The Tarheel SURVEYOR

FALL 2018 | No. 18.2

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The Tarheel SURVEYOR

Fall 2018

In This Issue...

Cover Image: By NC Geodetic

ABOUT NCSS:

- Founded January 31, 1939
- Second oldest professional surveying organization in the United States
- Only professional surveying organization in NC
- Affiliated with the National Society of Professional Surveyors and, therefore, all Professional Members are also accounted as members of NSPS as of July 1, 2013

OUR MISSION:

"A society of professional surveyors and their associates dedicated to enhancing professionalism, improving legislative awareness and promoting the profession of surveying."

Who We Are

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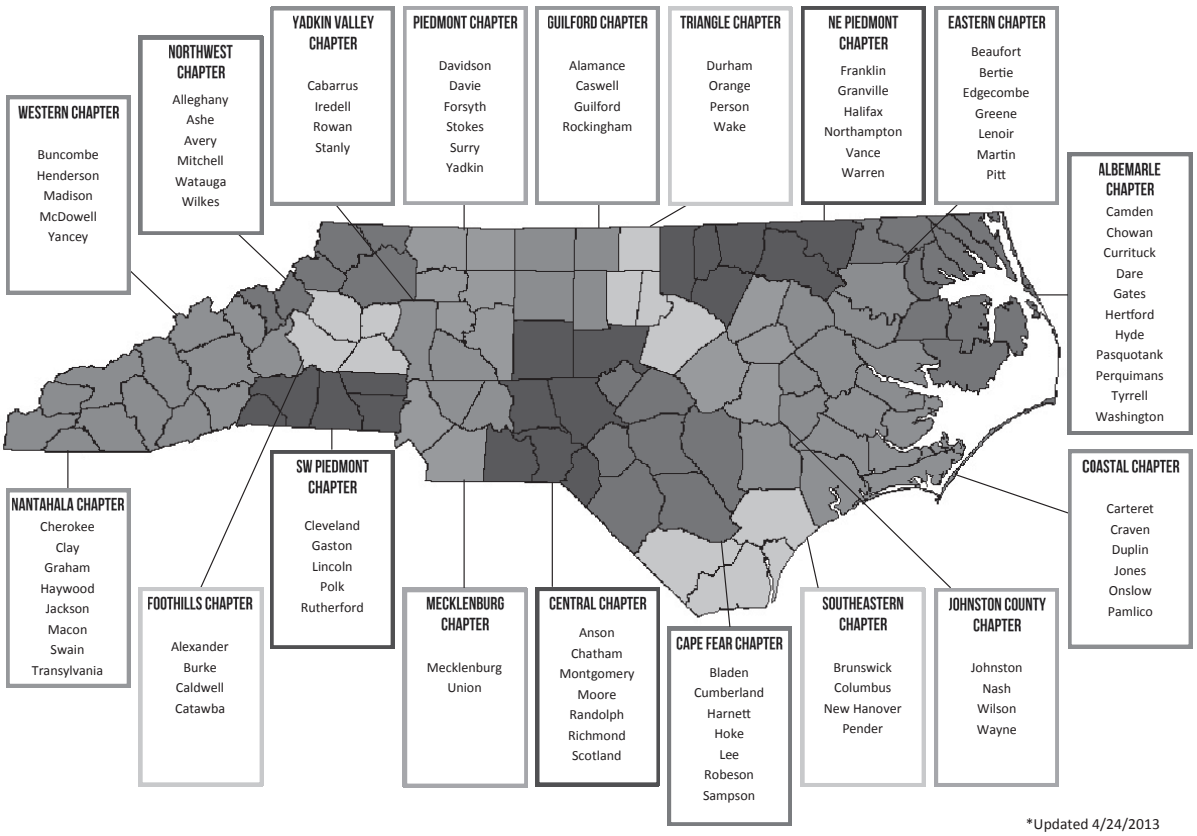
CHAPTER MEETINGS

CHAPTER	DATE & TIME	LOCATION
Albemarle	3rd Tuesday | 6:30 pm	Cypress Creek Grill, Elizabeth City
Cape Fear	Last Tuesday | 6:30 pm	Various Locations, Fayetteville
Central	Last Tuesday | 7:00 pm	Pumpkin Creek Cafe, Seven Lakes
Coastal	Last Monday | 6:30 pm	Texas Steakhouse, Morehead City
Eastern	2nd Monday | 6:30 pm	Parker's BBQ, Greenville
Foothills	2nd Tuesday, 7:00 pm	Timberwoods, Morganton
Guilford	3rd Wednesday | 6:00 pm	Various Locations in Greensboro
Johnston County	2nd Tuesday | 6:00 pm *no meeting Jun-Aug	Holt Lake BBQ, Smithfield
Mecklenburg	1st Monday | 6:00 pm *no meeting Jul-Aug	Dilworth Grille, Charlotte
Nantahala	3rd Tuesday | 6:30 pm *no meeting Jun-Aug	Bogart's, Sylva
NE Piedmont	Last Tuesday | 7:00 pm	Various Locations, Louisburg
Northwest	3rd Tuesday | 6:00 pm	Various Locations, Boone & Wilkesboro
Piedmont	4th Tuesday | 6:00 pm	Various Locations, Winston-Salem
Southeastern	Last Wednesday | 7:00 pm	Carolina BBQ, Wilmington
SW Piedmont	2nd Thursday | 6:30 pm	Dragon Palace, Spindale
Triangle	3rd Tuesday | 6:30 pm	Peddler Steakhouse, Raleigh
Western	2nd Tuesday | 6:30 pm	Cornerstone Restaurant, Asheville
Yadkin Valley	2nd Wednesday | 6:30 pm	Various Locations, Salisbury

NCSS Local Chapters



*Updated 4/24/2013

Director's Notes

The North Carolina Society of Surveyors (NCSS) has given me many new opportunities through the years, for which I am very appreciative. The latest opportunity came in the month of September when I was invited to attend the Future of Surveying Forum meeting in Red Wing, Minnesota to discuss opportunities for North Carolina to play an instrumental role in increasing awareness of the surveying profession.

In April of 2018, NCSS submitted a grant proposal to National Council of Examiners for Engineers and Surveyors (NCEES). Our goal was to apply the grant, if awarded, to focus on recruiting under-represented minorities into the surveying profession. Although we received very positive feedback from NCEES, they subsequently denied our request during their May Board of Directors meeting. The grant denial; however, came with two caveats that could be addressed and then resubmitted. First, we were asked to broaden our program geographically and second, we were asked to consider potential involvement with NSPS.

This is what led me to the Future of Surveying Forum's most recent meeting in Minnesota. The Forum began in 2014 under the authority and funding of NCEES to serve as a think tank for industry leaders to discuss awareness of the profession of surveying with those making primary or secondary career decisions. After two years, NCEES removed the group's funding and they found a new home under the NSPS Workforce Development Committee. North Carolina surveyor and North Carolina Board of Examiners for Engineers and Surveyors (NCBEES) representative, Mike Benton, who has served with the group for two years, proposed to the NCSS Executive Committee that a representative from NCSS attend the meeting with him to see if there was a way to partner with the group if NCSS decides to reapply for the grant funding.

The group was most welcoming as I arrived for the day-long meeting. It is made up of individuals from all over the country and throughout all of the professions that touch upon the skills and knowledge included in surveying. Representatives were there from groups such as: NCEES, National Society of Professional Surveyors (NSPS), National Geodetic Survey (NGS), American Society of Photogrammetry & Remote Sensing (ASPRS), POB Magazine, NCBEES, Surveying and Geomatics Educators Society (SaGES), Management Association of Private Photogrammetric Surveyors (MAPPS), America Society of Civil Engineers (ASCE) and the private sector. It was encouraging to participate in a group that was so diverse yet pursuing a common goal.

The group began by unveiling their new logo which was exciting for everyone to see on cups and jackets. They are hoping to brand items to wear and print materials to increase awareness. Discussion followed regarding the beasurveyor.com website that was begun here in North Carolina by Doug Suttles, PLS as an outreach tool for NCSS's Education Foundation. The Foundation recently asked NSPS to take over the site with the goal of growing a national website where anyone interested in the profession can trust as a valued resource for education and career direction. NSPS invested money into the site and it now looks wonderful. It is a focal point for those thinking of a career in surveying or thinking to change careers.

Ultimately the trip resulted in the Forum's recommendation that NCSS reapply for the grant with a few of our surrounding states as part of a pilot project to recruit not just minorities and females, but anyone who may be interested in becoming a surveyor. Everyone agrees that it is a great profession. The biggest hurdle we have is communicating facts about the career to those who may be a great fit for the profession, but have no idea what resources are available to them as they choose their professional path. I look forward to updating you in the future as our Board of Directors considers the options for another grant.

