoration of Original Corners. (39 mandays)
- Survey Quality GPS training, San Jose, CA and Alexandria, VA. (4 manweeks)
- Advance Cyclone Training, Norcross, GA., 2006. (Leica Scanner) (1 manweek)
- Multiple Professional Level Continuing Education classes at the rate of 24 credit hours every two years.
- 2007 Riparian Rights Continuing Education course.
- 2013 Testifying as an Expert.

OTHER AFFILIATIONS (PRESENT AND PAST)

- Member Martin County Planning & Zoning Board (1984 thru 1988), Former Chairman.
- Member Martin County Local Planning Agency (1984 thru 1988), Former Chairman.
- Member Martin County Airport Advisory Committee 1988-1990.
- Martin County Leadership Program Graduate ~ CLASS 01.
- Florida GPS User Group.
- Martin County Code Enforcement Board. (Past Appointment)
- Martin County Agricultural Landowners - Executive Director 1988-1996/Founding Member.
- Member of Board of Directors of First Bank and Trust of Indiantown, 1992-2012, Vice-Chair 2008-2012.
- Member of Board of Directors of "Treasured Lands Foundation, LLC" a non-profit Land Trust, 2009-2012.
- Florida Atlantic University Advisory Board Member to the Geomatics Engineering (Surveying) four-year degree Program, 2009 to 2012.
- Florida Atlantic University Adjunct Professor teaching "Legal Aspects of Surveying" Geomatics Engineering Program, 2010.

PRINCIPAL AREAS OF PRACTICE

- Boundary Surveys (from 108,000 +/- acres to 1/4 acre lot surveys)
- F.D.E.P. Acquisition Surveys
- F.D.E.P. Mapping Projects
- F.D.E.P. Submerged Land Lease Surveys
- Expert Testimony on Boundary and Construction disputes
- Riparian Rights Line Allocation Determination
- Condominium Surveys
- Geodetic Horizontal and Vertical Surveys
- GPS Surveys
- Construction Staking
- Mean High Water Surveys
- As Built Surveys
- Subdivision, Platting and Land Development
- Topographic Surveys
- Mortgage and Title Surveys
- Materials Quantity Surveys

**MAKE PLANS TO
ATTEND THE
68TH ANNUAL FSMS
CONFERENCE
JULY 26TH-29TH AT
THE SADDLEBROOK
RESORT IN WESLEY
CHAPEL, FL.**





68th Annual FSMS Conference

Conference Registration

July 26th – July 29th, 2023, Saddlebrook Resort
5700 Saddlebrook Way, Wesley Chapel, FL 33543

Name _____ PSM # _____

Packet 1 – Full Registration/Best Value

Member \$350
Licensed Non-Member \$450
Non-licensed \$300
(Includes one (1) Wednesday Barbecue ticket, one (1) Friday Exhibitors' Lunch ticket, one (1) Friday Recognition Banquet ticket, six (6) Saturday Seminar CECs)

Packet 2 – Partial Registration

Member \$335
Licensed Non-Member \$435
Non-Licensed \$285
(Includes one (1) Friday Exhibitors' Lunch ticket, one (1) Friday Recognition Banquet Ticket, six (6) Saturday Seminar CECs)

Packet 3 – Saturday Only

Member \$210
Licensed Non-Member \$310
Non-licensed \$160
(Includes six (6) Saturday Seminar CECs)

Saturday Seminars – July 29th

Course options are listed below, please mark the circle next to the course. Choose only ONE course per time segment.

6 Hour Course Option			
8:30 am – 3:00 pm (All day course)	<input type="radio"/> Course name: To Adhere or Not Adhere – A Discussion on Laws and Rules, and BPSM Cases (6 CEC's - Course #10491) Moderator: Nicholas Campanile, PSM Guest Panelists		
2 Hour Course Options			
8:30 am–10:10 am (Choose one from this row)	<input type="radio"/> Course name: FEMA and the Surveyor, dealing with MT-1 Processes (2 CEC - Course #10500) Instructors: Richard Allen, PSM	<input type="radio"/> Course name: Real-Time Surveying to Support the Mission to Mars (2 CEC - Course #10498) Instructor: Bryan Merritt, PSM/LS/FAA Certified UAV Pilot	<input type="radio"/> Course name: Considerations for Automatic Feature Extraction of Drone Based Point Clouds (2 CEC - Course #10489) Instructor: Jennifer Triana
10:30 am – 12:10 pm (Choose one from this row)	<input type="radio"/> Course name: The ASPRS Positional Accuracy Standards for Digital Geospatial Data, the 2014 Standards and 2023 Proposed Revisions (2 CEC - Course #10492) Instructor: Michael Zoltek, L.S., C.P., CFedS, GISP, PMP	<input type="radio"/> Course name: Professionalism & Ethics (2 CEC - Course #10493) Instructor: Robin Petzold, PSM	<input type="radio"/> Course name: High-Tech, Low-Tech, No-Tech - Embracing Technology to Overcome Labor Shortages (2 CEC - Course #10494) Instructor: Timothy Kinder, PSM
1:30 pm – 3:00 pm (Choose one from this row)	<input type="radio"/> Course name: Guiding the Course, Leveraging Mobile Mapping with TopoDOT to Help Build a Formula 1 Race Track (2 CEC – Course #10495) Instructors: Russell Hall, PSM Jennifer Triana	<input type="radio"/> Course name: Are We There Yet? Update on Working Towards the Modernized NSRS (2 CEC - Course #10496) Instructor: Denis Riordan, PSM	<input type="radio"/> Course name: Sovereignty Lands/Water Boundaries (2 CEC - Course #10497) Instructors: Richard Malloy, PSM Scott Woolam, PSM



Additional Seminar Offerings

Wednesday Seminars: Separate Registration Required for Each Seminar Choose the 6-hour option or the two 3-hour options			
July 26, 2023 8:00 am – 3:00 pm			
<input type="checkbox"/>	<p style="text-align: center;">Seminar I: <i>The Art of Original Retracement - Practical Application and Forensic Style</i> (6 CEC's - Course #10499)</p> <p style="text-align: center;">Instructor: <i>Robert A. Stevens, RSM Florida</i></p>		
July 26, 2023 8:00 am – 10:45 am	July 26, 2023 12:15 pm – 3:00 pm		
<input type="checkbox"/>	<p style="text-align: center;">Seminar II: <i>2021 ALTA/NSPS Land Title Survey Standards – 2016 Changes</i> (3 CEC's - Course #10486)</p> <p style="text-align: center;">Instructor: <i>Gary Kent, PS</i></p>	<input type="checkbox"/>	<p style="text-align: center;">Seminar III: <i>The Surveyor in Jeopardy</i> (3 CEC's - Course #10487)</p> <p style="text-align: center;">Instructor: <i>Gary Kent, PS</i></p>
SIT Prep Course (<i>Un-Licensed Attendees, No CEC Credit</i>) July 26, 2023 8:00 am – 4:00 pm			
<input type="checkbox"/>	<p style="text-align: center;">Geoscholar's Florida Surveying and Mapping Society Fundamentals of Surveying (FS) Exam/Surveyor in Training (SIT) Certificate Prep Course</p> <p style="text-align: center;"><i>Included with Live Course - Online study materials (one year access)</i></p> <p style="text-align: center;">Instructor: <i>Dr. Stacey Lyle, PhD, RPLS, PLS</i></p>		
Thursday Seminars: Separate Registration Required for Each Seminar Choose One			
July 27, 2023 8:00 am – 10:45 am			
<input type="radio"/>	<p style="text-align: center;">Seminar I: <i>Surveyors of Florida: Who Were They</i> (3 CEC's - Course #10488)</p> <p style="text-align: center;">Instructor: <i>Dr. Joe Knetsch</i></p>		
<input type="radio"/>	<p style="text-align: center;">Seminar II: <i>Understanding Road Rights of Way</i> (3 CEC's - Course #10482 CE Provider# 53)</p> <p style="text-align: center;">Instructor: <i>David Melvin, PLS, CFM</i></p>		

Complete payment information on the following page of the registration form.

Cancellation Policy:
 30 days prior to conference: 50% refund
 Less than 30 days to conference: No refund



68th Annual FSMS Conference Registration Form

Name: _____ PSM#: _____ FSMS Member: YES NO Phone: _____

Address: _____ City/State: _____ Zip Code: _____

Email Address: _____ If Any: Guest Name(s): _____ Name Badge: Yes No

PACKET SELECTION

Licensed Government employees receive a \$100 discount on Packet 1 price

See pg. 1 to choose Saturday Seminars

		\$ Amount:
Packet 1 (\$350 member, \$450 licensed non-member, \$300 non-licensed)	Includes one (1) Welcome Barbecue ticket (Wed.), one (1) Exhibitors' Lunch ticket (Fri.), one (1) Recognition Banquet ticket (Fri.), six (6) Saturday Seminar CECs	\$
Packet 2 (\$335 member, \$435 licensed non-member, \$285 non-licensed)	Includes one (1) Exhibitors' Lunch ticket (Fri.), one (1) Recognition Banquet ticket (Fri.), six (6) Saturday Seminar CECs	\$
Packet 3 (\$210 member, \$310 licensed non-member, \$160 non-licensed)	Includes six (6) Saturday Seminar CECs	\$

ADDITIONAL SEMINARS

Wednesday Options: Select the 6 hr. course, or one or both 3 hr. courses

Thursday: Only Select One Per Day

		\$ Amount:
SIT Prep Course - Wed. (8 hrs., 8:00 am – 4:00 pm)	\$250	\$
Wednesday Seminar I (6 hrs., 8:00 am – 3:00 pm)	\$200	\$
Wednesday Seminar II (3 hrs., 8:00 am – 10:45 am)	\$100	\$
Wednesday Seminar III (3 hrs., 12:15 pm – 3:00 pm)	\$100	\$
Thursday Seminar I (3 hrs., 8:00 am - 10:45 am)	\$100	\$
Thursday Seminar II (3 hrs., 8:00 am - 10:45 am)	\$100	\$

EVENT TICKETS

**Only Pay if Participating*

		Number of Tickets:	\$ Amount:
*Casino Night (Thur.):	\$50		\$
Golf Match (Wed):	\$100 per person		\$
	\$400 per team (4 players)	Players:	\$
The Florida Aquarium (Thur.)	\$50 per person (Auxiliary)		\$
*Clay Shoot (Thur.):	\$175 per person		\$
	\$700 per team (4 players)	Players:	\$

FOOD TICKETS (Additional or Individual Tickets)

** No cancellations unless replacement found*

		Number of Tickets:	\$ Amount:
Welcome BBQ (Wed.):	\$50		\$
	\$60 (at conference)		\$
*Legislative Reception (Thur.):	\$100		\$
Exhibitors' Lunch (Fri.):	\$50		\$
	\$60 (at conference)		\$
Recognition Banquet (Fri.):	\$100		\$
	\$110 (at conference)		\$
	\$25 (kid's meal 12 or under)		\$
	Requested Vegetarian Meal		\$

Payment must accompany all pages of registration form.

TOTAL ENCLOSED \$ _____

Payment Information: Check Enclosed (Make Payable to FSMS) VISA/MasterCard/AE/Discover

Card #: _____ Exp. Date: _____ CVV Number: _____

Billing Address of Credit Card: _____

IF PAYING BY CHECK, MAIL FORM TO: FSMS, P.O. Box 850001-243, Orlando, Florida 32885

IF PAYING BY CREDIT CARD, FAX OR EMAIL FORM TO: 850.877.4852 or director@fsms.org

Questions? Call us at 850-942-1900

Cancellation Policy:

30 days prior to conference: 50% refund

Less than 30 days to conference: No refund

Conference Seminars

Wednesday, July 26th

Seminar I

8:00 am —
3:00 pm



"The Art of Original Retracement" - A Practical Application and Forensic Style
Course #10499 - 6 CEC's

Robert A. Stevens, RSM Florida

Objectives:

- Approach to successful retracement
- Procedures for success
- Evidence, historical and existing
- Role of astronomy
- Application of results

Robert A. Stevens, RSM Florida has been surveying for approximately 40 years. Acreage and Commercial surveys, Boundary, Right-of-way, and Easement Litigation, Expert Witness, and Trial Testimony with over a 90% success rate in original retracement. Robert A. Stevens & Associates, established 2009.

