Missouri Surveyor

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Missouri Society of Professional Surveyors

Jefferson City, Missouri

March 2009

MISSOURI SURVEYOR

CALENDAR OF EVENTS

2009-2010

May 7-9, 2009
Spring Workshop
Lodge of Four Seasons
Lake Ozark, MO

July 10-11, 2009
Board of Directors Meeting and
Minimum Standards Workshop
Lodge of Four Seasons
Lake Ozark, MO

October 15-17, 2009
52nd Annual Conference
St. Louis Airport Marriott
St. Louis, MO

December 5, 2009
Board of Directors Meeting
MSPS Office
Jefferson City, MO

May 7-8, 2010
Spring Workshop
Lodge of Four Seasons
Lake Ozark, MO

October 7-9, 2010
53rd Annual Meeting and
Convention
Tan-Tar-A Resort
Osage Beach, MO

John Alan Holleck, Editor

Notes from the Editor's Desk

by John Alan Holleck

Well, it is almost March and the ground hog saw his shadow on 2 February, fortunately, he is only about thirty percent accurate. That's the good news; the bad news is that they are predicting snow for this weekend. Even if it does snow, it has been a very mild winter in Kansas City. Sandy and I have put together another fine *Missouri Surveyor* (if I do say so myself) for March with about seventy percent in state authorship—a record during my editorship.

We have an interesting cover photo of the Mile Point Zero re-monumentation crew (hearty souls one and all). Following the Editor's Notes and the President's Message is "Mile Point Zero" by Jim Mathis and Darrell Pratte. Please note the picture on page five of Jim and his pet armadillo. Next is an article by New Hampshire land surveyor, Donald Wilson entitled "Forensics in Surveying." Mr. Wilson has been a presenter at a previous MSPS function and a practicing forensic surveyor. Southern Missouri surveyor, Jerry Anderson follows with a very interesting article, "WOW! I'm an LSIT!! (uuhh—NOW What do I do?)." Jerry has some quite insightful tips for these budding young surveyors. Dr. Richard Elgin informs us of the results of his State specific exam question seminar and then challenges us with a test question designed for sophomore engineering students. My favorite author, Wilhelm Schmidt, follows with "Short Buying," an amateur's primer on the economic crisis. As he intimates, this is a crash course. Rounding out the front half of the *Missouri Surveyor* is "MoDOT Real Time Network" by Tom Bryant of Seiler and Pete Decker of MoDOT. The article deals with the contract awarded to Seiler by MoDOT to install a system of CORS monuments, it sounds like quite a project.

Opening the back half of this issue is "Walking the Footsteps of the Colonial Surveyor: Why setting additional corners is not always the correct answer" by Milton Denny. Milt is a wonderful story teller and this article is a perfect example. Mr. Denny is followed by "The Boundary Conflict That Wasn't (Until they hired a surveyor)" by Christopher Wickerm & John Stahl. Chris is very adept at presenting his case and making his conclusions. Wilhelm Schmidt returns with a review of Francis Parkman's Oregon Trail. This is a book that should be read by everyone but seldom is since it is 150 plus years old. If the economic crisis is affecting your practice, than pay particular notice to the ad on page 38. Continuing with the lighter side of our profession, an article by Earl F. Henderson entitled "Humour in Surveying: The Conversation" follows. It is a very funny story. Finally, Kansas surveyor and engineer, Norman Bowers, wraps of the March issue with "The Relationship Between Survey Plat and Deed." Mr. Bowers's article in the December issue was quite popular. Happy reading.

THE MISSOURI SURVEYOR

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President's Message

by Darrell D. Pratte

One of the great things about being MSPS President is being invited to so many functions having received five invitations in the five months I've been President. I was privileged to administer the 2009 oath of office at the Southeast and Southwest Chapters of MSPS. I tried to make the Ozark Chapter December meeting as not only were the officers to be sworn in, but Jerry Day was to be honored with a lifetime achievement award. That award will now be an annual event in the Ozark Chapter and will be known as the "Jerry Day Award for Excellence in Surveying." I wanted to be there, but as I headed west down Interstate 44 toward Springfield my windshield began to ice over. The freezing rain and sleet hit the Rolla area just as I was leaving town, rather than waiting until I got to Marshfield, which is generally, how things happen. I'm going to count the phone call I received from Fermin Glasper as an invitation to the St. Louis Chapter swearing-in ceremony, even though it came the day before the event. Fermin assured me it was a simple oversight.

The other invite is the adventure described later on in the *Missouri Surveyor.* The remonumentation of Mile Point 0 where the St. Francis River crosses the 36 degree 30 minute parallel of latitude. This was a public relations endeavor taken on by those intrepid surveyors in the Southeast Chapter. What began, as a very, very cold morning, actually became a very cold day. A sidebar to Jim Mathis, one of these days I will get down there and pull those forms off the concrete.

Legislator Visits Day was a success. All the Representatives and Senators in the Missouri Legislature accepted a one-gigabit zip drive with the MSPS logo to remind them of surveyors every time they need to save something. The gift was very well received. As was the MSPS legislative agenda. Support for the land surveying profession and the issues that concern the profession, remain high on the legislative agenda. As this session continues, I hope surveyors across Missouri will avail of themselves the time to phone or write their representative and senator and ask them to support bills that affect the future of the profession. Someone from the MSPS board or legislative committee may be giving you a call.