Christy C. Davis

Christy C. Davis, Executive Director

Letter from the President

Happy fall everyone! Time truly does fly when you are having fun. It seems as though it was just the other day that I was writing my spring newsletter to you. My time as your president is quickly passing by and as your president, I would like to take this opportunity to say, "thank you," to each and every one of you for stepping up to the plate and being a member of this great organization. It truly has been an honor and a privilege serving each one of you.

This year has been a great year for NCSS. Christy, Michelle, and Sherri have been extremely busy and working hard to make sure that our society is everything that we promote it to be and then some. Whether it has been seizing opportunities for growth and diversity or bringing threats to the surveying profession to our attention, our staff has been on top of things and have been nothing less than remarkable. I can now say what I have heard so many past presidents before me say; our staff makes my job so easy.

In my spring newsletter, I talked about my conference theme "Driven to Inspire". What would it take for us to grow as a society to numbers we've never seen before? It would only take each one of us inspiring just one person to join. Last year, we had a great year for membership, having surpassed 1000 members for the first time in a long while. As of today, our year-to-date membership numbers are slightly higher than last year. This is great to hear! This is a step in the right direction, but we still have a long way to go. While out talking to students and technicians about joining NCSS, let's not forget to talk to other professionals about how great our society is and what it is doing for you. The challenges, issues, and threats to our profession that are brought to our attention on a daily basis are most likely not even known by a lot of professionals in our state. This is where you and your voice can help us.

Sometimes when there are great things happening around us, there are also bad things happening to some of us. This being the case with Hurricane Florence passing through North and South Carolina and causing catastrophic damage to so many. Having gone through many floods myself, my heart goes out to all who have been affected by this storm. It is tough to watch others go through the struggles you have been faced with. The road to recovery may seem dark and long but believe me, there is a light at the end of the tunnel. During this crisis, I have seen and heard of so many from NCSS stepping up to aid their colleagues. I've heard about everything from loaning out equipment at no charge, to offering office space to use at no charge until they get back on their feet. The comradery that NCSS provides is what it is all about. We are a family!

In closing, I would like to say again what a privilege it has been for me thus far. I look forward to finishing out this year and working with the great group of people I have met and worked with along the way. Most of all, I look forward to serving you, the members of NCSS.

Thank You and GOD Bless!

James Watkins, PLS
NCSS President 2018-2019

Otis A. Jones
EDUCATIONAL INSTITUTE

by Christy C. Davis, NCSS Executive Director

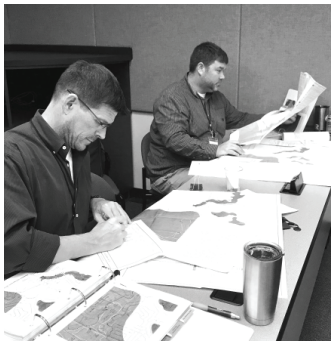
The Otis A. Jones Educational Institute began October 31, 2018 at the McKimmon Center in Raleigh, NC. The three-day event was introduced by Education Chairman, John Story, as he welcomed the largest attendance in seven years. Approximately 100 professionals joined the staff of the North Carolina Society of Surveyors (NCSS) to enjoy the benefits of some of the best instructors in the country. Three sections ran simultaneously offering a variety of topics.

Section A, Boundary Retracement, covered topics during the three-day event such as: Writing Legal Descriptions, Easements, Condominium Platting and Encroachments on Real Property. Comments indicated that surveyors found the three days very beneficial. Ronald Frederick, PLS, said, "The Institute is my primary source for continuing education because of the quality of the instructors and the level of interest I find in the variety of topics offered."

Section B, Business Practices, had the largest attendance in recent years. The Business of Healthcare, HR and Tax Tips for Your Surveying Business, Surveying Business Practices, The Five Fundamentals to Facebook Success and The Top 7 Business Laws all generated in-depth discussions and a renewed energy for surveyors to pursue excellence both as surveyors and businessmen. Another business benefit for those attending was noted by Greg Bewley, PLS who commented that he loved coming not only for the instruction, but for the camaraderie with fellow professional surveyors.

Section C, Emerging Issues, began the week with a Unmanned Aerial System (UAS) focus, hosted by the NC Department of Transportation (NCDOT). Wednesday culminated with UAS demonstrations off of Lake Wheeler Road in the afternoon. On Thursday, participants watched as a plat was recorded in Burke County by Doug Suttles, a member of the Electronic Recording Council, who walked surveyors step by step through the process. Attendee Toynia Gibbs with ESP Associates was excited to see the process at work and acknowledged how helpful it was to watch the process in person. NC811 discussed some of the issues that surveyors have been having with the Design Ticket process followed by an announcement during their time that a new process will hopefully make the response time much better. Employees of NCDOT offered computers for hands-on instruction for the new ORD (explain abbreviation?) Software. The week ended with open source QGIS (explain abbreviation?) instruction for surveyors, which was another hands-on instruction opportunity.

The lunch hour also offered attendees a PDH with interesting topics and speakers. Mike Benton of NCBEES discussed competency in the practice of photogrammetry. Gary Thompson discussed the past,



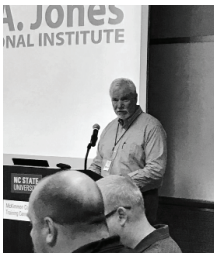

present and future of surveying. The week culminated with Rep. Dean Arp addressing surveyors regarding his platform for the upcoming legislative session. Rep. Arp has been an excellent friend to NCSS through the years sponsoring the GS47-30 rewrite in 2017 and amending the qualified immunity clause which passed in 2018.

Four surveyors graduated in 2018, Guillermo Anzola, James Huggins, Jeff Munn and Mike Wood. Congratulations to these four surveyors who completed 27 hours in Sections A, B and C to become the latest addition to our website under Accomplished Members. Several returning graduates, George Paris, Paul Toti, Jimmy Nelson, and Anthony Campbell returned to the Institute in 2018 to take the Certified Floodplain Surveyor Certification, Section D, or to earn their general PDHs with the best possible instructors. Thanks to all those who came. It was a great example of NCSS fulfilling our mission statement:

A society of professional surveyors and their associates dedicated to enhancing professionalism, improving legislative awareness and promoting the profession of surveying.









Education Foundation

by James E. Davis, PLS
Education Foundation President

The NCSS Education Foundation was created to carry out the purposes of the North Carolina Society of Surveyors (NCSS). In recent years the Foundation's primary focus has been to develop funding sources to provide scholarships for students in 2-year and 4-year surveying programs. As most of you know, the funding sources now consist of revenue from the cash raffle and from the NC Surveyor License Plate Program. These two sources generate approximately $15,000 per year in revenue for the foundation. This past year we were pleased to announce that we awarded $10,000 in scholarships to eight students representing four different schools, NC A&T State University, Fayetteville Technical Community College, Central Piedmont Community College and Asheville Buncombe Technical Community College. As part of the scholarship awards, we recognized Peter Brennan as the winner of the Don Clements Memorial Scholarship with an award of $5,000. Congratulations to all the winners.

As the Foundation continues to grow, we want to honor those who have contributed so much to our profession in the past. Next year, our goal is to once again award a single $5,000 scholarship to our top applicant and each year following to name the scholarship after a surveyor who has contributed greatly to the Foundation and to the Society. Please submit your nominations for next year's scholarship honoree.

As we move forward with supporting the North Carolina Society of Surveyors, the Foundation looks to support and grow the next generation of surveyors. One program that we support for this effort is the NC Council of Teachers of Mathematics Conference which will be held on November 1-2, 2018, in the Koury Convention Center in Greensboro. The convention is a good opportunity to meet with high school and middle school teachers and give them information about a career in surveying. The convention also gives us an opportunity to promote the Trig-Star program which is another avenue to reach potential surveyors. We will also be supporting NCA&T professors and NCSS staff as they attend the NC School Counselor Association Fall Conference.

To achieve success in the recruitment and development of the profession, the Foundation relies on the continued support of the membership, vendors, educators and other professionals. We are also looking for new ideas for outreach and funding opportunities. If you would like to offer your ideas, your service or attend a meeting, please let me know or contact one of the other board members.

Sincerely,

Jim Davis, PLS
President

Schedule at a GLANCE

NOVEMBER 9, 2018
Yadkin Valley Chapter Partnership
8:00am-4:30pm
7.5 PDHs
Gold Hill Mines Historic Park
Gold Hill, NC

NOVEMBER 14, 2018
Proctoring CST Exam
8:00am-12:00pm
NCSS Office
Wake Forest, NC

NOVEMBER 16, 2018
NCSS MAPS Bodie Island Base Line Cleanup
8:30 am-4:00 pm
Whalebone Junction Information & Visitor's Center
Cape Hatteras National Park Road
Nags Head, NC

NOVEMBER 30, 2018
Foothills Chapter Partnership
8:00am-5:00pm
8 PDHs
The Rock Barn
Conover, NC

DECEMBER 7, 2018
SW Piedmont Partnership
8:00am-4:30pm
7.5 PDHs
Rankin Lake Baptist Church
Dallas, NC

DECEMBER 14, 2018
Intermediate Civil 3D
8:00am-4:30pm
7.5 PDHs
The Oak Branch Conference & Event Center
Greensboro, NC

Continuing Ed Outside Your Comfort Zone

by Bill Beardslee, PLS, PE, PP

Originally appeared in xyHt magazine, September 2018.