Seminar II

8:00 am —
10:45 am



The 2021 ALTA/NSPS Land Title Survey Standards - Changes from 2016

Course #10486 - 3 CEC's

Gary Kent, PS

After 2 years of work on the part of the Joint ALTA/NSPS Work Group and others, the 2021 ALTA/NSPS Land Title Survey Standards were adopted by ALTA and NSPS with an effective date of February 23, 2021. In this program we will explain the reasons for each of the many changes from the 2016 Standards and provide an explanation on what each change means to the Surveyor. In addition, an overview of the relationship between Land Title Surveys and title insurance will be provided and each of the eight sections of the Standards will be overviewed. Finally, some common questions that arise and conundrums that surveyors encounter in the process of performing a Land Title Survey will be discussed.

Gary Kent, PS is a Professional Surveyor with Schneider Geomatics in Indianapolis where, after 37 years, he transitioned to part-time in 2020 and formed Meridian Land Consulting to provide training, consulting and expert witness services. He has presented over 1,500 programs on various surveying topics multiple times in all 50 states over the last 20 years. Gary has served on the Indiana Board of Registration for Professional Surveyors since 2004 and is a past-president of both the American Congress on Surveying and Mapping and the Indiana Society of Professional Land Surveyors.

Seminar III

12:15 pm —
3:00 pm



The Surveyor in Jeopardy

Course #10487- 3 CEC's

Gary Kent, PS

This program will be presented in a Jeopardy like format with the presenter offering answers for which audience members — assembled into teams — must provide the relevant question. The program will include approximately 175 questions/answers in a variety of topic areas such as: ALTA/NSPS Land Title Surveys, Boundaries, Easements and Rights of Way, Expert Witness, Riparian Rights Risk Management, Safety and Health, Florida Statutes and Rules, and Florida Standards of Practice. Answers and questions will be discussed as appropriate or necessary to be sure all participants understand the context and correct answers. This is a very "audience participation"-centric program; it is far more than a simple trivia contest.

Gary Kent, PS is a Professional Surveyor with Schneider Geomatics in Indianapolis where, after 37 years, he transitioned to part-time in 2020 and formed Meridian Land Consulting to provide training, consulting and expert witness services. He has presented over 1,500 programs on various surveying topics multiple times in all 50 states over the last 20 years. Gary has served on the Indiana Board of Registration for Professional Surveyors since 2004 and is a past-president of both the American Congress on Surveying and Mapping and the Indiana Society of Professional Land Surveyors.

SIT Prep

8:00 am —
4:00 pm



Geoscholar's Florida Surveying and Mapping Society Fundamentals of Surveying (FS) Exam Prep Course

Un-Licensed Attendees—No CEC Credit

Dr. Stacey Lyle, PhD, RPLS, PLS

Geoscholar's Florida Surveying and Mapping Society Fundamentals of Surveying (FS) Exam Prep Course is designed to provide critical information needed to obtain a Surveyor in Training (SIT) Certificate based upon topics tested on the NCEES Fundamentals of Surveying (FS) exam. The course offers an in-person FS review during the annual Florida Surveying and Mapping Society Conference in July 2023 supplemented by online self-paced instruction via Canvas Learning Management System (LMS) topic-based modules.

Dr. Stacey Lyle, PhD, RPLS, PLS is an Associate Professor of Practice at Texas A&M University's Zachry Department of Civil and Environmental Engineering and Department of Geography. He has served as an expert witness on land boundary court cases. He is active in the industry with over 35 years of surveying experience including civil engineering, land surveying, cadastral land records databases, GIS/CAD/BIM Fusion, geodesy, hydrography, photogrammetry, and cartography.

Conference Seminars

Thursday, July 27th

Seminar I

8:00 am —
10:45 am



Surveyors of Florida: Who Were They
Course #10488 - 3 CEC's
Dr. Joe Knetsch, PhD

The Course "Surveyors of Florida: Who Were They" will emphasize the personal nature of early surveying based upon the instructions from the Land Office and the Surveyor General of Florida. The instructions section will note the inconsistencies asked by the GLO, often to meet the special needs of those working in Florida. It will also include many citations to the letters written by individual surveyors to the Surveyor General describing the conditions facing them in the field. Pre-drainage Florida was a totally different looking place than we now see and offered many challenges to the early surveyors. The concept for the course is to put the current surveyors as close as possible into the mindset of the original surveyors whom they follow in their daily business. Hopefully this will give the current surveyors a better understanding of their predecessors predicaments and how they solved the problems facing them, thus saving today's surveyors time and money in retracing our pioneer surveyors' work and monuments.

Dr. Joe Knetsch received his PhD in history from Florida State University (1990), an MA in history from Florida Atlantic University (1974) and a BS from Western Michigan University with a major in History and Economics. He was the historian for the Florida Department of Environmental Protection (formerly Department of Natural Resources), Division of State Lands, from 1987 to August, 2014. He is the author of fourteen books (mostly on Florida History), over two hundred journal articles, forty book reviews, and over two hundred and twenty papers and presentations on Florida history. Dr. Knetsch is a member of numerous historical societies and associations. He currently resides in Tallahassee, Florida, with his wife of forty-five years, Linda. He also currently works as a consultant for the Town of Redington Beach, the State of Alabama, and other private interests.

Seminar II

8:00 am—
10:45 am



Understanding Road Rights-of-Way
Course #10482 Provider #CE-53 - 3 CEC's
David Melvin, PLS, CFM

Understanding Road Rights of Way is a 3-hour seminar. It discusses things land surveyors should know about road rights of way. The instructor uses case law examples to explain how roads are defined, the road's ownership status, the land-owner's rights, and others' rights within the right of way.

David Melvin, PLS, CFM is a Professional Land Surveyor, licensed in the State of Florida, a 1981 graduate of the University of Florida with a degree in land surveying, with over 40 years of experience in land surveying and land surveyor education. He has owned and operated Land Pro Seminars since 2003 and is also a consultant specializing in land boundary problems, floodplain issues, wetland mapping, and land surveying regulations.

Saturday, July 29th (All Day Course)

8:30 am—
3:00 pm



To Adhere or Not Adhere – A Discussion on Laws and Rules, and BPSM Cases
Course #10491 - 6 CEC's
Panel Discussion - Moderator: Nicholas Campanile, PSM

An expert panel will run through a variety of laws and rules applicable to surveying and mapping, to include potential for updates, and conclude with example disciplinary cases that came before the Board of Professional Surveyors and Mappers.

Nicholas Campanile, PSM is the FDOT District Five Surveyor and Mapper and recently completed serving eight years on the Board of Professional Surveyors and Mappers. Prior to FDOT, Nick served as Chief, Surveying and Mapping in DEP's Division of State Lands, and also served eight years as Adjunct at Tallahassee Community College, all after having served as adjunct at Miami-Dade Community College and was raised in a surveying and engineering family business.

Panelists:

- | | |
|-------------------------|------------------------|
| Richard Allen, PSM, CFM | Richard Malloy, PSM |
| Jack Breed, PSM | David Melvin, PLS, CFM |
| Dianne Collins, PSM | Ray Niles, PSM |
| Dr. Bon Dewitt, PSM | Robin Petzold, PSM |
| Don Elder, PSM | |

Conference Seminars

Saturday, July 29th

8:30 am—
10:10 am

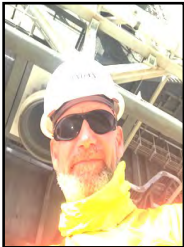


FEMA and the Surveyor, dealing with MT-1 Processes
Course #10500 – 2 CEC's
Richard Allen, PSM

The course will cover eLOMA, LOMA, CLOMA, LOMR-F, CLOMR-F, and the other floodplain impacts and how the surveyor is involved in these processes. The material will cover the different processes and how they impact the floodplain, if any.

Richard Allen, PSM is a Florida Licensed Surveyor & Mapper, and Certified Floodplain Manager who is the City Surveyor at the City of Orlando. He has been in surveying for over 26 years and has been with the City for 17 years. He is the Surveyors in Government Liaison for FSMS and Region V Director for the Florida Floodplain Manager's Association. He is the scholarship chair and Valencia College Liaison for the Central Florida Chapter of FSMS. He is married to his lovely wife Amanda and has a son named Richie.

8:30 am—
10:10 am



Real-Time Surveying to Support the Mission to Mars
Course #10498 – 2 CEC's
Bryan Merritt, PSM/LS/FAA Certified UAV Pilot

The unmanned Artemis I launch system this past November is the first in a line of complex missions aimed at enabling exploration of the Moon and Mars. But before the Orion spacecraft can be launched into space, it must first be moved from the Vehicle Assembly Building to the launch pad at the Kennedy Space Center. Enter the Crawler-Transporter, four connected building-sized vehicles on rolling tracks that, when loaded with the Orion and its mobile launcher, will carry over 25 million pounds. One of the heaviest overland loads ever recorded. NASA needed to evaluate the potential risk that this VERY heavy load may deform the travel way as carried Orion to the launch pad. The presentation will provide the background and process required to provide real-time surveying as the Crawler-Transporter moves to the launch pad. The hardest part: they needed to survey the Crawler-Transporter in motion, making the project exponentially more complex.

Bryan Merritt, PSM/LS/FAA Certified UAV Pilot is a Professional Land Surveyor licensed in FL and NY and FAA Part 107 Certified Pilot and serves as the Manager for Langan's Florida and Caribbean Geospatial/Survey Group. He has more than forty years of experience in the Geospatial Industry. His experience includes management and direct technical experience in performing complex geospatial related projects and providing solutions to complex situations. He is experienced in all facets of surveying and geomatics technologies which includes UAV/UAS systems; terrestrial and mobile lidar systems; 3D modeling and BIM (Scan to BIM); GIS data collection; building documentation and all forms of conventional survey technologies. Bryan has been published in many trade journals and has presented sessions in geospatial survey technology to many organizations. He is a member of the Geomatics Engineering Program Advisory Council for Florida Atlantic University and is one of the founders of the United States Institute of Building Documentation (USIBD) which is a non-profit organization dedicated to actively promote, guide, and support the building documentation industry.

8:30 am—
10:10 am



Considerations for Automatic Feature Extraction of Drone Based Point Clouds
Course #10489 – 2 CEC's
Jennifer Triana

With the expansion of the geospatial drone market in the transportation industry, we explore how to achieve a more automated feature extraction process in topography mapping. Drone based point clouds from LiDAR vary greatly from Imagery based point clouds, so this presentation aims to explore their differences from the point cloud processing aspect. We will examine the pros and cons of each system for practical survey and mapping applications such as topographies, bare earth, volumetrics, etc. Learn how data accuracy, density, intensity/color, and other data characteristics affect a deliverable. We'll also show how to evaluate whether the data meets quality requirements for a certain application, and if it is suitable for automated feature extraction. Examples of automated extraction of break lines, surface models and asset identification will be demonstrated.

Jennifer Triana has over 18 years' experience in the LiDAR industry. After graduating with a Mechanical Engineering degree from UCF, she joined Riegl USA heading the systems team. More than a decade ago she was one of the founding members of TopoDOT, Point Cloud Processing Software, where she is now the Business Development Director.