Since its inception in the geomatic arena in the 1990s, the requirement for continuing education, also called continuing competency, has had the aura of a penalty rather than an opportunity. Obtaining legislative approval in many states for the continuing education legislation was difficult. Getting courses approved for credit in many states has been, and continues to be, a challenge. But why? Are we all so bold as to think we know all we ever need to know?

Over the years, I have heard all, or most, of the arguments against the concept:

- *I'll learn what I need to know on my own.*
- *Why do I need business courses? I paid all my bills last month.*
- *Why do I need communication courses? I do my best to avoid talking to people, and I have an answer machine in my basement.*
- *It's just the "good old boys" wanting to get my money for the society.*

And on and on…

Unfortunately, many of the professionals who attend seminars or take on-line courses would be very willing to just send a check to get their credits without taking any courses. How sad and myopic. I will save a discussion on the on-line courses for another day.

Continuing education is not a penalty. It is not an unwanted tax. It is an opportunity to explore areas you know little about or are weak in. Note: it is Continuing Education – not Repeating Education. Many folks take the same or similar technical courses over and over to avoid leaving their tiny comfort zone. Personally, I would like to see the states prohibit taking the same courses in successive renewal periods or limiting the number of times a person can repeat a course.

Continuing education opportunities are a wonderful chance to obtain some direction outside your comfort zone. Unfortunately, some states frown on non-technical courses for credit – a significant mistake. Across all industries, a major area of recruitment concern for most positions is oral communication skills. That is even more critical in the technical fields where little or no formal non-technical skills are addressed. Yet, most technical people would rather have a root canal than take a communication or business course.

As for the owners and managers, do you ask your staff, on return from a seminar the firm most likely paid for, to "share with us what you learned and how we can apply it to better our methods?"

In a 1999 survey of all state boards, 80% of the citizen complaints against land surveyors were on business practices. My daily experience would lead me to believe that fatal flaw has not changed. Yet, at any conference, the classes on deed retracement will have 120 attendees, while the business or communication class next door will have 20.

While my experience is primarily with surveyors, I believe the approach to continuing education is similar in other geomatic specialties, whether it is a requirement or not. And size doesn't matter. Whether a one-person operation or a large firm, non-geomatic skills are a necessity.

A fine young surveyor in one of my seminars once asked, "What use is all this management stuff to me? I am a one-man operation." My answer was, "Most of it will have no use at all – unless someday you would like to be more than a one-person operation."

To end this rant, I would like to caution all in the geomatic world about technological isolation. For thousands of years, isolation has been a form of torture to alter the mental state of a captive by creating depression. Today, many in the technology world are voluntarily isolating themselves from human contact. Yet, humans thrive on, and need, personal contact.

So, with the next opportunity, attend that seminar outside your comfort zone. Talk to all your attending peers about what they are working on or suggest a course to the sponsoring group.

If all that fails, call me – we'll talk.

William E. Beardslee, PLS, PE, PP, is a licensed Professional Land Surveyor, Engineer and Planner with over 45 years of experience in the field of land development. He is known for his excellent presentation and writing capabilities, along with being one of the leading technical experts on land development in the engineering and surveying arena.

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Build It and They Will Come

by Peggy Fersner, PE

As everyone knows in this profession, change is happening sometimes faster than most of us can stay focused upon. Keeping an academic program relevant can be difficult. As reported in the spring, the Geomatics program modified its curriculum to include two new courses focusing on the use of small unmanned aerial systems, sUAS. We are teaching both campus and online sections this semester of GEOM 107 Intro to unmanned aerial vehicles that encompasses material needed for the FAA Part 107. (Do you see the relationship to the course numbering?)

That was the first step. When we did this, we adopted the attitude of "if you build it, they will come." We had no idea at the time how we were going to acquire the necessary sUAS for incorporation into our courses. Duncan-Parnell stepped up and donated the Trimble ZX5 to the program. That was a start to our fleet, but we were definitely a long way from where we needed to be.

Every year we submit our wish list of equipment and software that we need for the program. That is the last we hear about it. So the following year we find the one we submitted the previous year and modify it if necessary and resubmit. We have never received funding for new equipment. This year there was a slight variation in the request procedure. We were asked to submit the list based on three levels. Level 1 asks, what do we need to stay competitive as a program? The second level was a wish list. For example, it would really be great if we had this. And the third level addresses bigger goals. If we are going to dream big, what would we want? Our Level 1 list included new day-to-day equipment for teaching the basic surveying course. We have been living on borrowed time with what we had. We also included multiple sUAS platforms, sensors and software in order to incorporate the flying as well as the planning and processing into the curriculum. I must admit this was submitted with the usual amount of skepticisms – sure – whatever.

The planets apparently aligned and we were awarded over $100,000 in new equipment and software. We have all new levels, total stations and data collectors and all the necessary peripherals that go with those pieces. Of course we have a new Topcon Hiper V Base and Rover, but best of all, we really do have a fleet of small unmanned aerial systems. It includes three Phantom 4 Pros and two Inspire 2's with sensors that include the Zenmuse X4S, X5S, and a Z30. We are working in conjunction with a faculty member in Construction Management and we will be adding the Matrice 600 to our fleet this year as well. We also have three professional licenses for Agisoft and ten student licenses for instruction. None of these are fancy window dressings. All of the equipment and software is being put to use this semester either in our first surveying course or in our Senior Capstone class that has a record number of seven students in it including four licensed surveyors with one being GIS-focused and the other a photogrammetrist. We are extremely excited to see the level that these seniors will perform on their capstone project with the addition of the new GNSS equipment and sUASs. We will introduce you to these students and professionals in the next article as well as their capstone project.

Peggy Fersner is the Geomatics Coordinator at NC A&T State University in Greensboro. She has been on staff since 1993, teaching surveying, GIS, and hydrology courses. She has earned both her BS and MS in Civil Engineering.

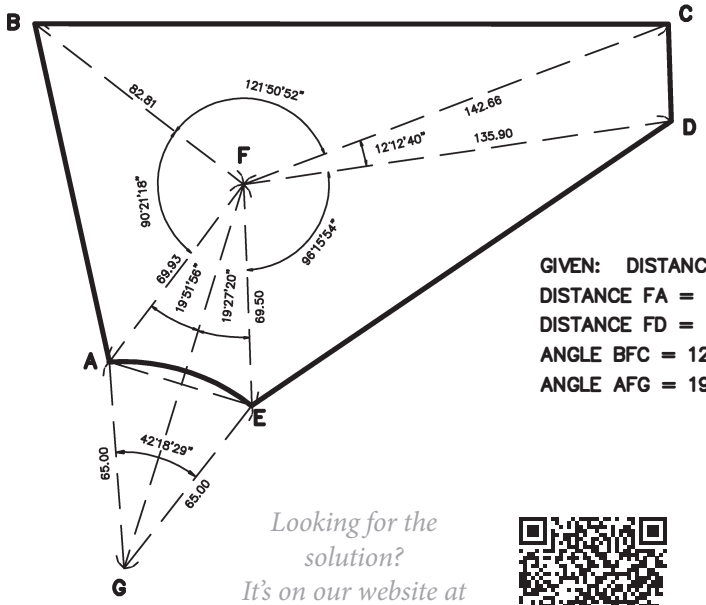
Welcome New Licensees

Joseph Avolis
James Ballard
Jacob Berry
Aaron Broyles
Caleb Clayton, Sr.
Charles Cullipher
Jonathan Derr
Joshua Dixon
Ronald Fink
Aaron Fleener
Jake Gentry
Joshua Hodges
Mark Lamb, Sr.
Clyde Mason II
Gavin Proffit
Jonathan Rick
David Sheehan
Glenn Shivar
Ben Singleton
James Smale
Jimmy Toole
Casey Whitley

PROBLEM CORNER

by John Furmage, PLS

ABC HOME Construction COMPANY HAS BEEN HIRED TO BUILD A NEW HOUSE ON LOT 22, AND HAS HIRED A SURVEYOR TO SURVEY THE LOT. THE SURVEYOR'S FIELD MEASUREMENTS ARE AS SHOWN. DETERMINE THE REQUIRED LOT DIMENSIONS BASED ON THE GIVEN FIELD MEASUREMENTS.



GIVEN: DISTANCE GA = DISTANCE GE = 65.00 ANGLE AGE = 42°18'29"
DISTANCE FA = 69.93 DISTANCE FB = 82.81 DISTANCE FC = 142.66
DISTANCE FD = 135.90 DISTANCE FE = 69.50 ANGLE AFB = 90°21'18"
ANGLE BFC = 121°50'52" ANGLE CFD = 12°12'40" ANGLE DFE = 96°15'54"
ANGLE AFG = 19°51'56" ANGLE GFE = 19°27'20"

FIND: ARC LENGTH AE = _____

DISTANCE AB = _____

DISTANCE BC = _____

DISTANCE DE = _____

CHORD LENGTH AE = _____

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Surveyors Receive High Marks

by Leland D. Strother, PLS

I have always been one that believes we, as surveyors, can and should use our talents and abilities to benefit our community when the need arises. The High Water Mark Preservation Program gives us just that opportunity. Even though it is not necessary to be a Professional Land Surveyor, the knowledge and experience we have makes us the perfect group to help with this program.

The Cape Fear Chapter hosted Gary Thompson at one of our regular meetings about a month prior to Hurricane Florence making landfall. We all received the necessary training to mark high water levels in the event that NC had a natural disaster involving flooding. As it is with every topic that Gary brings before us, the High Water Mark training is an interesting and very professional presentation.

As it became more apparent that Florence had her eye on North Carolina, a state of emergency was declared and the State of North Carolina Emergency Operations personnel were activated. This state of emergency required Gary, as a part of his job, to remain on location at the Emergency Operations Center until the State of Emergency was lifted. This situation presented a couple opportunities to get a little more involved in this training. Not able to attend the Johnston County Chapter meeting, Gary asked if I could assist Curt Thompson with the High Water Mark training for them. I was honored to assist. I have visited with the Johnston County Chapter in the past, where I have always been made to feel welcome. The fact that Holt Lake Barbeque in Smithfield is a really good place to eat was a real bonus. Their training was scheduled for the Tuesday night before Florence made landfall early Friday morning. Just as a side note, my route to Smithfield included I-95 between Fayetteville and Smithfield which in the days ahead were closed due to flooding. The traffic running north/south on I-95 was not bad at all; however, the east/west roads were already feeling the effects of west bound traffic under evacuation orders. I was carrying on a conversation on my HAM radio with a gentleman from the Raleigh area returning from Topsail Beach, west bound on I-40. He had been on the road four hours and had not yet made it to I-95 which normally takes only about one hour and fifteen minutes.

Fast forward to a week later, the Tuesday after Florence made landfall I decided to apply what I had taught to my fellow surveyors. I had already selected a few places that I thought might give some good flood information. The first was Peddlers Creek. Peddlers Branch is a collecting stream for a significant drainage basin of the City of Raeford and has always been a problem area. The second was Drowning Creek (appropriately named as per some of the older folks from the community) and Turnpike Road. Drowning Creek is the county line between Hoke and Scotland Counties and becomes the Lumber River at its confluence with Buffalo Creek a little over a mile downstream of Turnpike Road. The Lumber River continues about four more miles to its intersection with U.S. Hwy. 401, the third location that I marked.

One question I had about the high water marking was determining the crest of the flooded areas. Using the NC FIMAN website, I checked the status of the only local gauge at US Hwy. 401 and Rockfish Creek. The estimate was for Rockfish Creek to crest around noon on Tuesday, September 18th. I "guessed" that the other location would crest about the same time and waited until then to begin. The first mark that I attempted was Peddlers Branch. The first street where I stopped and looked for evidence of a high water mark was not a good decision. As soon as one of the land owners along that portion of the problematic stream saw me with my safety yellow vest, they "knew" that I was there to do something about "fixing the problem" at that particular location. Living and working in a small town has its pros and cons. I knew these people very well and the history with this area. They proceeded to enlighten me for about 45 minutes regarding the history of flooding in that location and what needed to be done. Not "finding" any evidence of high water in that area, I decided to move on to the next intersecting street and try again. I had much better luck at the next location. I had a good debris line of pine straw upstream of the intersection. I saw no evidence that Peddlers Branch overflowed this street. I called the City Public Works Director to confirm that and proceeded to use the app provided by NC Floodplain mapping to gather the required data. This was my first attempt at using the app. It took me a few minutes and a couple attempts to get the feel of the interface. Once I successfully uploaded one photo along with information, all other uploads were a breeze. Gary can thank me later for marking this point on Peddler's Branch rather than my first choice. I can only imagine what would happen if a "state-owned vehicle" showed up at the first location.

The next point was at Turnpike Road where Drowning Creek was overflowing the road. I placed a nail with a marker in the center of the road at the water line. If you look closely at the picture, you may want to criticize my placement of the nail. After looking at the picture later, I realized the road was still damp uphill from the nail that I set. Considering the road here was as flat as a pancake and, at the most, there might be .02-.04' vertical distance, I left it the way I set it. While I was there, Andy, a friend of mine who lives close by, came to the site. He had made sure that "road closed" signs were placed strategically. He pointed out to me his "high tech" equipment that he had been using as a gauge to track how much the water was rising or receding. He directed my attention to a couple of beer bottles that he had placed along the edge of the pavement. The "highest" one was very close to where I had selected to set my nail.

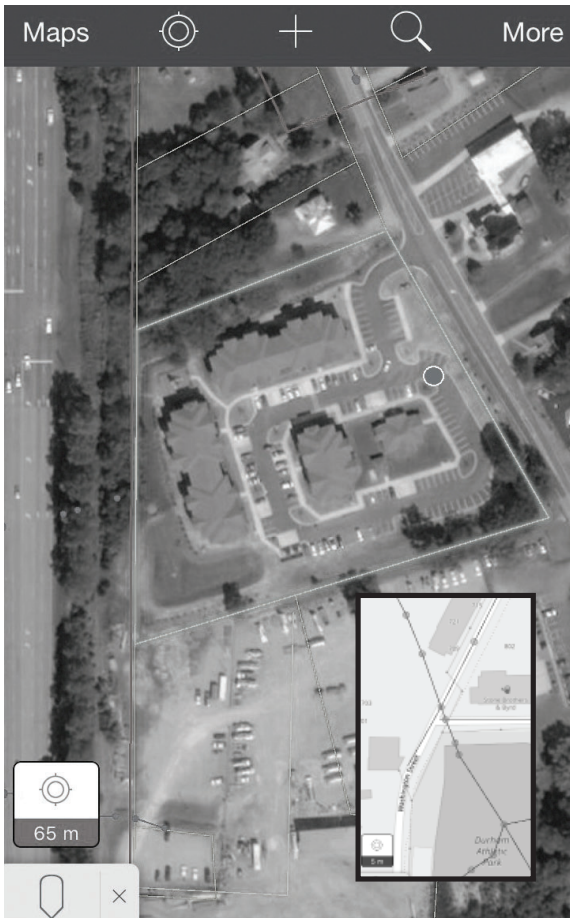
About two hours later, after going back to the office for a little while, I drove to the US 401 and Lumber River intersection. Several people had stopped and were watching to see if the Lumber River would flow over US 401. A local fire department was even monitoring the situation. They told me that they had been watching it for several hours and the Lumber River did not appear to have risen during that time. I decided I would set a couple of points. One was on a debris line on the downstream side of US 401 and the other was on the water line on the upstream side. While I was there, Andy called and told me that the water level at Turnpike Rd. and Drowning Creek had dropped about 4 feet. I had to see this as that would place the water level well below the bridge. When I arrived, Andy was directing traffic away from this crossing about a quarter of a mile away. I got a real chuckle when I got there to see that the water line was, in fact, about 4 feet different than when I left. The difference was horizontal not vertical. My best guess of the vertical change was about -.05 feet.

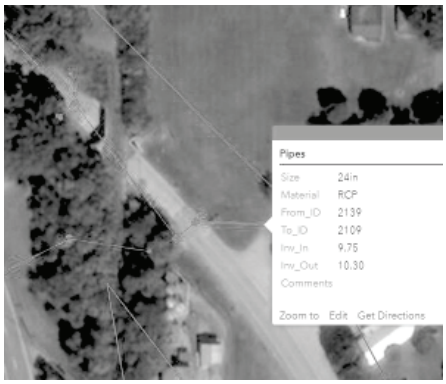
Because I had already been closed a couple days because of Florence, I decided that I really needed to get back to work. I really enjoyed marking these points and hope that they will be of some benefit for floodplain mapping in North Carolina. I regret that I only had time to mark a few. Maybe with the collective efforts from all of the surveyors that received the High Water Mark Training there will be a tremendous amount of data that can be used to be better prepared for what we all hope never happens again.

Leland D. Strother is the owner of Strother Land Surveying in Raeford, NC. He earned his degree in Civil Engineering from Sand Hills Community College. He was president of the Cape Fear Chapter for 10 years and President of NCSS in 2017.