Conference Seminars

Saturday, July 29th

10:30 am -
12:10 pm

The ASPRS Positional Accuracy Standards for Digital Geospatial Data—2014 Standards/2023 Proposed Revisions
Course #10492 – 2 CEC's
Michael Zoltek, LS, CP, CFedS, GISP, PMP



This workshop provides an in-depth look at the ASPRS Positional Accuracy Standards to categorize positional accuracy of products derived from digital aerial cameras, manned and unmanned aerial systems, and all types of lidar including terrestrial, mobile, and airborne. The workshop will explain the basis for each accuracy measure adopted in the standards.

Michael Zoltek, LS, CP, CFedS, GISP, PMP is a land surveyor, photogrammetrist, and GIS professional with over 30 years of geospatial experience. As the National Geospatial Program Director at GPI Geospatial, Inc (GPI), Mike is responsible for the coordination, execution, and supervision of projects for local, state, federal, DOT, and private clients. He brings to clients a comprehensive background in surveying and mapping, which includes data collection and processing, project management, and QA/QC coordination.

A licensed surveyor who holds active Surveying/Photogrammetry registrations in 26 states, Mike has extensive experience in a variety of Surveying & Mapping tasks for Departments of Transportation in multiple states. Mike is a member of Florida's State Board of Professional Surveyors & Mappers and is a long-standing member of the American Society for Photogrammetry and Remote Sensing (ASPRS) where he currently serves on the Committee revising the ASPRS Standards for Digital Geospatial Data and where he Chairs the Evaluation for Certification Committee, overseeing the organization's certification program. He has also previously served as a member of the ASPRS Standards Committee responsible for establishing the 2014 ASPRS Accuracy Standards for Digital Geospatial Data, as the Director of the ASPRS Professional Practice Division and has also served as an ASPRS Board member. Mike has presented numerous technical seminars at universities and community colleges, as well as at industry conferences, and has served as an expert witness in boundary litigation cases in the state of Florida.

10:30 am -
12:10 pm

Professionalism & Ethics
Course # 10493 – 2 CEC's
Robin Petzold, PSM



This course will delve into the professionalism and ethics that will keep you out of "harm's way" should you ever have an encounter with the State Board. A case study will be presented showing you how to respond in a professional manner in accordance with our rules and regulations as well as the history of how these rules developed. Since these types of encounters are very stressful, this is a course worth your time to prevent any future anxiety.

Robin Petzold, PSM retired from Wantman Group, Inc. as an Executive Vice President and partner in December of 2018, but continued to serve on a consulting basis until February 2020. He holds professional Surveying Licenses in Florida, Alabama, Ohio, Iowa, and Wisconsin, and has over 40 years of professional experience. Additionally, Robin served as an adjunct faculty instructor for 12 years in the engineering department of Palm Beach State College as well as an adjunct instructor at the University of Florida from 2017 thru 2022. He has also taught seminars on State Plane Coordinates, Electronic Data Collection, and Global Positioning Systems Methodologies throughout the United States and abroad. In 2010 Robin was appointed to the Florida Board of Professional Surveyors and Mappers and served as Board Chair for three of those years. Robin's second term ended in 2018 but he continued to serve on the Probable Cause Panel as a past Board member for an additional three years ending his tenure in January of 2021. During that time, Robin developed a keen sense of awareness of how Professionalism and Ethics play a very important roll in performing surveys under the guidelines of both the old and new rules, thus avoiding interaction with the Probable Cause Panel.

10:30 am —
12:10 pm

High-Tech, Low-Tech, No-Tech...Embracing Technology to Overcome Labor Shortages
Course #10494 — 2 CEC's
Timothy Kinder, PSM



This presentation will walk through a brief history of surveying, where we are today with technologies, and the need to embrace multiple technology platforms to overcome the labor shortage in the surveying and engineering industry. The number of licensees leaving the profession is greater than the number entering. Fewer people are getting into surveying for various reasons; we will dig into this a little. The recession of 2008 – 2010 saw a huge loss to the survey labor market; we lost a lot of younger staff that decided to never get back into surveying. We will have sample projects, case studies, visuals, and data to drive the discussion, as well as labor statistics and projections. Real life projects examples will be reviewed to show how technology was used to save time (labor) and some that should have used technology to save time but didn't. We will dive into what we can expect when we embrace the various technologies and when we don't. We will see how various technologies are currently being used to help offset the shortage of qualified and experienced talent, some of the best practices when using the different technologies, and what our end product could look like.

Timothy Kinder, PSM is a Licensed Professional Land Surveyor and experienced leader of 3D reality capture technologies. He has 28 years of experience in surveying and 3D data collection, analysis, processing, and modeling. He has spearheaded the growth and development of the Reality Capture operations with his current and previous employers pushing them to be some of the foremost providers of advanced technologies in the region. Under Tim's direction, his teams have scanned more than 45,000 lane miles of roadway across the eastern half of the United States. More than 7,200 miles of roadways have been developed into 360 degree panoramic videos. In addition to investigating and implementing ongoing technology solutions for capturing data to support engineering design, Mr. Kinder is responsible for building a strong talent pool, directing surveyors and technicians, as well as managing client expectations.

Conference Seminars

Saturday, July 29th

1:30 pm -

3:00 pm

Guiding the Course, Leveraging Mobile Mapping with TopoDOT to Help Build a Formula 1 Race Track Course #10495 — 2 CEC's
Russell Hall, PSM and Jennifer Triana

This course is an overview of mobile LiDAR and its pros and cons versus UAV and Terrestrial LiDAR. It will go through the entire process from planning and acquisition, to registration of the clouds. We will then go through the case study of how it was used to complete a Formula 1 race track. The class will also cover how TopoDOT is used in the extraction process for both the track as well as other real world examples.

Russell Hall, PSM is a professional land surveyor in Connecticut and has over 20 years experience in various aspects of land surveying with a big focus on Terrestrial LiDAR, Mobile LiDAR, and UAV LiDAR.

Jennifer Triana has over 18 years experience in the LiDAR industry. After graduating with a Mechanical Engineering degree from UCF, she joined Riegl USA heading the systems team. More than a decade ago she was one of the founding members of TopoDOT, Point Cloud Processing Software, where she is now the Business Development Director.



1:30 pm —

3:00 pm

Are We There Yet? Update on Working Toward the Modernized NSRS Course #10496 — 2 CEC's
Denis Riordan, PSM

The mission of NOAA's National Geodetic Survey (NGS) is "to define, maintain and provide access to the National Spatial Reference System (NSRS) to meet our nation's economic, social, and environmental needs." The NSRS is the system of latitude, longitude, elevation, and related models and tools, which comprise the nation's foundational positioning infrastructure. NGS has, for several years, been developing and promoting the ongoing modernization and evolution of NSRS, toward the 2022 goal of replacing the North American Datum of 1983 (NAD83) and the North American Vertical Datum of 1988 (NAVD88). The new positioning paradigm will impact all users of geospatial data, either directly or indirectly, and an understanding of the resulting changes of this effort will ease your transition. This presentation will update you on today's status of the NSRS modernization and help you prepare for 2024.

Denis Riordan, PSM Gulf Coast Region Geodetic Advisor, NOAA, National Geodetic Survey - Mr. Riordan has worked with the National Geodetic Survey (NGS) for the past 18 years and serves as the Geodetic Advisor for the NGS Gulf Coast Region (AL, FL, LA, & MS). He works to support those who use NGS products and services, products like the National Spatial Reference Frame. He holds a B.S. Degree in Surveying and Mapping from the University of Florida, is a licensed surveyor in the State of Florida, and worked for over ten years with private industry in the field of land surveying prior to joining NGS.



1:30 pm —

3:00 pm

Sovereignty Lands and Water Boundaries Course #10497 — 2 CEC's
Richard Malloy, PSM and Scott Woolam, PSM

This discussion will focus on the history of sovereignty lands and how to identify them. It will also look at water boundaries and how they impact the private surveyor.

Richard Malloy, PSM has worked for the Board of Trustees for over 40 years. He has worked on retracement surveys and boundary surveys for state lands; however, his specialty is water boundaries and he has worked for over 30 years defending the ownership of sovereignty lands for most of that time. Richard has had the opportunity to work with many of the surveyors throughout the state, an opportunity most surveyors haven't had the pleasure to experience. Through this, he has learned how surveyors have handled many difficult problems as they arise through the course of conducting surveys.

Scott Woolam, PSM is the Chief of the Bureau of Survey and Mapping with the Department of Environmental Protection. After 10 plus years surveying in the private sector in the Pensacola area, he went to the Bureau of Survey and Mapping in 1991 where he is now in his 33rd year or tenure. Scott graduated from the Surveying and Mapping Program (Geomatics) at the University of Florida. He is a member of Tau Beta Pi Engineering Honor Society and the Florida Survey and Mapping Society.





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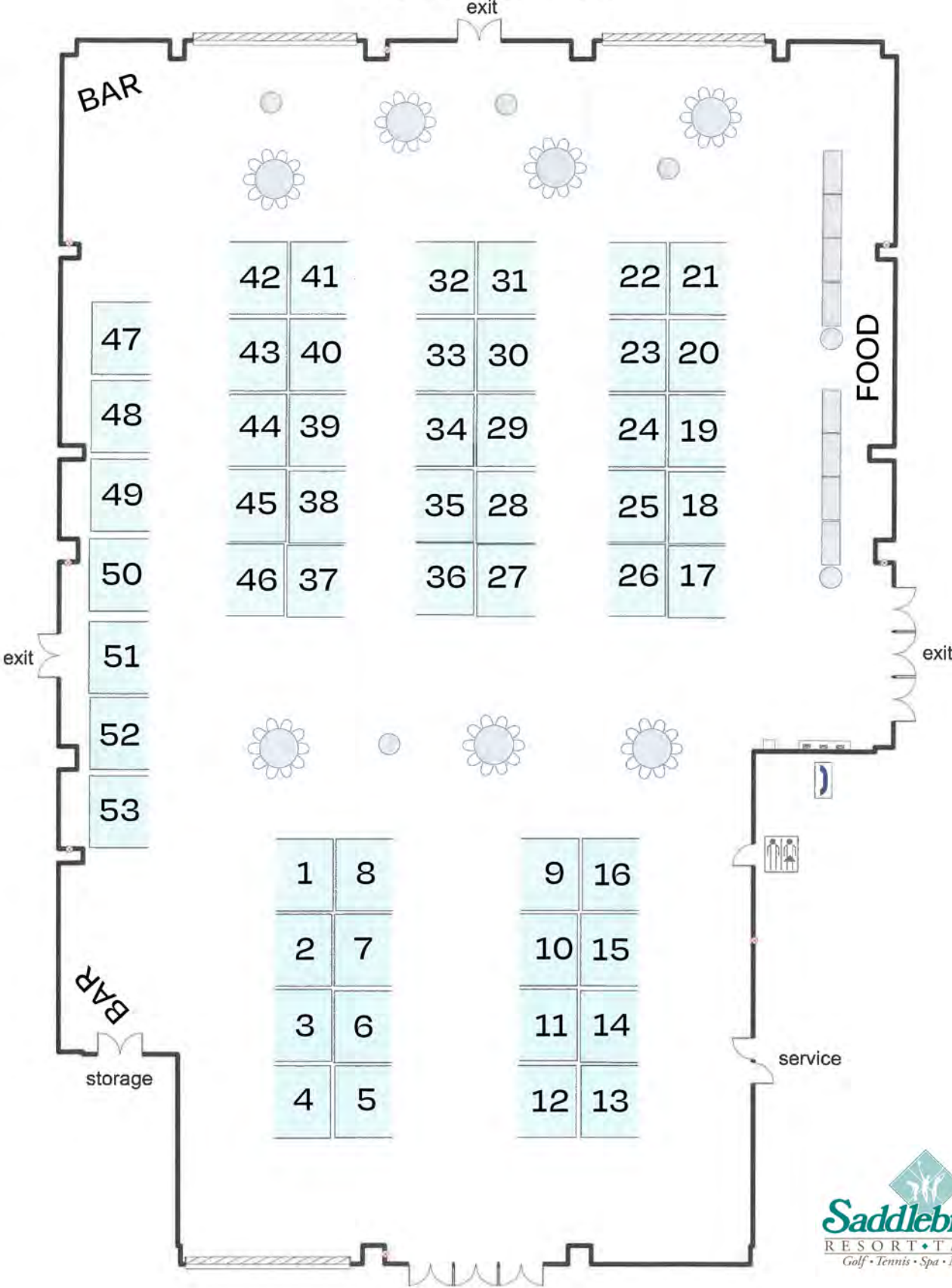


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on
July 26th – July 29th



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- Opportunity to Speak at Welcome BBQ



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- Logo with Hyperlink to Website displayed on [FSMS.org](#)
- 1 night complimentary hotel stay
- One Packet 1 Registration (Each Registration includes 1 BBQ Ticket, 1 Exhibitor Luncheon Ticket, 1 Recognition Banquet Ticket, & 6 Saturday Seminar CECs)
- 1 Floor Cling with Logo displayed in Exhibit Hall
- Opportunity to Speak at Welcome BBQ



EXHIBITOR OPPORTUNITIES



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- Recognition in Conference Edition of The Florida Surveyor
- Logo with Hyperlink to Website displayed on [FSMS.org](#)
- 2 Welcome BBQ tickets

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68th Annual Conference

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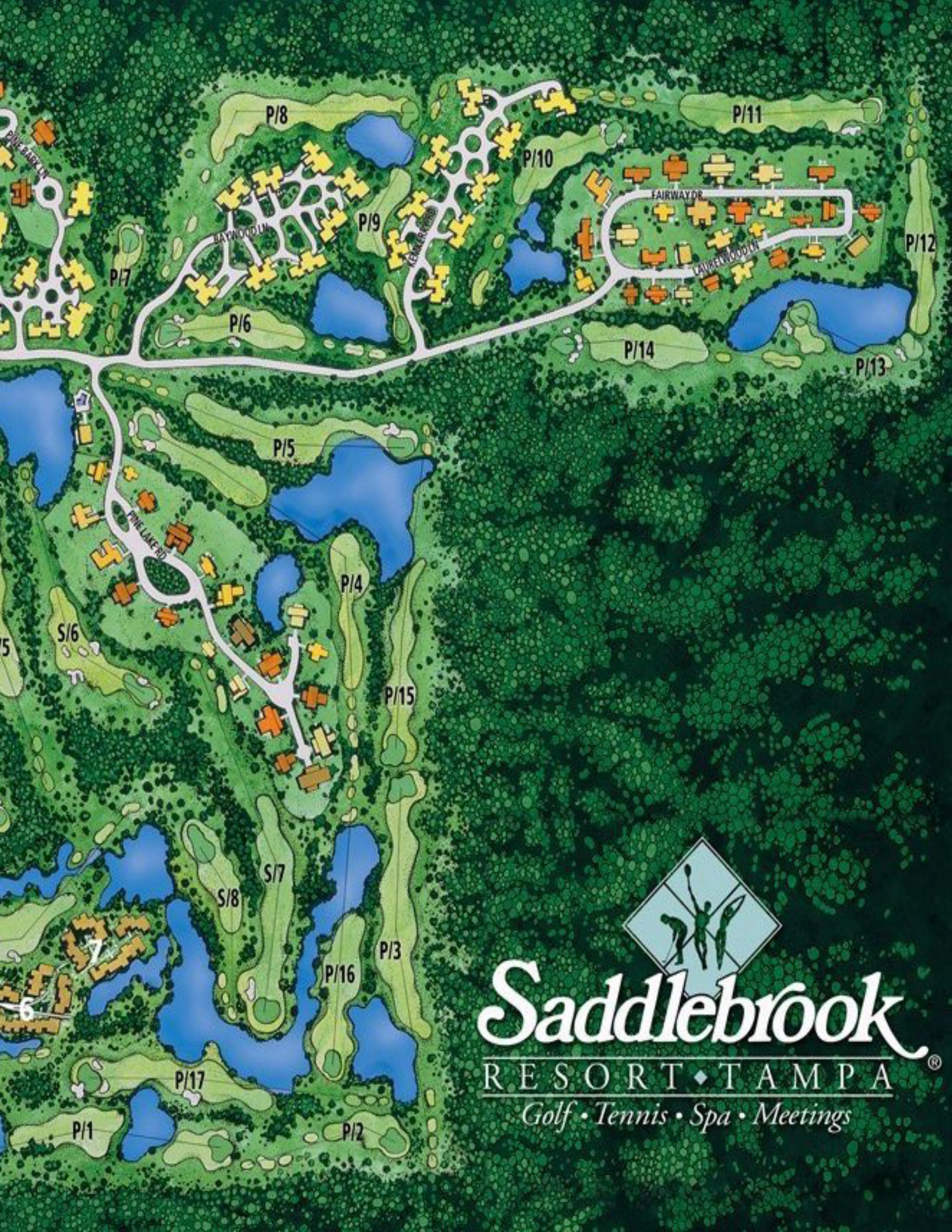
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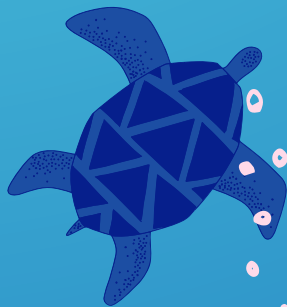


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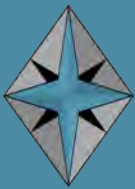
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DSWorld software is a free application originally distributed by NGS in 2012 to display datasheet information in a “world view.” The tool adds new functionality in that it allows users to report errors they have discovered in the database. The software was designed to provide geospatial professionals and the public with up-to-date geodetic control information at the click of a button. Since its inception, it has been enhanced to become a major interface with NGS and the NGS Integrated Database (IDB).

The new [DSWorld Upload Web Form](#), currently on Beta, offers many of the same features of the application as an online form. It allows users to upload new photos, descriptive text, and updated hand-held GPS coordinates for survey marks with poor positions, as well as report errors and corrections found in the database with photos, estimated coordinates, or text. The website will also allow users to request a new agency code if they do not currently have one.

The screenshot displays the National Geodetic Survey (NGS) website. At the top left is the NOAA logo. The main header reads "National Geodetic Survey" with the tagline "Positioning America for the Future". A navigation menu includes "NGS Home", "About NGS", "Data & Imagery", "Tools", "Surveys", and "Science & Education", along with a search bar. The main content area is titled "DSWorld Upload Web" and lists several functions: "Photo(s)", "Description File", "GPX File of Hand Held Positions", "Photo Trouble Report", "Request for New Agency", "Single Hand Held Position(s)", "State/County Correction(s)", and "Text Problem". Each function is accompanied by a button and a brief description of the action. For example, the "Upload Photo(s)" button is labeled "Upload photos of marks." The footer contains links for "NOS Home", "NGS Employees", "Privacy Policy", "Disclaimer", "USA.gov", "Ready.gov", "Site Map", and "Contact Webmaster".

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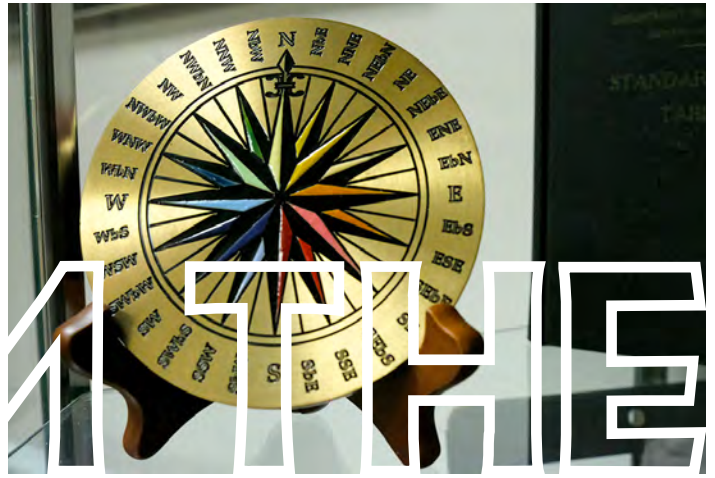
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OPUS Projects 5 has added an [Upload GNSS Vectors] function to incorporate high efficiency real-time kinematic (RTK) surveys into geodetic control projects. This update, along with new [Requirements for Use in the 2023 GPS on Bench Mark Campaign](#) will guide users in using high-efficiency GPS methods to maintain NGS datasheets and improve transformation models relating the nation's existing NAVD 88 heights to the next GPS-based vertical datum.

Users can now upload GNSS vectors into their OPUS Projects, including vectors derived from either a single-base RTK setup or from a real-time network (RTN), for evaluation, quality assessment, and inclusion in a least squares network adjustment.

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FROM THE ARCHIVES



The Need for Professional Education in Land Surveying

By Dr. R. B. BUCKNER

Department of Geodetic Science

The Ohio State University, Columbus

(Originally published in *Surveying and Mapping*, Volume XXXIV, No. 1, March, 1974)

INTRODUCTION

A Missing Curriculum

In 1964 an article was published, entitled "The Case of the Missing Curriculum" and authored by Professor Kenneth S. Curtis of Purdue University. This missing curriculum discussed in the Curtis article is that of surveying and mapping. In the 1950's and earlier, related statements were made and papers were written which dealt with the need for professional education in surveying and mapping. The movement for formal education for surveyors is at least 20 years old, perhaps even older.

A review of the Curtis article, related articles, and letters written by surveyors in practice and in education reveals that most "experts" feel that professional degree programs are needed to educate professional surveyors and that the apprenticeship and other methods are no longer suitable for this purpose. Such opinions are not based on whim or fancy but have solid foundation; for example, the education of surveyors is a requirement before one is considered a professional in most other progressive countries. Why should the requirements in this country

be lower? Modern methods, increased knowledge, sophisticated equipment, the high costs of land, the needs of the public for diversified services other than just property line locations, the level of educational standards used by other so-called "professions," and the lack of adequate land description and surveying in some past surveys, all create the need for formal education for surveyors today.

Filling In What Is Missing

As a result of efforts by both educators and practicing surveyors in Indiana, Purdue University now has a program leading to a bachelor's of science degree in land surveying. It is a well-rounded program with at least 32 semester credit hours of course work that could be termed surveying and mapping and with an adequate amount of related course work. The program is administered by the School of Civil Engineering, but graduates receive a land surveying degree rather than a civil engineering degree.

The University of Florida now has a bachelor's degree called "engineering technology" which emphasizes surveying. Surveyors in that state are now trying

The Need for Professional Education in Land Surveying

to upgrade the degree to a bachelor of science in land surveying.

Ferris State College in Big Rapids, Michigan, has recently expanded their two-year associate degree to a four-year program leading to the degree of bachelor of science in surveying. The program appears to be technical in nature, having evolved from a technician program.

The Committee on Surveying Education of the New York State Association of Professional Land Surveyors has designed a program for a bachelor of science degree in land surveying, which supposedly will be introduced soon at one of the major universities in New York. This program closely resembles Purdue's program.

California State University in Fresno offers a bachelor of science degree in surveying and photogrammetry. From the course titles, the program appears to be adequate in most areas of surveying and photogrammetry except for a noticeable weakness in property surveying, legal principles, surveying history, and other background courses desirable for future registered surveyors.

Efforts are being made in other states to establish land surveying programs. For example, the Society of Land Surveyors of Iowa recently adopted a resolution encouraging the development of a curriculum in surveying and mapping at Iowa State University. The Wisconsin Society of Land Surveyors recently passed a motion that their society should contact the University of Wisconsin and urge the formation of a four-year program leading to a degree in land surveying. These actions imply that surveyors in both Iowa and Wisconsin feel a need for a program

other than the surveying and mapping options in civil engineering presently offered at their state universities. There have been discussions among members of the Professional Land Surveyors of Ohio and the separate Departments of Geodetic Science and Civil Engineering at The Ohio State University toward establishing a separate degree program designed to educate professional surveyors. At the time of the writing of this paper, the Geodetic Science Department was leading the efforts toward developing that degree, but progress was moving slowly due to administration and other problems.