Web-based GIS and the Future of Surveying

by Jamey Gray, Senior Geomatics Project Manager, Stewart





The Shift from Field Books to Mobile Apps

The business and mindset of surveying has remained on the traditional side for a long time, requiring handwritten notes and sketches in field books. Many surveying professionals are still loyal to this manual process, but advancements in hardware and software applications (apps) provide alternative options using web-based geographic information systems (GIS). Since the early 2000s when GIS first started to become a hot topic and feasible application for surveying and engineering, the surveying community has continued to be hesitant to embrace this technology. Concerns have included the accuracy and reliability of the technology as well as having to change existing processes that surveyors have known so well for so long. However, one exciting innovation in recent years pushing surveying further into the digital era is the introduction of new mobile application tools that are deployed using web-based GIS.

Benefits of Web-based GIS and Mobile Applications

There are many benefits of web-based GIS and mobile apps as compared to traditional manual processes. These include:

Quality assurance: From a quality assurance standpoint, companies can't afford to resist the benefits of these new tools and technologies. Every time a person touches raw data, whether they're in the office or in the field, there is potential for human error or inaccuracies in translation. Web-based GIS technology allows surveyors to keep the data in an all-digital format, reducing the potential for mistakes when surveyors are working in the field and compiling and presenting data.

Convenience and ease-of-use: While it may seem complicated at first glance, deploying and utilizing this technology is as simple as navigating a smart phone. Surveyors can download the app to their phone or tablet or access the web-based system through the internet on a desktop. They can then leverage GIS mapping software to log data and share information directly from the field. As the software is cloud-based, the sharing of information is instant and secure. The web and mobile application

can connect field staff to employees in the office, allowing every team member the ability to see data in real-time and providing more efficient completion of projects even under tight deadlines.

Situational awareness: Traditionally, when arriving at a site, a surveyor in the field would first have to spend time getting acclimated to his or her surroundings, often using paper maps. Alternatively, a mobile app provides situational awareness with GPS-enabled smart phones or tablets which can be a powerful tool in the field. Surveyors can now see where they are in relation to multiple basemaps and datasets in the application. For large sites, long corridors and utility surveys, these tools can largely mitigate the potential for aimless wandering as field surveyors perform reconnaissance, project planning and associated mapping duties. This creates a big picture context including where the surveyor is and what they're looking for, allowing professionals to get to where they need to go and capture the required data correctly the first time.

Decreased errors and increased consistency: The decrease of human involvement inevitably decreases human errors and increases consistency in work. No more field sketches with scribbles of labels and notes that someone else in the office then must decode. No more worrying that a map is going to blow away in the wind or get lost on the way from the field to the office. A user-friendly app is easy to deploy and understand, with the added benefit of incorporating picklists to eliminate typing and the ability to attach photographs if needed. Even with basic GIS knowledge, any team member can implement this technology into his or her work plan.

Transparency: A critical benefit that comes from web-based and mobile GIS work is the improvement in the relationships with clients and stakeholders. By leveraging both a web map and mobile app, the output looks polished, clean and professional. It's quick and easy to share a project to the cloud, allowing clients to monitor progress in realtime, which adds a level of trust that a firm could not provide before. Now, groups both inside and outside the organization can see the planned steps of project completion and follow along as the survey team completes each phase, feeling more engaged in the process. This transparency creates assurances that the final product will be delivered on schedule or clearly identifies situations in realtime that arise which may affect on-time delivery.

The Impact of Web-based GIS

Web-based GIS software and mobile applications have an impact on many areas of surveying and engineering, including subsurface utility engineering (SUE). Stewart has recently deployed an app to simplify our SUE field documentation process with a form-like design. With the app, the typical line items that field staff would write on a clipboard or field book are available electronically, using a drop-down menu. Then, on the backend, the GIS app takes this data from the created database and develops a professional, branded report which can be shared internally for review or externally with clients. Each report and associated database can be edited as required both internal to the app or externally through the GIS application.

The Future of GIS

From a workplace standpoint, this technology also helps with the recruitment of the profession's next generation. Without question, today's high school and college students are looking at careers in technology-driven fields. These innovations are important because as technology moves forward, surveying must move with it. Surveyors can't fight progress for the sake of not wanting to change the old ways or fearing the possibilities at our fingertips. This technology isn't going anywhere - it's going to get more user friendly, more capable, more detailed and more necessary to businesses as companies hop on the growing tech trend. This technology will continue to make larger and larger impacts on surveying and engineering fields assisting with location analytics with a growing variety of businesses and the public at large.

Companies that survey large-scale projects should consider web-based GIS. To start the process of implementing this technology in the workplace, examine existing workflows and processes and see where web-based GIS apps could save time and money for your firm. By creating all-digital, sharable maps in real time, Stewart has been able to create a high-quality product for our clients in a very efficient and economic manner. Consider the pain points of your current workflows and take a look at the many uses web-based GIS and mobile apps can offer.

Jamey Gray is Senior Geomatics Project Manager at Stewart. Gray has over 14 years of progressive survey experience and is currently licensed as a Professional Land Surveyor (PLS) in North Carolina, South Carolina and Tennessee.

Replacing the North American Datum of 1983 and North American Vertical Datum of 1988 in 2022

by Gary Thompson, Chief of the North Carolina Geodetic Survey and Deputy Risk Management Chief
Originally created for Hydrographic Services Review Panel (HSRP).

ISSUES AND STATUS

The replacement of the North American Datum of 1983 (NAD83) and the North American Vertical Datum of 1988 (NAVD88) will dramatically impact everyone in North Carolina (NC), from professional applications and services to recreational users who use maps, charts and satellite positioning systems such as GPS (Global Positioning System).

The National Geodetic Survey (NGS) defines and manages the National Spatial Reference System (NSRS), a consistent coordinate system that defines latitude, longitude, height (elevation), scale, gravity, and orientation throughout the United States. Today, various layers of The National Map are produced with centimeter-level absolute accuracy relative to NGS' official horizontal and vertical datums that establish the origin of horizontal coordinates and elevations above mean sea level. This ensures that orthophotos, elevation data, hydrography, transportation, administrative boundaries, and other mapped features fit together with centimeter-level precision when one mapping layer is registered to another.

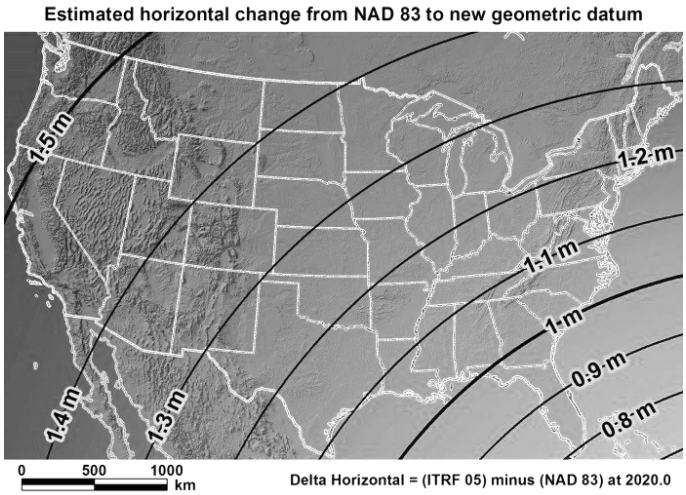


Image source: National Geodetic Survey

However, in 2022, NAD83 and NAVD88 will be replaced with new interrelated reference frames (geometric and geopotential) which will rely on Global Navigation Satellite Systems (GNSS) such as the Global Positioning System (GPS) as well as an updated and time-tracked geoid (gravity) model. The new geometric reference frame will change latitude, longitude, and ellipsoid heights approximately 1-2 meters from the current NAD83 (2011) values, and the new geopotential reference frame will change orthometric heights (elevations) on an average of -50 centimeters (from -1 meter in the Pacific Northwest to zero in south Florida).

The replacement of NAD 83 and NAVD88 with new reference frames (datums) will impact all maps, charts, geographic information systems, surveying and engineering operations that federal, state, and local agencies produce and perform, to include hydrographic charts produced by NOAA; 3DEP elevation datasets and National Hydrography Datasets produced by USGS; and Flood Insurance Rate Maps. Furthermore, the North Carolina State Plane Coordinate System (NCSPCS) will change. It is critical that federal, state, and local agencies along with the private sector are made aware of this change and develop plans for a transition to the new reference frames.

Professional Land Surveyors should be aware that in addition to the changes to the North Carolina State Plane Coordinate System that are unavoidable due to the new reference system, North Carolina Geodetic Survey (NCGS) is contemplating several additional changes to enhance the system for users. These changes include changing the location of the systems orientation so that coordinates in the enhanced system will have significantly different values, enabling users to tell at a glance in which system the coordinates have been generated. Additionally, the system will be enhanced so that the majority of the state will have distortion between NCSPCS values and ground values minimized, making lengths and acreages shown in the NCSPCS closer to ground lengths and acreages.