Undoubtedly there are discussions and movements to establish full professional-level degree programs elsewhere. Those mentioned here are the ones that have come to the attention of the author; programs not mentioned are those in other countries having a survey science approach and a few "surveying and mapping" options in civil engineering curricula in this country. These have not been included in this listing as their central purpose and scope is not expressly designed to educate professional survey practitioners.

Toward Understanding the Problem

The remainder of this discussion encompasses the author's viewpoints on what surveying is today, what surveying education means, the relationship between education and professionalism, and what a professional educational program should include. It is hoped that a review of these points will lead to a common understanding of the future of surveying as a profession and give insight into ways in which educators and practitioners can

work together to establish and maintain professional curricula.

WHAT IS LAND SURVEYING?

Background

Land surveying is claimed to be one of the oldest or perhaps the oldest of all professions. It was practiced as an art and a science many hundreds of years before Christ. Historical references to boundary stones having been placed and resurveyed in early Egypt and Babylonia have been found. Surveying and mathematics developed simultaneously; basic geometric principles derived from a need to lay something out on the ground. Since man became civilized, there has been a continuing need to locate and relocate not only real property but also man-made and natural features on the earth's surface. More recent needs include locations below and above the earth's surface as well.

Definition and Function

The practice of surveying as a profession is defined under the term "land surveying" in nearly all state statutes. One reference discloses that three states use other terms. In Texas, it is "public surveying," and in Ohio and Pennsylvania it is simply "surveying." Definitions range in scope from one short sentence to lengthy descriptions, such as the one recently accepted in Florida. Many are patterned after the American Society of Civil Engineers' definition and others after that of the National Council of Engineering Examiners. Some states have kept their own unique definitions. All definitions of land surveying that include more than

one or two sentences have some common features. They include: original property line surveys, resurveys, land subdivision (often excluding engineering functions, however), topographic surveying and mapping, and the preparation of plats and descriptions of whatever has been surveyed. Many definitions spell out more detailed functions, such as route surveys, hydrographic surveys, mining surveys, photogrammetric surveys, and control surveys.

Land surveying has usually been equated with property surveying. This is unfortunate as this connotation implies that land surveying is narrow, when actually, all surveying functions are found in its definition. Furthermore, professional registration or licensing is found only in land surveying. Other narrow specialties in surveying and mapping do not have licensing requirements. Therefore, a truly professional surveyor is a land surveyor. To put it in the words of Sol Bauer of Cleveland, Ohio:

... the land surveyor should be the general practitioner of the surveying field, with sufficient knowledge of the various specialties so that he would be familiar with their applications, realize his own limitations, and be able to coordinate the efforts of one or more specialists into his work.

This statement by Mr. Bauer was made in 1952, so even then it was recognized by some that land surveying was broader than just property surveying. In the last 20 years, the surveying practice has become even broader, warranting even more the changes of the land surveyor's image to the diversified practitioner that he is.

Electronic distance equipment, photogrammetric equipment, electronic

The Need for Professional Education in Land Surveying

computers and calculators, and other automated equipment have changed surveying practice considerably. Accelerated land development and high land values have increased the need for accurate surveys and maps. Today, land surveying firms are larger and more diversified than they were 50 years or even 20 years ago. Surveyors are actively performing services not only in property location but also in construction and engineering surveys, control surveys for mapping and other purposes, aerial photography, the preparation of photogrammetric maps, land planning or subdivision design and layout, computer services for other surveying and engineering firms, mining surveys, industrial surveys, hydrographic surveys, accident surveys, and other services.

Thinking of land surveying and property surveying as synonymous should be stopped. Property surveying is only one part of modern land surveying. Land surveying includes all surveys made on or near the land surface. Besides the recognized functions listed previously, this could include environmental surveying and mapping of slopes, soils, geology, vegetation, land use, and other natural and cultural details. Such surveys and maps are needed by planners, landscape architects, ecologists, and others working with the environment. A practicing professional surveyor is the logical person to make such environmental surveys and analyses for planning agencies and others.

A New Image for the Land Surveyor

If the land surveyor of the future is to perform most of the functions falling

within the present definition competently, a better formal education will be necessary. Before educational needs are discussed, let us first describe the image that should be molded by education.

The modern version of a land surveyor would know how to measure expertly for any purpose. He would understand error propagation, know how to control his errors to the extent feasible for each job, and estimate his probable error for statements on plats of survey. To do this, he need not be a highly educated statistician. He would understand photogrammetry enough to make maps or coordinate the efforts of other specialists, but he need not be a research scientist in photogrammetry, nor would he want to be. He would need to be a geodesist to the extent necessary for performing control surveys within limited areas, but he need not be involved in research concerning the earth's size and shape or gravity field. He would be a planner and designer to the extent necessary to lay out safe, efficient, and appealing new communities, but he would not be a landscape architect or an urban planner and would work with such professionals for extensive landscaping and planning problems. He would know how to determine accurate directions, but he would not be an expert astronomer. He would take pride in preparing maps and plats to make them portray the intended message in an appealing manner, but he need not be a highly educated cartographer. He would know how to program computers for surveying and land subdivision problems, but he need not be a mathematician or computer science specialist. He would understand drainage,

sewage flow, alignment, and grades of various forms of circulation necessary for land subdivision, but he would not be a structural, sanitary, transportation, or other civil engineering specialist, nor would he need to be to make a living. The land surveyor envisioned here would be a property surveyor of the first order. He would understand property law and survey history toward conducting resurveys efficiently, but he would not be a lawyer or historian. He would appreciate preservation of survey evidence. He would be proud of his work and would identify his survey monuments with his registration number, place accurate directions on his survey lines, prepare clear and concise descriptions, place his surveys on public record, continue his education, seek to improve his profession further, and experience the joy of being a highly useful servant to the public. Add to all of this the logical function of being a terrain or environmental surveyor and mapper and the new image of the land surveyor is complete.

A Word on Surveyor Pride

In today's society many groups are seeking either to assert themselves and be recognized or to be free of unnecessary prejudice and discrimination. Is it not time that land surveyors assert themselves as a group which is separate and unique in itself? There is more than enough surveying function to permit the profession to quit hiding under the skirts of the engineering profession. *Engineers are not the mothers of surveyors! Engineers and surveyors are brothers*, closely related but each having individual characteristics. Surveying has

a heritage of its own. Surveyors in past years have held the highest respect of the public and other professionals; many famous Americans were surveyors. The surveyor performs an indispensable role in society. He should be able to hold his head high, so why does he sometimes not do so? A simplified explanation stems from what might be termed “the apprenticeship syndrome.” Those highly esteemed surveyors of the last century were self-taught, which was all that was needed to be termed a “professional.” Nowadays, other professions have strong educational requirements; therefore to gain the respect of other professions—not as individuals, but as a group—the practice must be upgraded through education. When educational requirements are raised, all those identified with the profession, including progressive surveyors who were educated by the “school of hard knocks,” will have reason to stand and be recognized and thus “surveyor pride” will be a reality. Without this elevation to a profession by accepted definition, surveyors will continue to grovel at the feet of engineers and other professionals. This idea is stated as a principle in a well-known text on land surveying:

Professional stature cannot be attained by self-proclamation; it must be earned, and others must bestow the title on the profession.

One acknowledged way to gain attention is to make a lot of noise. To gain true recognition and respect, rather than just attention, points must be proved through actions. This is not to say that this is the way it should be, but human nature seems to operate in this fashion. Acceptance is measured by impressions on others. Pride

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comes from acceptance. Without this acceptance, pride is false. The frustration resulting from false pride causes peculiar reactions and sometimes manifests itself in the desire of some surveyors to align themselves closely with another profession, such as engineering. The “apprenticeship syndrome” forms the base of the disease eating away at the marrow of the pride of the profession. It must be overcome. Then and only then can surveyors, engineers, and other professionals treat each other as brothers.

WHAT IS SURVEYING EDUCATION?

General Comment

One constantly hears of short courses, correspondence courses, refresher courses, extension courses, technical curricula, technology curricula, professional curricula, institutes, conferences, etc. All of these forms of education are often considered as just variations of the same theme with little distinction among purposes. The courses and curricula are often considered as avenues toward professional registration and instruction in “survey-type things.” Conferences, institutes, and conventions are usually considered as gatherings for those already registered and others to discuss mutual problems, and possibly learn how to do some more “survey-type things.” Some of these narrow impressions may be accurate, but since education does and should serve varied purposes, finer distinctions are warranted. Let us attempt to categorize and examine the various forms of education available.

Technical Training

Technicians in surveying are generally considered to be those who gather field data, plot the data, and perform calculations— highly valuable, skilled individuals who are depended upon to make accurate measurements, plot and draft accurately and neatly, and compute without mistakes or errors. They are the group who are given individual job titles, such as rodmen, tapemen, instrumentmen, draftsmen, computers, compilers, lab technicians, photographers, and sometimes party chiefs. Usually they are not expected to make all of the decisions in the field or office and are supervised either by a party chief, a section leader, a head draftsman, or simply the boss. Their work and importance on a survey team should never be downgraded as they are highly important to the success of any surveying mission.

Technical college training generally requires two years with 20 to 30 semester hours of surveying topics; most of the remainder of the course is devoted to mathematics and technical subjects related to surveying. Graduates of such curricula are generally awarded an associate degree. Recently, such technical training has been expanded or introduced in some schools in the form of a four-year study course. During the second two years, advanced surveying topics are introduced and the student's background is broadened through course work in related engineering and other subjects. Graduates of such curricula are usually awarded a bachelor of technology degree. A technologist might be considered as being a highly trained technician or as a dependable link between the technician and the supervisor

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or boss. His background may ideally equip him to be a survey party chief.

Technical schooling is more properly termed training instead of education, since technicians are taught how to “do things.” In the training for associate or technology degrees, emphasis is generally on practical matters, rather than theoretical. There is no pretense that graduates are highly educated theoreticians or ready-made professionals. This is evident in the names of the degrees and the course titles and descriptions which deal almost entirely with survey practice. The practice of surveying is usually taught in a traditional fashion to insure that graduates are of immediate use to employers. As such, technical and technological curricula serve a valuable purpose in supplying established survey firms with needed technical employees and in providing organized training for interested individuals.

Education for Professionals

Professionalism has been discussed in the context of defining modern-day land surveying: professionalism is not self-bestowed; the title must be awarded by others. For land surveying to be considered a profession, educational requirements must be uniform and equivalent to the quality for other professions. As stated in the Taft-Hartley Act of 1947, a profession is a vocation:

Requiring knowledge of an advanced type in the field of science or learning customarily acquired by prolonged course of specialized intellectual instruction and study in an institution of higher learning, as distinguished from an apprenticeship or from training in the performance of routine,

mental, manual or physical processes.

The key phrases of this statement might be “advanced knowledge,” “prolonged course of ... study,” and “intellectual instruction.” The distinction between professional education and apprenticeship or training in routine processes is most significant, setting professional education apart from technical training.

Professional education not only teaches the student how to do things but also gives insight into how they might be done better. If courses are structured and taught properly, students should begin to automatically question—but never automatically reject—traditional ways of performing surveys. Students' minds should be opened to new ideas, no matter how abstract the ideas may seem initially. True professionals always consider new methods and approaches to survey practice.

With the possible exception of the program at Purdue, it is doubtful that a truly professional-level curriculum in land surveying exists in this country. Some approach what is needed, but significant features are missing. Desirable features will be outlined subsequently.

Continuing Education

As implied by its name, continuing education is for those currently practicing, either as registered surveyors or as technicians. Such education is designed to keep practitioners abreast of new techniques and ideas, or to round out their background in established areas of study.

There are movements in some states to require by law that practicing surveyors

participate in some type of continuing education as a condition for renewing registration. Surveyors might be required to accumulate a certain number of “points,” with various activities being assigned different point values.

The following categories of continuing education are presented with implications of their relative value, but they are discussed primarily to place the subject into a logical perspective.

The *first category* of continuing education as viewed by the author, is the most formal approach and takes the form of extension, correspondence, and short courses. These courses may or may not offer college credits, but what sets this category apart from others is that some effort is required from the recipient: he must write lessons, take exams, etc. Courses offering college credits and a grade are generally of a higher quality than noncredit courses. Some credit courses might also be used toward a technical or professional college degree.

A *second category*, still rather formal, but less so than the first, consists of workshops, institutes, and seminars. Such programs are usually attended by individuals desiring instruction in some specific topic or series of topics. Sessions are usually well attended, and participants are issued various materials and notebooks or workbooks. Certificates are generally issued to all attendees. The certificate merely witnesses the fact that the individual attended the sessions. Since there are no requirements for writing papers or passing exams, the certificate carries no guarantee that the person

gained significantly from participation. Stated differently, the person attending can gain as much or as little knowledge from the sessions as desired.

A *third category*, less formal than the second, consists of conferences and conventions. The only formality is that speakers appear according to a planned program, but attendance is purely arbitrary, with no requirement. Attendance of conferences and conventions rarely results in receipt of a certificate. Again, the participant gains intellectually according to self-motivation to become involved in the activities.

A *fourth category* of continuing education includes membership in professional societies, attendance at informal local meetings and discussions, and subscriptions to publications related to one's area of interest. This form of education is, of course, quite informal. Society membership does not guarantee the participation of a member in activities or in reading the publications.

Other Surveying Education

In a class nearly alone are “refresher courses.” As the name suggests, these are designed to refresh the memory concerning a topic to which one has supposedly been exposed to sometime in the past. If taught properly, basic theory is only briefly outlined and is then developed by examples and answers to questions. Unfortunately, many consider such courses as the principal formal educational vehicle to become registered as surveyors. For example, this author has been involved with the teaching of refresher courses

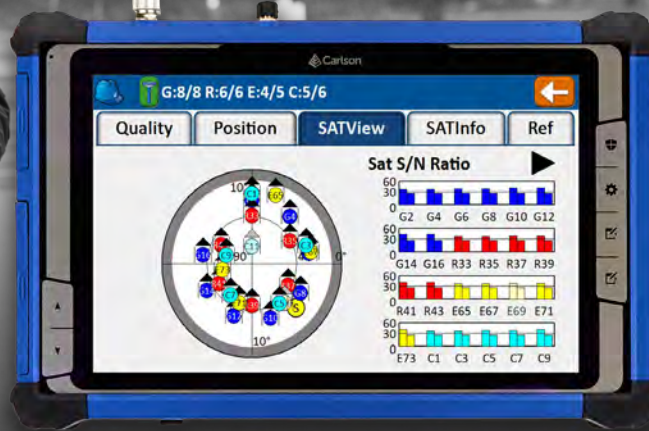
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to students who have never seen or used much of the theory but expect to learn all that is necessary from the course. Furthermore, concerning some topics such as astronomic observations for azimuth, some confess that they never intend to use the theory but need it to pass a registration examination. Refresher courses should not be considered as “cram” courses. If treated as such by educators and students, their ultimate value may be negative rather than positive.

Compilations of sample registration exam questions are in the same class with refresher courses. The purpose of such questions should be to give registration aspirants a chance to drill in typical problems. If the sample questions or problems appear in the same form on any future registration exam, the publishing of such samples ultimately has a negative effect on professionalism. This is especially true of detailed mathematics and practical situation problems. The public is entitled to registered practitioners with higher qualifications than the ability to memorize solutions to specific mathematical exercises or answers to some examiner's pet questions.

Service courses for those not studying surveying as a profession or vocation are often taught in colleges and universities. For example, landscape architecture, forestry, geology, geography, and engineering students often take an elective or required course in general surveying, photogrammetry, or other areas related to surveying and mapping. Such courses are and should be designed merely to explain and define surveying, to present the basic theory, and to include any special topics

desired by students for background in their particular curricula. These should not be used as an attempt to teach individuals to be surveyors but only to understand the function of surveying. Many feel that surveying for civil engineers should be taught in this fashion, especially since most surveying has been removed from the curricula and what remains is grossly insufficient—even in curricula with surveying and mapping “options”—to educate land surveying professionals. There is an obvious threat to the existence of surveying as a unique profession if students taking only one or a few courses in surveying are led to believe that they have acquired sufficient background to practice as professionals. The idea that professional depth is developed through exposure to a few basic topics is absurd. This point will be further developed subsequently.

ALTERNATIVE APPROACHES FOR PROFESSIONAL EDUCATION

General Comments

In this discussion so far, the land surveyor of today has been described as the general practitioner of the surveying field, and it has been implied that any undergraduate degree program should provide background to assure that graduates will make competent professional surveyors whether they decide to practice classical land surveying or seek employment in other areas of surveying. Surveying education has been explained and the different purposes placed in perspective. Following is a discussion of professional college education in Surveying. The various approaches advocated or used

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at present will be discussed in terms of their potential for molding the type of professional surveyor visualized herein. The last one described, as yet nonexistent, is the author's opinion of what is needed.

Exclusively Property Surveys

When some practitioners speak of curricula in land surveying, often they mean property surveying; they would have students spend most of their time learning how to search for and evaluate property line evidence. Although ample time should be devoted to this, there are other equally important topics. With this approach, only very basic mathematics would be taught. All subjects, including surveying, would be taught only to the extent that they relate to local property line resurvey practices. Most advocates of this approach agree that photogrammetry and computers are important, so a course in each would be included. Proponents of this idea are usually quite concerned that graduates will not be able to “go out and make a survey” on graduation day.

Many who feel that this is what is meant by professional education really only want colleges to do the training that should be acquired mostly on the job during the “practical experience” phase of education. Others see land surveying as a narrow field of surveying based on past practices and do not see a need for including many scientific aspects or topics designed to broaden land surveying practice. Some feel that professionalism can be attained through a purely technical approach and that instilling original thought through more varied and theoretical topics is unnecessary.

The major weakness in this approach is that there is not much basis for actually advancing or improving the profession. The principles and practice of modern land surveying, as pointed out in a previous section, go beyond traditional property surveying. As professional programs these would fail because of their irrelevance and narrowness, but probably none are in existence anywhere. However, similarities can be seen in technical programs used as vehicles toward registration.

Survey Science and Engineering

At the opposite extreme from the exclusive property surveying approach is the program that emphasizes the scientific aspects of surveying. Proponents of this approach are difficult to identify, but observations indicate that they are primarily science-oriented educators. Surveying educators typically hold a Ph.D. degree and their interests are greatly in research. Frequently they are inexperienced regarding the practice of surveying. Their interests, knowledge, and values are naturally transferred into education for future surveyors, resulting in courses that emphasize theory. Applications, practical aspects, and legal principles of boundary relocations are all but excluded. Topics such as survey history are considered too mundane for inclusion in such theoretical curricula. Such programs are probably very good as stepping stones for students continuing in graduate school or seeking employment in research or governmental agencies. What is lacking is a foundation in practical problems to create student

interest in the land surveyor as a general practitioner with the goal of serving the public at the “grass roots” level. Without this orientation, employers may be disillusioned with institutions of higher learning, because graduates will be grossly incapable of “going out and making a survey.” As a result, the need for private practitioners may not be filled since employers in practice may be reluctant to hire graduates. Students may then become more interested in scientific research and theoretical endeavors and therefore seek employment in those areas.

With the inclusion of additional courses to form a foundation for the general practitioner land surveyor, emphasis on practical as well as theoretical problems, and perhaps even a name change, these programs would be excellent. Such additional flavor may have to be developed by appointing faculty having both academic degrees and practical experience, whose main interest is in teaching and scholarly endeavors rather than in “hard-core” research. Teaching, scholarly, and service efforts would of course have to be evaluated for promotion in rank in lieu of research in order to attract and keep such faculty.

Civil Engineering Degree

The trend of reduction in surveying courses as part of civil engineering curricula has been observed for several years and indicates that the civil engineering departments are not in the business of educating students in two professions. Perhaps this is as it should be. References for the need for separate curricula are numerous in literature.

Milton O. Schmidt said it in 1951, Sol Bauer said it in 1952, Hugh C. Clark said it in 1956, Ken Curtis stated it in his own words and through other quotations in 1964, and Rolland Hardy made several excellent observations in 1965. The list of advocates of separate curricula could continue indefinitely, but to attempt to quote from all of them would unnecessarily lengthen this article.

Despite what seems obvious to most surveyors, there are still a few—unfortunately, sometimes respected educators and surveyors—who feel that the subordinate role held traditionally by land surveying under civil engineering is all the profession deserves. A statement issued by the American Society of Civil Engineers in 1959 has done more harm than good, according to many who feel the profession is unique.

The few civil engineering departments with “options” in surveying and mapping seldom require any property surveying, and other courses available seem to be mostly science and theory-oriented. Furthermore, even if a student elects a course in property surveying, the time allotted for one course is not adequate to cover even a fraction of what should be taught. Two of the most elaborate options of this type do not require a course in property surveys but have only a two or three credit hour elective. Therefore, students supposedly being educated as professional surveyors either receive no background in property surveying, or receive such a shallow presentation that they are left with a very incomplete idea of the professional practice of surveying. Most will have a rude awakening later.

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Some will take the initiative to learn what they need to know—an extension of the apprenticeship approach; others will not bother but will somehow manage to make a minimum score on registration exams. The result is that all are short changed, including the graduates, the employers, and the public.

None of these comments should be construed to imply that a land surveying degree could not be granted through a department of civil engineering. It matters little where the program is administered. What does matter is that the land surveying degree is a separate and distinct degree. Nor are these comments meant to imply that considerable material could not be taught by civil engineering faculty and that there could not be general cooperation between the faculties for the two separate degrees—as long as the separate degree in land surveying is recognized as having its own objective and course content.

Land Surveying

The basic idea. A curriculum in land surveying should be consistent with the new image of the land surveyor as described previously. Desirable objectives should be to emphasize modern survey practice and broaden the base of land surveying expertise in order to make the profession somewhat more attractive to prospective students and enable graduates to be of substantial use to society upon graduation. A policy to retain the best elements of traditional land surveying practice without compromising the objectives should be effected. Rational, professional, and ethical practices as well

as thought should be taught continuously within the program. Other principles should be to provide sufficient depth and flexibility in the program so that students could complete another undergraduate degree or a master's degree in a related field within a reasonable time and to keep the required credit hours within limits that would allow students to complete the program in four academic years without undue hardship or strain.

As long as the ECPD remains the primary accrediting council for surveying programs and the NCEE continues to prepare land surveyor examination questions, close alliance with engineering, is felt to be practical and appropriate. The inclusion of physics and engineering fundamentals in a land surveying program would accomplish the purpose of providing background courses toward ECPD accreditation and would cover those topics listed on the NCEE syllabus of the Fundamentals of Land Surveying Examination. Most first and second year physics, engineering fundamentals, and mathematics provide excellent theoretical background in surveying courses and also serve as necessary prerequisites for some civil engineering counties which would be desirable to include in a land surveying curriculum. There is an overlap between the practices of land surveying and civil engineering, and flexibility would be added to the program if students could earn a second bachelor of science degree in civil engineering, with perhaps not much more than an additional year of study beyond the B.S. in land surveying. This would be an attractive element, it is felt, for prospective students whose

primary interest may be in surveying but who have more than a passing interest in civil engineering design. The inclusion of engineering fundamentals would provide a stepping stone toward a second degree. It should be emphasized, however, that this in no way suggests that both land surveying and civil engineering could be covered in one four-year program.