New Reference Frame Names:
NAD83 becomes:
North American Terrestrial Reference Frame (NATR2022)
NAVD88 becomes:
North American-Pacific Geopotential Datum of 2022 (NAPGD2022)

The new 2022 geometric (horizontal) reference frame (NATR2022) will be based on a Cartesian coordinate system with positions represented as sets of X/Y/Z coordinates with the origin of the coordinate system (0/0/0) at the center of the earth (the origin of the International GNSS Service (IGS) reference frame at a chosen epoch). It will be Earth Centered, Earth Fixed (ECEF), aligned with the International Terrestrial Reference Frame (ITRF) at a particular epoch (TBD). It is likely to contain aspects of some well-modeled velocities, e.g., plate rotations. Passive control will continue to be used as a secondary method to access the NSRS.

The new 2022 geopotential (vertical) reference frame (NAPGD2022) will be accessed with Global Navigation Satellite System (GNSS) technology. Gravimetric geoid model and passive monuments will continue to be used as a secondary method to access the NSRS. It will be based on a spherical harmonic model (SHM) of Earth's external gravity potential. This will be partly derived from airborne gravity data collected as part of the Gravity for the Redefinition of the American Vertical Datum (GRAV-D) and likely build upon the planned "EGM2020" model from the National Geospatial-Intelligence Agency (NGA). This SHM will be used to derive various quantities, such as dynamic heights, surface gravity, and a gravimetric geoid serving as the zero height surface of orthometric heights (commonly known as "elevations"). The target accuracy is 2-centimeter in both absolute and relative (over all distances) orthometric heights using GNSS and a geoid model. It will monitor the time-varying nature of the gravity field, including the geoid.

GRAV-D is an NGS project being performed to: (a) complete an airborne campaign to develop a high-resolution snapshot of gravity in the U.S., supporting gravimetric geoid accuracy, and (b) monitor changes to the gravity field at decadal scales, including changes to the geoid.

North Carolina products/services that will be impacted:

- North Carolina Continuously Operating Reference Station (CORS) network
- NC State Plane Coordinate System
- All activities/services related to highway construction
- All public/private sector construction projects
- Land Records Management Program
- State/local agencies geographic information systems
- Charting and navigation systems
- Aerial imagery projects
- Precision agriculture
- North Carolina OneMap
- North Carolina Geodetic Survey geodetic database
- Flood Risk Information System (FRIS)
- Flood Inundation Mapping Alert Network (FIMAN)

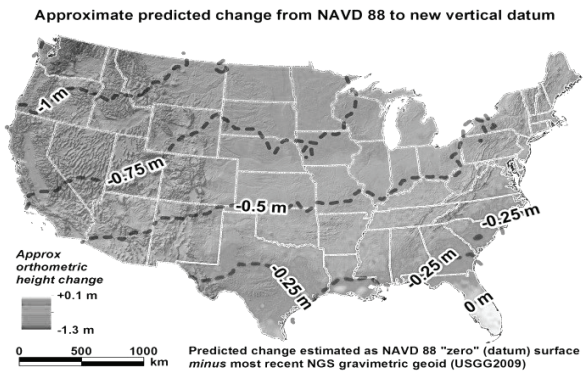


Image source: National Geodetic Survey

Gary has held a professional license as a Professional Land Surveyor (PLS) in NC since 1980. He has served as president of both NCSS & NSPS. He most recently served as treasurer of NCEES, chair of the North Carolina Boundary Commission, and an emeritus member of NCBEES.

Fun in Court

by Ken Mills, PLS

Once upon a time, I think in 1972, when I was a survey crew chief, my supervisor, Bruce Small, PLS was involved in a court case for a survey client. I didn't know about his involvement in the case until it had been decided in his client's favor. Mr. Small told me the city of Fort Lauderdale wanted to annex this farmer's land, but according to the annexation laws of the state of Florida, the existing city limit line had to touch the farmer's land. Based upon a very accurate survey of the sections and townships in the area that the State ordered earlier and the deed descriptions, the two properties did not touch by less than a foot distance.

This court case caught my attention and planted the seed for my desire to help survey clients in need of a land surveyor expert to aid them in court.

Before my first state licensing exam, I attended a seminar given by Walter Robillard on research and testifying in court. At the time, Mr. Robillard was working with the United States Forest Service. He was licensed as a Professional Land Surveyor in every state where the Forest Service owned land and had testified in court many times. I learned a tremendous amount about court proceedings, what the lawyer's duties were to their clients and what type of questions they could ask. More importantly, I learned how to prepare court exhibits, how to behave on the witness stand and how to answer the questions.

Let me explain the exhibits first. All surveyors put a lot of information on their survey maps. The information is easily readable with the map right in front you. However, an exhibit is mounted on a foam core board and placed on an easel so all of the members of the jury can see the map. The problem is most of the jury will not be able to see the small details on the map. The other problem, which I think is the most important, is most people can't understand what is on a survey map.

The best exhibit I had, which I learned later had helped the jury decide the case in my clients' favor, only had the boundary lines of the original neighboring deed descriptions with the overlapped survey. The only other thing I did was to color code my clients' lines, the neighbors' lines and the overlapped survey lines. I made a legend with the land owners' names and the survey along with the color I used for each. The best court exhibit is the simplest.

The design of the exhibit should be discussed with the clients' lawyer. Remember, the lawyer may not be able to understand a survey map. What you must do is to find out what the lawyer intends to present to the jury so you can make the clearest exhibit possible. You're the expert and part of the clients' team.

Most of the time, the lawyer will want your map as the exhibit. At this point, how you testify is very important. More on this later.

Now the fun part! Testifying on the witness stand! Before you can begin to answer questions, the lawyers must qualify you as an expert. You will have to answer questions about your education, your work history and other things to show the court and the jury you are qualified to be an expert in land surveying matters. I have my Curriculum Vitae (my work history) typed out. Before court, ask your lawyer to present your Curriculum Vitae to the court as an exhibit to show your qualifications. This is important because if the case is appealed, your Curriculum Vitae will go with all the other exhibits to the appellate court. If you are asked to explain to the court your work history, cover the most important parts first. Your statement will be in the court transcript. Very important!

I was told a long time ago that you are helping the court get to the truth of the matter. That's true, but you are also defending your survey. So, if you don't do the best surveys all the time, one day one may turn on you and bite your buttress.

Now, while testifying on the witness stand, it's very important to remember to be absolutely truthful all the time. Be calm and collected all the time. Don't get upset and raise your voice. I'll explain this later. When you answer a question, face the jury and make eye contact with each member of the jury. The job of both lawyers is to ask questions. The job of the jury is to decide the case, so only answer the questions while facing the jury. When you finish answering the question, turn back to the lawyer and wait for the next question.

When a lawyer asks a question, you have all the time in the world to answer. If it's a surveying related question, take the time to explain your answer so the jury will understand what you are talking about. Don't use surveying jargon. If you need to, explain in simple terms what you are talking about. For example, "I used a theodolite to measure the

vertical angle. A theodolite is a surveying instrument used to measure very accurate angles and distances. The vertical angle can be either above a level line or below the level line. In this case, the angle I measured was above a level line."

The judge runs the court. What he or she says goes. The lawyers ask questions. Their jobs are slightly different. The lawyer who subpoenaed you can only ask direct questions such as "What is your full name?" or "Are there any encroachments crossing onto Mr. Johnson's land?" The lawyer for the other side can ask leading questions such as "Isn't it true you didn't read Mr. Smith's deed?

Now, this is really important. Try to never answer too quickly. Give your lawyer time to object to the question. When you do answer, try to never answer with a yes or no. Always try to explain your answer. "Did you find a marker at the back corner?" Look at the jury and make eye contact like you are teaching a class. "I found a planted stone at the back corner as called for in Mr. Smith's deed and in Mr. Johnson's deed." Then explain what the planted stone looks like.

Another important thing to remember is to listen to every word in the question. Surveyors are experts in measuring. Lawyers are experts in using words. Listen very carefully. If you don't understand a question, ask the lawyer to either repeat the question or to rephrase the question. Also, never try to answer the question as soon as the lawyer asks. Pause for a second or two to formulate your answer and to give your lawyer a chance to object to the question. If the judge sustains the objection, the lawyer will have to ask another question. If the objection is overruled you may answer the question.