A professional program in surveying should emphasize both the theoretical and practical aspects of surveying. It is important that the practical remain, or else the instruction is pure theory, which by itself is of limited value. Science itself cannot be practiced as a profession; it must be applied. But without theory, philosophy of thought, and teaching approaches designed to make the student think, the professional ingredient would be missing. The courses should develop the students progressively in the several aspects of surveying and have professional overtones throughout. These should not be just a series of topics but should be an integrated body of knowledge designed to develop thought processes, to present ideas, and to teach facts.

Although the program envisioned is an undergraduate degree program, a professional graduate degree is also a possibility for students holding undergraduate degrees in related fields or for those wishing to continue in the surveying program. One must consider "first things first," however, and this means implementation of an undergraduate program.

A rough outline. University, college, and departmental requirements vary at

different institutions. Course offerings, course content, available faculty, faculty interests, laboratory space, and available equipment also vary; some schools operate on a semester system, others on a quarter system. For these reasons, no unique outline of a curriculum would be appropriate. The following outline assumes that there are certain requirements in physical sciences, social sciences, humanities, and physical education for all university students. It also assumes that faculty and equipment are available in the department where the curriculum is based to teach most of the surveying courses (listed in capital letters). Approximate credit hours are listed on both the semester and quarter system, although the courses are designed for the latter. Where credit hours for courses on the semester system are low, consideration shall be given to combining some of the courses. The curriculum is explained following the outline.

Credit Hours
Quarter Semester

FRESHMAN YEAR

English	5	3
Mathematics	15	10
Physics	15	10
Graphics	4	3
Computer Science, Social Science, or Humanities	5	3
Electives	3	2
Chemistry or Science Requirement	4	3
Physical Education	3	2

The Need for Professional Education in Land Surveying

	Credit Hours			Credit Hours	
	<i>Quarter</i>	<i>Semester</i>		<i>Quarter</i>	<i>Semester</i>
SOPHOMORE YEAR			SENIOR YEAR		
Economics	5	3	Humanities Electives	7	5
Mathematics	10	7	Technical Writing	3	2
Statics and Dynamics	8	5	Land Use Control Law	3	2
Geology and Astronomy, or Other Science Requirement	10	7	City Planning Principles	3	2
History or Other Social Science Elective	5	3	Soil Science or other Science Requirement	5	3
LS-1 SURVEY ORIENTATION	1	1	LS-12 PHOTO-INTERPRETATION /REMOTE SENSING	4	3
LS-2 SURVEY MEASUREMENT THEORY	3	2	LS-13 GEODESY	5	3
LS-3 SURVEY COMPUTATIONS	4	3	LS-14 MATHEMATICAL METHODS AND ADJUSTMENTS	3	2
LS-4 FIELD SURVEYING	3	2	LS-15 PRESERVATION OF SURVEY EVIDENCE	6	4
LS-5 LAND SURVEYING HISTORY	3	2	LS-16 LAND SURVEY PRACTICE	2	2
JUNIOR YEAR			Area of Specialization	13	9
Transportation Principles or Hydrology	5	3	Electives	<hr/>	<hr/>
Geography or other Social Science Elective	5	3	TOTALS	210	141
Landscape Architecture Design	5	3	<hr/>		
Strength of Materials	4	3			
Real Estate or Property Law	3	2			
Fluid Mechanics	4	3			
LS-6 PHOTOGRAMMETRY	4	3			
LS-7 SITE AND ENGINEERING SURVEYS	5	3			
LS-8 ENVIRONMENTAL SURVEYS	3	2			
LS-9 BOUNDARY RELOCATION PRINCIPLES	5	3			
LS-10 CARTOGRAPHIC PRINCIPLES	4	3			
LS-11 SITE PLANNING FOR SURVEYORS	3	2			

Freshman Year. The freshman year is essentially that of any student enrolled in engineering or science. The course called LS-1 Survey Orientation might be included in the freshman year.

Sophomore Year. The second year includes additional background courses, basic education requirements, and courses in the major. At the end of the second year, students will have completed enough mathematics, science, drafting, and surveying courses to have attained some proficiency as survey technicians. Should education be terminated for any reason at the end of the sophomore year, a student should be capable of working

as a technician. Students should also be useful, at this point, as summer helpers for surveying firms.

Survey Orientation LS-1 is designed as a motivating and interest-arousing experience for the student and general familiarization with surveying and might include films, demonstrations, and lectures from the faculty and guest speakers. Surveying would be defined. LS-1 shall be taught concurrently with or precede LS-2.

Survey Measurement Theory LS-2 is intended to familiarize students immediately with the world of measurement. This course would be a lecture-lab. It is felt that this theory should be presented first to prevent the development of misconceptions and bad habits. However, the course would not be pure theory, since it would include field familiarization with tapes, transits, theodolites, and levels. Systematic errors, random errors, mistakes, significant figures, theoretical analysis of measured quantities, weights, propagation of random errors, derivation of specifications for measurements, and a general discussion of basic measurements in the three elements of space would be covered.

Survey Computations LS-3 is planned for the winter quarter to follow LS-2. It would cover angles and directions, traverse computations, triangulation, geometry of the circle, and the application of trigonometry and analytic geometry to the solution of problems, such as those of land division and missing parts. The course would be a lecture-lab where all computational methods, including logarithms, calculators, and computers,

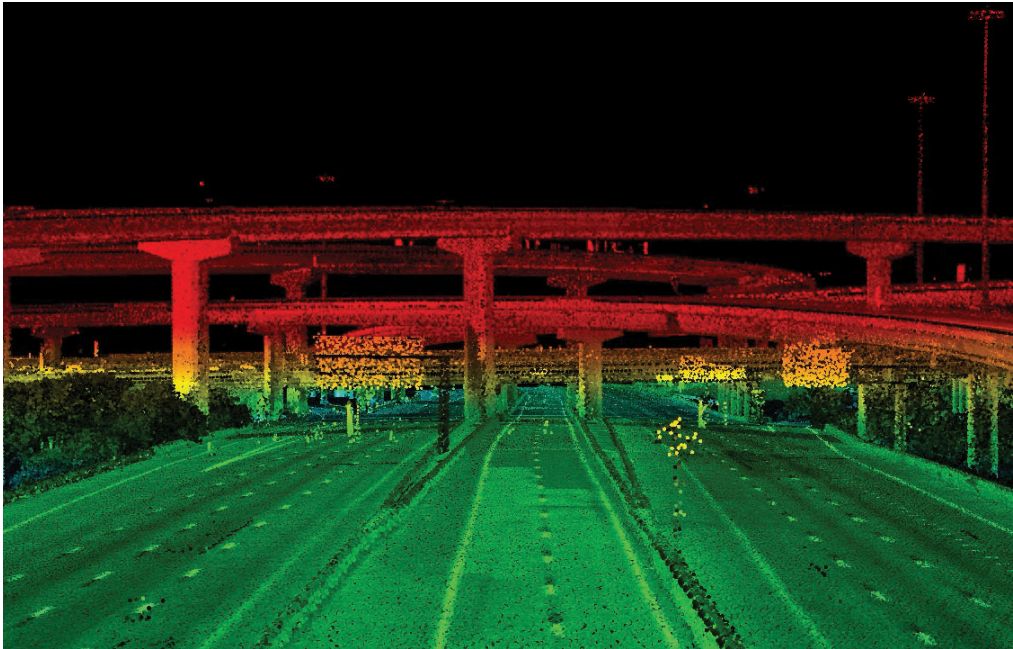
would be employed; emphasis would be placed on electronic calculators and computers. Significant figures in computations would be stressed.

Field Surveying LS-4 is the first actual field course and continues where LS-2 ends. The field surveying course is intended for the spring. Its main purpose should be to develop the art of keeping field notes, and planning and executing field problems. At the same time, students should gain more appreciation for the art and science of accurately measuring in the three elements of space. Lab problems would consist of elevation, angles and magnetic directions, and distance measurements. Electronic distance and other equipment would be employed as available. The subject of sources of instrumental and other errors would be expanded over that taught in LS-2, instrument adjustments would be included, and error theory would be applied.

Land Surveying History LS-5 could be taught at any time between the middle of the sophomore year and the first part of the junior year, but should precede the course in Boundary Relocation. The history course should include a sketch of early Greek, Roman, and Egyptian surveying and trace the development of surveying equipment and units of measure. Various principles of land ownership and transfer should also be discussed, which could be followed by land surveying and ownership in this country prior to the Revolution. A detailed accounting of the Public Land Survey System would account for a large part of the course. Substantial time should be

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spent on metes and bounds systems in states not using the Public Land System. State and local peculiarities of early surveys should be discussed. The course could be concluded with a discussion on developments in surveying in the 20th century and the future of the profession.

Mathematics throughout the sophomore year would include calculus, analytic geometry, and differential equations. Physics would include mechanics, heat, light, sound, electricity, and magnetism.

Junior Year. The third year should include more in-depth courses in several aspects of land surveying and related areas, additional engineering fundamentals, a course in landscaping designs, a law course related to real property, and civil engineering courses in transportation or hydrology.

Photogrammetry LS-6 should include basic optics, photography, metric cameras, stereoscopy, ground control, photographic missions, stereoplotters and other equipment, an introduction to interior and exterior orientation, special problems in aerial and terrestrial photogrammetry, and applications to mapping and surveying. This course could be taught anytime during the junior year.

Site and Engineering Surveys LS-7 should include the several ground methods of gathering data for topographic maps, engineering plans, and architectural designs. Topics in route surveying would include circular curve design and layout, parabolic vertical curve design and staking, spirals, and geometric design of streets and highways. Construction staking for various types of engineering works should be included as well as earthwork

computations, hydrographic surveys, mine and tunnel surveys, as well as industrial surveys. The course would be a lecture-lab and should move fairly fast after the background developed in the sophomore year. This course is intended for the fall term.

Environmental surveys LS-8 is intended for the winter term but could also be taught in the fall. Data sources, soils classification and mapping, geology and water sources investigation, vegetation classification and mapping, slope mapping and studies of land forms and drainage should be covered at this point. Also included would be terrain analysis and land use suitability mapping, using computer methods and other techniques. Applications of airphoto interpretation and remote sensing to environmental surveys should be discussed. This course might be developed in cooperation with the civil engineering or landscape architecture faculty.

Boundary Relocation Principles LS-9 should be an intensive course covering real property transfer and interests, survey evidence, resurveys for sequence and simultaneous conveyances, Public Land resurveys, and special resurvey problems. Pertinent state laws and court decisions concerning resurveys should be covered, with basic steps in conducting a resurvey included. Some laboratory time would be spent on records searching and evaluation of field evidence. *Boundary Control and Legal Principles* by Curtis Brown and *Evidence and Procedures for Boundary Location* by Brown and Eldridge ought to be covered as well as *Restoration of Lost or Obliterated Corners and Subdivision of Sections*, and the *Manual*

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of *Instructions* and books by Skelton, Clark, and others should be introduced.

Cartographic Principles LS-10 would include thematic mapping, map projections, map reproduction, inking and scribing techniques, map compilation techniques, map and information sources, map generalization, computer mapping, and map expression. It should not be a course in topographic surveying and mapping. This course could be taught anytime during the junior year; it might be available for geography department.

Site Planning for Surveyors, LS-11, should follow the course in site and engineering surveys. As visualized, this course would encompass traditional courses entitled “subdivision design” but would approach the problem of land conversion not only from a design and platting procedure viewpoint, but also from a social and aesthetic viewpoint. The art of site planning would be developed through a study of *Site Planning* by Kevin Lynch, and practical aspects of land development through study of *The Community Builders Handbook* by the Urban Land Institute. Topics would include site analysis, land use controls, consideration of environmental factors, design principles, and platting procedures. Traditional and modern designs for residential, commercial, industrial, and recreational areas would be discussed, also planned unit developments and new cities. Student lab projects would be preparation of various types of plans. The role of the surveyor as designer and member of a design team would be presented as well as surveyor relationships with clients, contractors, plan commissions, and others.