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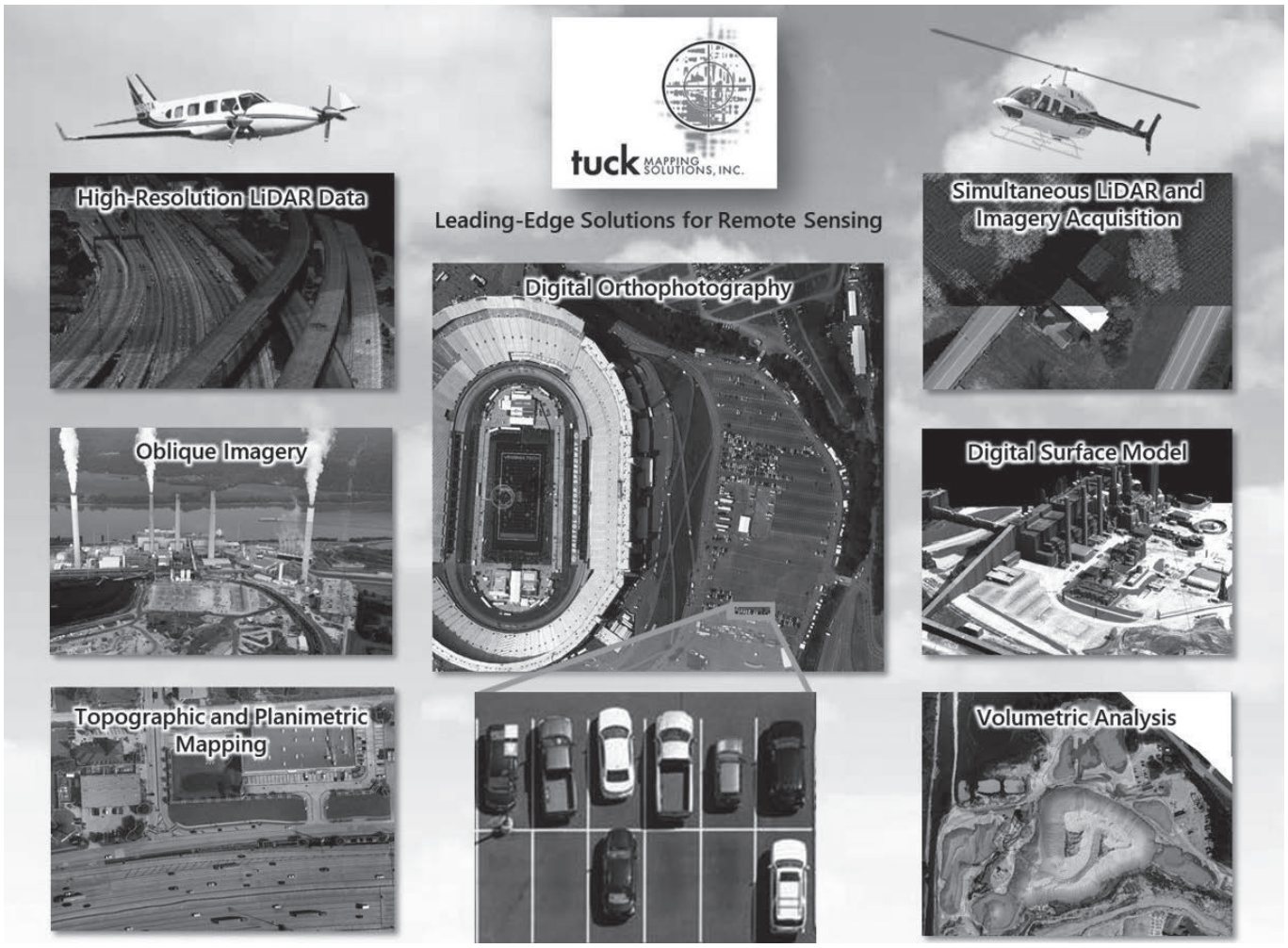

PPL Montana LLC v. Montana; ALCOA v. State

by Kristopher M. Kline, PLS, GSI

Arguments persist over ownership of riverbeds and confusion continues regarding the appropriate definitions applied to navigable waterways. A recent benchmark ruling from the U.S. Supreme Court sheds light on several principles associated with title to riverbeds in the United States. Many elements of this 9-0 decision also have been deemed applicable to upland watercourses in North Carolina.

PPL Montana LLC v. Montana: 132 S. Ct. 1215; 182 L. Ed. 2d 77 (2012) chronicles a title dispute between the state of Montana and a power company operating hydroelectric facilities along the Missouri, Madison, and Clark Fork Rivers. When the state claimed compensation from the power company for the use of state land, PPL Montana filed suit. The power company lost both rounds in the state courts but ultimately prevailed at the U.S. Supreme Court.

The Madison River is a tributary to the Missouri, while the Clark Fork is west of The Continental Divide and ultimately empties into the Columbia River. Both watercourses also run through mountainous terrain.

The Missouri River is one of the longest in the country and is known for frequent flooding and for the high incidence of sandbars and debris found in its lower portions. The upper reaches of the Missouri are characterized by steep and rocky terrain, including a 10-mile stretch of rapids with an elevation change of approximately 400 feet. Another stretch of the same river includes no fewer than five waterfalls.

The area of the present dispute was first described in the writings of Meriwether Lewis and William Clark, during their 1805 expedition through the western territories. Their writings were relied on by the Court to prove the condition of the river prior to statehood. Travelling this stretch of river, Lewis and Clark were forced to leave the watercourse and portage around numerous waterfalls and rapids. They also stated that the larger boats used on the lower portion of the Missouri River were abandoned in favor of lighter canoes that could be hauled around any additional obstacles. References to buffalo that were swept over the waterfalls and killed highlighted the hazards associated with the upper portion of the river. Justice Kennedy delivered the unanimous opinion of the Court. This case clarifies several issues, the most notable being the standard for navigability applicable to determine the extent of state ownership based on the public trust doctrine: *Navigability must be assessed as of the time of statehood, and it concerns the river's usefulness for 'trade and travel,' rather than for other purposes. … Mere use by initial explorers or trappers, who may have dragged their boats in or alongside the river despite its nonnavigability in order to avoid getting lost, or to provide water for their horses and themselves, is not itself enough. … Evidence of recreational use, depending on its nature, may bear upon susceptibility of commercial use at the time of statehood.* Present-day use of the watercourse may be considered as evidence of early navigability only if (1) the watercraft are similar to those that were in use at the time of statehood and (2) the watercourse has not been significantly altered or improved.

This standard defines the limits of submerged lands held by the State and protected by the inalienable obligation placed on the respective state governments by the public trust doctrine. Submerged lands protected by the doctrine are also immune to private prescriptive claims.

Rivers are assessed based on a "segment-by-segment" basis, with each part judged based on its physical characteristics. This may result in a patchwork of state ownership depending on the character of the area under consideration. Evidence of portages is generally sufficient to defeat a claim of navigability under the public trust doctrine.

Any watercourse must be considered in its "natural and ordinary condition." Artificial lakes and rivers that have been improved by dredging may qualify as navigable under federal regulatory standards but not under the dictates of the public trust doctrine. Kennedy also points out that despite numerous mis-applications of the law, the iconic case ***The Daniel Ball, 77 U.S. 557 (1871)*** is not controlling for title determination, though it continues to provide relevant definitions for determining the extent of federal regulatory authority.

Applicability to North Carolina

The principles formalized in the Montana decision above also have been applied to a recent dispute over upland North Carolina rivers in **Alcoa v. State: 853 F.3d 140 (2017)**. In this case, the 43-mile stretch of the Yadkin River bears a significant resemblance to the disputed segment of the Missouri River. Both have been improved and used for power generation; both were considered too dangerous for shipping or travel in their unimproved condition. Evidence indicates that early travelers actively avoided both stretches of river in favor of alternate transportation.

Alcoa claimed the riverbed based on recorded deeds (supported by the Marketable Title Act) and by adverse possession. North Carolina asserted that the river was navigable according to principles set forth in ***Gwathmey v. State: 342 N.C. 287 (1995)*** and that the bed belonged to the state by virtue of the public trust doctrine. This stance would have also precluded private prescriptive claims to the riverbed.

It was not helpful to state arguments that in 1937, North Carolina representatives had agreed with the Alcoa assessment of the river as non-navigable. Alcoa had also paid property taxes based on their deeds describing the riverbed area.

Historical records clearly indicated that this stretch of river in its natural state had not been used for navigation or commerce. Early roads, despite their rugged nature, were preferred by locals for moving goods and livestock. Several plans to improve the river had been proposed but rejected.

Despite contrary arguments from the North Carolina contingent, Judge Niemeyer concluded that the standards applied in ***PPL Montana*** were equally acceptable in North Carolina for determining the limits of state protection under the public trust doctrine. In applying the Montana decision, the judge observes: *Thus, when the PPL Montana Court stated that "questions of navigability for determining state riverbed title are governed by federal law," it was only reaffirming the federal nature of the issue of navigability for title, a nature evident since the founding and recognized in cases over the course of more than 150 years.* Any attempt to create a contrary standard for the original 13 colonies would violate the spirit of the equal footing doctrine and create a dual standard while allowing North Carolina to avoid federal jurisdiction.

Alcoa v. State was further complicated by the destruction of some early Montgomery County deeds in a courthouse fire. As a result, Alcoa also claimed adverse possession to some areas. Since North Carolina could not claim immunity to prescriptive claims based on the public trust doctrine, the court ruled that Alcoa had title to the riverbeds in dispute.

Finally, it should be noted that North Carolina appealed this decision to the U.S. Supreme court but the appeal was rejected in February 2018, leaving the federal appellate court decision intact.

Summary

The North Carolina appellate court has recognized the difficulties inherent in determining the limits of the public trust doctrine. In ***Baumann v. Woodlake Partners: 199 N.C. App. 441 (2009)***, Judge Ervin observes that: … *the extent of the public trust ownership of North Carolina is confused and uncertain* ...This sentiment was repeated a year later in ***Fish House Inc. v. Clarke: 204 N.C. App. 130 (2010)***. By contrast, ***Alcoa v. State*** appears to return North Carolina to the standards substantially similar to those found in many early North Carolina court decisions. Both ***Alcoa*** and ***PPL Montana*** recognize that different

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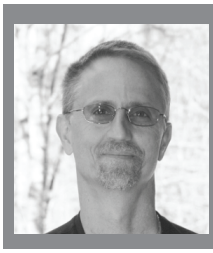
standards are applied to determine limits of the public trust doctrine as opposed to those used to determine the limits of federal regulatory authority. Neither decision allows for subsequent improvement of a non-navigable watercourse to alter the underlying title. Also note that nothing in this ruling precludes a public right of navigation on smaller upland rivers and streams, but this right of use is more analogous to an easement and should not be confused to ownership of the underlying fee. These cases and numerous others highlight the many possible definitions of the term "navigable."

Kris will present a class on riparian retracement principles with his friend and mentor Donald A. Wilson, organized through Surveyors Educational Seminars (surveyorsed.com). He can be reached via email at kristopherkline1@gmail.com or through www.2Point.net.



Kristopher Kline is a writer, educator, consultant, and land surveyor living in Alexander, North Carolina. Kris has published three books relating to legal aspects of boundary retracement and writes the bi-monthly column "Unmistakable Marks" for Point of Beginning Magazine.

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Earlier I mentioned "Don't get upset and raise your voice." Here's the reason why. If a lawyer asks a question and you begin to answer to the jury and the lawyer charges over your answer before you finish, just wait until the lawyer finishes talking. Then turn to the judge and ask, "Your Honor, may I be allowed to answer the question?" The judge will instruct the lawyer to wait until you finish answering the question before asking another question. You then turn back to the jury and answer the question. When you finish, turn back to face the lawyer and wait for the next question. This happened to me in two cases in which I was testifying. It makes the lawyer look bad to the jury and helps you look more professional.

Now, when the exhibit is presented to the court both lawyers must accept the exhibit. If one lawyer objects, there will be a discussion before the judge then the judge will decide to accept the exhibit or not. Then, you will be asked to point something out on the exhibit. Before you get out of the witness stand, the lawyer will ask the judge if you can approach the exhibit or you may need to ask the judge. When you get to the exhibit, look at the jurors to be sure each one can see the map. Don't ever stand in front of the exhibit. Always stand to the side, because you are instructing the jury as to what you put on the map. I always have a red laser pointer with me to use and I ask the judge if it's okay for me to use it to help the jury see where I'm pointing.

I also watch the lawyer asking the question to make sure he or she is not standing in any of the jurors' line of sight. If they are, I ask them to move so all of the jurors can see the exhibit.

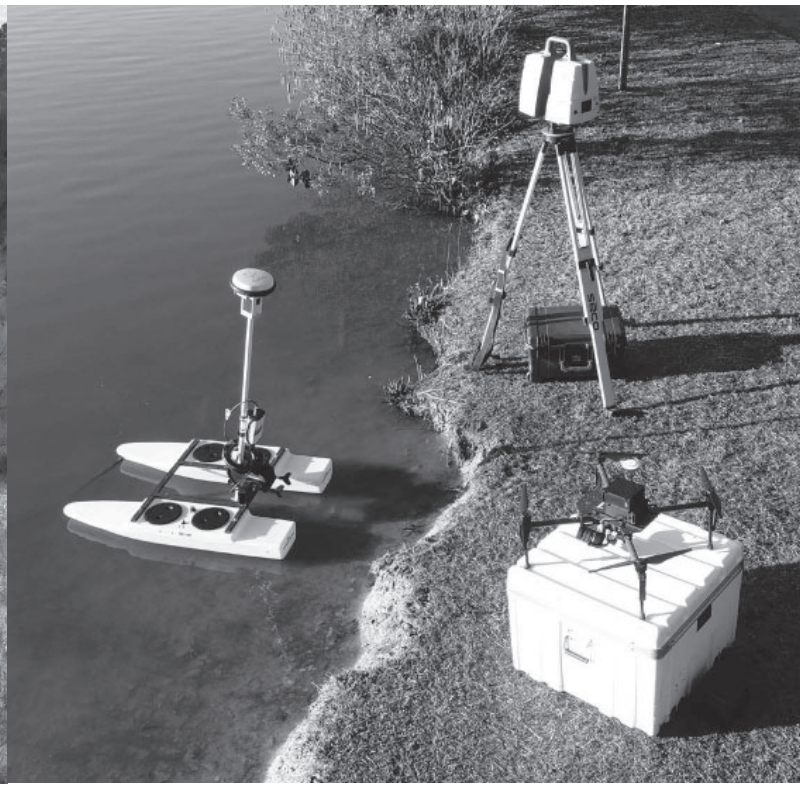
Another important thing to remember when talking about what's on the exhibit is to describe where on the map you are pointing and what is there. While pointing at the exhibit, don't say, "This is where I found the old wooden hub," because, if the case is appealed, the only thing the appellate court will have is the transcript and the exhibit. You won't be there to show the court where you pointed. Say this, "At the southeast corner of the property, the lower right part of the map is where I found the old hub corner marker as described in the deed and also as described in the neighbors' deeds." Remember, you have all the time in the world to answer, so take your time, answer like you are writing a scene in a book, which, by the way, you are.

This is why I have fun in court, besides helping my client. Good luck.

Ken Mills became a PLS in 1975. He has been an active member of NCSS, serving three terms as the Western Chapter President. He served as the NCSS President in 1998. Mills co-authored Following in their Footsteps with Otis A. Jones. He has written for American Surveyor Magazine and is a columnist for Madison County's News-Record & Sentinel newspaper.

NSPS Memorandum of Understanding

In 2012, NCSS agreed to partner with the National Society of Professional Surveyors (NSPS) to foster membership on both the state and national levels. As a result, your membership with NCSS now includes dual membership with NSPS. Read the MOU on our website at: www.ncsurveyors.com/about_ncss/governing_documents/nsps



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J. David Lee, II

Wife
Wendy

Children
Cole, Katie & Bryson

Place of Employment & Title
CALYX Engineers and Consultants, an NV5 Company as the Principal, Survey Program Manager

Childhood Ambition
To do anything outside

Favorite Movie
Christmas Vacation

Favorite Band or Genre
Nickleback or any 80's Rock Band

Most Recent Purchase
Benelli Over/Under Shotgun

Favorite Surveying Equipment
Trimble R8 GNSS GPS Receiver

Project You Are Most Proud Of
Project Surveyor for the Charlotte Area Transit System from Uptown Charlotte to UNC Charlotte's Campus

David Lee currently serves as the Mecklenburg Chapter President. He also serves on the Board of Directors of the Education Foundation a 501c3 organization created to further the education of surveyors. He is currently employed by CALYX Engineers and Consultants, an NV5 Company as the Principal, Survey Program Manager. Growing up, David's ambition was to work outside which makes it a little humorous that his first job was washing dishes and bussing tables at the Western Sizzlin in Wadesboro, NC. Obviously, David found his true passion when he was hired by NCDOT as a Survey Crew Bagman in 1990.

David is married to Wendy and they have three children. Their oldest is Cole who is a freshman at Western Carolina University. Katie is their 16-year-old daughter who is a junior in high school. Bryson is a seven-year-old, second-grader.

After his humble beginnings at NCDOT, David spent the 90's moving through the ranks from Bagman to Party Chief then to Survey Crew Coordinator in 1998. Finally, he moved to the private sector beginning with CALYX as a Survey Party Chief and he passed his Surveying Intern exam. He started the millennium by passing his Professional Surveyor (PS) exam and began working as a CAD technician for CALYX. In 2004, he was promoted again to Charlotte Survey Group Manager with CALYX. In 2005, he became a principal partner. His most recent accolade was in 2016 when he was promoted to Survey Program Manager with CALYX to oversee all surveyors within the company.

David is passionate about the benefits of networking with other surveyors and promoting the education needed for the next generation to participate in the future of Geomatics. To accomplish these goals, David serves as the Mecklenburg Chapter President. In 2017, he began his tenure on the NCSS Education Foundation. David believes, "that it is important to make connections with local surveyors, promote education and knowledge, and to protect the interest of our surveying profession."

Finally, when asked what advice he would give a younger surveyor new to the profession, David replied, "Do not be afraid of technology. Use it to its fullest potential. Do not ever quit learning. This field is always changing and developing." Good advice from one who has grown and changed through the course of his career.

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