Construction inspection problems would also be included.

Senior year. The fourth year of study should include more courses in surveying and related areas, a course in technical writing or similar substitute, land use control law as taught from a legal or planning approach, basic principles of city and regional planning, a soil science or similar earth science course, and humanities electives.

Photo Interpretation/Remote Sensing LS-12 should include principles of interpretation from aerial photographs for geological, forestry, city planning, and survey planning purposes. Remote sensing methods and applications should include an introduction to the basic physical principles, multiband photography, thermal imagery, multispectral imagery, radar imagery, and passive microwave systems. The student should emerge with an appreciation of how various methods might be applied to land and environmental surveying problems. This could be taught in the junior year or the early part of the senior year and might be taught in cooperation with civil engineering or other departments.

Geodesy LS-13 would be an introduction to the basic problems involved in the extension of major control, the use of highorder geodetic instruments, geometric geodesy, gravimetric geodesy, geodetic astronomy, and satellite geodesy. This course could also be taught during the junior year but should follow or be taught concurrently with LS-14.

Mathematical Methods and Adjustments LS-14 should encompass vector

analysis, matrix computations, Taylor series, variance, covariance, observation equations, and condition and normal equations. The subject of weights and propagation of errors should be reviewed.

Preservation of Survey Evidence LS-15 as visualized by the author would be a course designed to cover subjects traditionally taught in courses with such titles as “land descriptions,” “astronomical observations,” and “state plane coordinates.” That is, all such subjects would be discussed in the appropriate context of preservation of evidence. Topics would include measurements as evidence and how to show them on plats of survey, written and graphical description preparation, survey monumentation, survey recording and filing, astronomy and gyro systems for determining directions and position, and state plane and other coordinate systems. Student lab problems would include description and plat preparation, astronomical observations, and state plane coordinate computations. Since this course contains much important material, it might suitably be divided into two courses: one to be taught in the spring of the junior year and the other in the fall of the senior year.

Land Survey Practice LS-16 would be a final seminar-type course, intended as a transition from the academic to the real world for graduating seniors. Survey business problems, professionalism, fees, salaries, ethics, business management, and personnel problems might be discussed. Guest speakers from practice would be used.

The balance of the senior year would consist of two or three courses in the student's chosen “area of emphasis,” which are explained below.

Areas of emphasis. These areas are intended to provide an opportunity for students to pursue individual interests and to develop further the background necessary for professional practice. The areas could also serve as springboards for more advanced graduate study or later specialization in practice.

- Area 1, Boundary Relocation Surveys contain aspects that have always been a part of the land or property surveyor's role. This could be developed primarily through a second course in boundary relocation problems, where more in-depth study of references on surveying boundaries would be undertaken. Part of the study might also be handled through summer employment with land survey firms where the student would be required to participate in the analysis of several property surveying problems and submit reports on these to the professor in charge. Other elective courses might be photogrammetry, accounting, business, economics, civil engineering, botany, law, and other areas.
- Area 2, Topographic and Control Surveys, encompasses functions which have also traditionally been a part of land surveying, namely, plotting and mapping the shape of the land. Necessarily, it includes the geodetic control work and techniques of mapping by modern methods. Among choices offered the student would be

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photogrammetry, geodesy, cartography, and advanced mathematical and adjustment concepts. The student may possibly wish to take additional courses in mathematics, statistics, or astronomy. Within this area of emphasis students could specialize specifically in photogrammetry, geodesy, or cartography, or combine these sciences as appropriate, in order to practice in these fields or pursue advanced degrees in theory and research.

- Area 3, Community Design, is included since it relates to the part of the land surveyor's function in land subdivision and represents a slight expansion of this function. Hopefully it will help to attract some students to the program. This area is intended to broaden the student's background in the planning, design, legal, and social aspects involved in platting land. It could include an advanced course in community design problems, where more in-depth study of planning layouts would be undertaken, and could also include electives in landscape architecture, city planning, civil engineering, geography, agricultural economics, political science, and law.
- Area 4, Environmental Surveying and Analysis, adds a new dimension to traditional land surveying, and it is hoped that it would also help to attract students to the program. This area is intended as an answer to the current needs for land use suitability survey and analysis of the many aspects of the physical and natural environment prior to the planning of cities and regions. Additional study in

remote licensing and elective courses in geology, astronomy, landscape architecture, geography, agricultural economics, computer mapping, and law could be included.

It must be pointed out that at least one course in all of these areas was included in the junior year or in the first term of the senior year. The assumption is that a student will have chosen an area of emphasis by the beginning of their senior year.

Discussion. The proposed program has no provision for summer camp. However, if a camp is deemed desirable, then the course called Site and Engineering Surveys LS-7 could be eliminated from the academic year program and the camp could be held after the sophomore year. The course mentioned does contain much laboratory time, and most of the traditional camp topics would be covered, assuming there is field space to work on campus. An alternative to camp might be summer employment after the sophomore and junior years; students might be required to submit reports for credit within their area of emphasis. It would probably be necessary to screen prospective employers for assurance that students would be assigned meaningful tasks in their chosen areas, sufficient to produce the required reports. Such arrangements would be economically advantageous to students. The experience might also count toward professional registration. The danger of such arrangements is that bad habits sometimes develop if students work in non-progressive surveying firms. For this reason, care in placing students should be taken, and generally encouragement

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should not be given to seek surveying employment before the foundation of thought is developed in sophomore year courses.

This author has been asked by more than one educator in civil engineering, including surveying instructors, what could possibly be included in a program in land surveying that would take four years. It is hoped that the answer to this question has been made obvious. The outlined program may be useful to others who are attempting to develop professional programs, since they will inevitably be asked this same question. Detailed course syllabi in lieu of the sketchy descriptions herein emphasize the point even more dramatically.

Upon comparing the program outlined with typical civil engineering programs with surveying options, several similarities can be noted. An easily seen difference between the two approaches is that the 30 credit hours, at least, of structures, sanitary engineering, transportation, and related courses included in civil engineering are replaced with surveying and supporting courses more related to surveying than civil engineering. An equally important difference is the manner in which the courses are arranged and taught. This difference is somewhat subtle inasmuch as some of the same material may be presented in civil engineering surveying courses. But, since one approach is for educating professional surveyors and the other for civil engineers, there is a difference. Cases in point are the importance placed on measurement theory, the context in which preservation of evidence is presented, the attempt to

cause the sequence of subjects to flow into one body of knowledge and not just a series of vaguely related topics, and an appropriate emphasis on property surveying and other subjects needed by a practitioner.

The engineering orientation of the program might at first seem inconsistent with the earlier comments on “surveyor pride,” etc. These comments are idealistic and should be what we are seeking eventually. The program, if it is to work, cannot be too radical. For reasons stated relative to accreditation and appeal to prospective students, it is felt that the approach outlined has the most likelihood of succeeding. Perhaps after many graduates are practicing and everybody accepts land surveying as unique, some of the courses in mechanics and other engineering fundamentals might be eliminated, allowing more time for other surveying electives. In the meantime, these courses do contain much relevant background material and should be considered advantageous for the overall goal of increasing the number of professionally educated surveyors.

Some might be tempted to ask why a student should be required to take all of the land survey history, boundary surveying, and other such topics, if they are interested in other areas. A similar question might be: Why do students interested in property surveys need to take all of the mathematics or courses such as adjustment computations and geodesy? Similar questions have been heard from students studying for other professions. Civil engineering students interested in structures wonder why they

need to take sanitary engineering. Others interested in transportation ask why they need structures. Perhaps law and medical students ask similar questions about their requirements. The answers to these questions are obvious: A body of knowledge defining any profession usually consists of several subjects; none should be omitted or the profession becomes ill-defined. In regard to land surveying, the public welfare is assured if all students studying for the profession have ample background in all areas, particularly property surveying. There is room for specialization in the “areas of emphasis.” Students wishing to specialize further or who are interested in teaching or research can continue in graduate school. The spirit of any undergraduate program should be to educate professional surveyors and, at the same time, provide flexibility for any student inclined toward more specialization or more theoretical study. This is best done by using the approach outlined herein. Professor Curtis recently stated:

There has never been an attempt to call it [the Purdue program] anything other than a program in “land surveying.” That’s what it is all about!

The program outlined here has been conceived in a similar spirit. Basic courses in all areas must be required of all students, or the program is incomplete. *Surveying is land surveying when speaking of it as a profession.*

It might be noted that the professional degree graduate will receive all of the technical education received by graduates of technical programs. If he is employed in private land surveying practice, his immediate function may be essentially the

same as the technical program graduate, since field experience will be important to fulfill the spirit of the practical experience requirement for registration as a land surveyor, and since such experience is important toward developing his ability to direct technicians in the future and to make the transition from the academic to the real world. The real worth of a professional degree program graduate will be realized ultimately in directing survey operations from a departmental head level, as an owner of his own business, as a future educator or researcher, or as a key member of a governmental agency involved in surveying and mapping. After registration as a professional, he may continue to function effectively in the field as well as in the office.

If future registered surveyors are required to have education as described, eventually survey practice should improve appreciably. The principal recipients of the benefits will be the public who will receive better quality for less cost, the educated professional himself who will enjoy confidence and pride from knowing he is useful to society and accepted as a professional by others, and the existing owners of surveying businesses who will be able to improve their own practices.

SUMMARY

For years many surveyors have advocated separate degree programs for educating professional surveyors. Only recently has much action been taken to direct education along the lines of a separate degree program and away from the apprenticeship method and the civil engineering approach. Land surveying

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today is a broad field encompassing many facets of surveying and mapping, and is not confined in practice or definition to property surveying alone. Such a broad field requiring knowledge of modern equipment, background in several areas, and an appreciation of public responsibility warrants an educational program consistent with accepted standards for any profession. So much is involved in the surveying profession that surveyors should not need to become civil engineers or scientists first. They can become proud land surveying professionals first, then diversify or pursue scientific endeavors, if so inclined.

Professional education in surveying differs from technical education. It is broader, more intense, more theoretical, and is designed to dilate the mind and ultimately advance the profession. Careful programming and attention to teaching methods is important to create the professional flavor; there are many surveying programs designed to train technicians. The higher level programs are found in graduate schools or are scientific in approach to groom undergraduates for graduate school. What is needed are sound undergraduate programs that can fill the gap between the technology programs and the scientific programs. Civil engineering programs do not accomplish this because many times they are science-oriented and because there is not time in such curricula to educate both civil engineers and land surveyors. The approach suggested here will fill the gap mentioned, educate professional surveyors who wish to go into practice or government work, and give background

for more advanced graduate study. Calling the program “land surveying” seems logical since this is “what it is all about.” Graduates would be qualified for any type of surveying endeavor, whether it required professional registration or not. Development and survival of educational programs demand the acceptance and active support of practitioners and educators. With sufficient interest in and promotion of these programs, the “sleek new surveying cat” envisioned here will soon be creeping around the countryside performing the best survey work in the history of mankind—all to the benefit of the public, the surveying firms who are fortunate enough to hire him, and to the individual himself.



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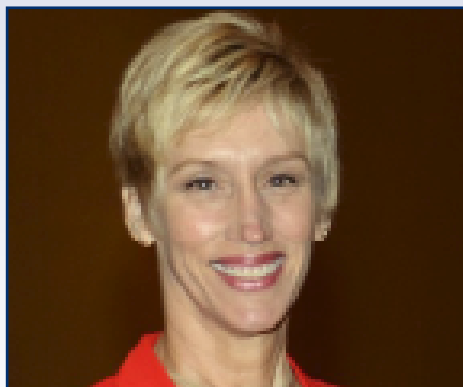
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