It will soon be time to start planning to attend the spring workshop in May, followed by the annual minimum standards workshop in July. The July MSPS meeting of the board will hopefully be a time of celebration for the many victories experienced during the legislative session. If not, we will lick or wounds and have another go in 2010.

Cover: Pictured are the survivors from the trip into, and the restoration of, mile point 0. No word on how many made it back out. Read more about our cover story on page 4. Photo taken by placing Bryan Ferguson's camera on a log. that is why Bryan looks so tired, this was the fifth try for him to get back to the group before the picture took. Front Row Kneeling (left to right): Benji Philpot, Sean Patterson. Back Row Standing (left to right): Bryan Ferguson, Darrell Pratte, Dan Fisher, Joseph Pulliam, Jim Mathis.

Mile Point Zero

by Jim Mathis and Darrell Pratte

On Saturday January 24, 2009 seven members of the Southeast Chapter of the Missouri Society of Professional Surveyors and the Missouri State Surveyor braved sub-freezing temperatures as they climbed aboard flat-bottom boats on the muddy St. Francis River in Dunklin County, Missouri. Their destination that cold winter day could have been some favorite fishing hole or picnic area, but it was 10˚F, they had almost 1200 pounds of concrete and an array of small tools, and they are land surveyors. A precise spot on the earth's surface about a mile upstream was where they were headed. This precise point had been defined March 6, 1820, by the Sixteenth Congress, Session 1, Chapter 22, in the Missouri Enabling Act, and finally physically located and marked on another wintry Saturday 166 years earlier.

The precise spot these boaters were heading for is a corner of Missouri – that point where John Hardeman Walker, an influential and wealthy landowner in Missouri's territorial days, had successfully argued the boundary line between the State of Missouri and the Territory of Arkansas should bend south along the St. Francis River, so as to dip from latitude 36 degrees 30 minutes to latitude 36 degrees 00 minutes and keep his vast holdings in the State of Missouri, thus forming Missouri's boot heel. The point that Walker argued for, and the U.S. Congress ratified - and these boaters were heading toward - has been known since it was marked on the ground in 1843 as Mile Point Zero, the point where the 36-30 intersects the St. Francis River on the Arkansas-Missouri state line. The mission of these later-day surveyors was to place a permanent monument at that precise historical spot.

The point that Walker argued for, and the U.S. Congress ratified - and these boaters were heading toward - has been known since it was marked on the ground in 1843 as Mile Point Zero, the point where the 36-30 intersects the St. Francis River on the Arkansas-Missouri state line.

It had not been an easy spot to locate. In fact, it took 20 years and three attempts to establish the corner in the first place, and has been more or less lost since then. Joseph Brown, the foremost surveyor in the state of Missouri in his day, made the first attempt. In 1823, he set out from Fort Osage near present day Kansas City to measure the west and south boundaries of the State of Missouri. He ran South through the Indian Territory to a latitude of 36˚30', which he determined from sextant observations on the sun, and a half-dozen other stars. Then he turned to run East. The rugged Ozark Mountains he was measuring through were so steep he found it necessary to measure in quarter-chain (16½ feet) increments to stay level. To make matters worse, the Indians had burned over the country so four of his horses were used up from lack of forage, and four more had been stolen outright. But by the time Brown reached the Eleven Point River, he and his crew were suffering from some real wear and tear; he sent part of his crew and heavy equipment back to St. Louis. He and the rest of his crew continued East, carrying their gear in knapsacks on their backs. By the time they reached the swampy bottomlands of Southeast Missouri, he was wading in knee-deep water and leading a dwindling, dispirited crew. When on Monday December 8, 1823, their line hit an Ash tree on the West bank of the St. Francis River, he marked it as the state corner, postponed the running of the south boundary of the boot heel, and returned to St. Louis. "I imagine that it is not material whether the line that remains ... be run shortly, for the country through which it passes will perhaps never be inhabited" he wrote. Because of the weather, he is not able to make any observations at the St. Francis River.

His struggles through the swamps were not over, where he stopped on the St. Francis River is where it snakes back and forth across the 36-30, and is almost four miles west of where the river heads South from this parallel of latitude. Joseph Brown would correct this with a second attempt in 1824 and observes this position on the St. Francis to be 36˚30'11" or 1112 feet North of the 36-30. Along this 240 mile line Brown made five observations for latitude and all were too far North. Brown's contract stated he was to measure the meanders of the St. Francis River. Ten miles South of the 36-30 he had to give this up, no current could be found. The river had widened to more than a mile, most of the trees in the flood stood dead except the cypress and poplar. Brown guessed the earthquake of 1812 must have had something to do with the unusual conditions he was witnessing. He may have been correct in this assumption; the St. Francis may have been displaced due to its bed being silted in and its banks being leveled during the liquefaction that took place during the quake. Brown finally found the thirty-sixth parallel of latitude and headed East to the Mississippi. Over and done - the Boundary between the State of Missouri and the Arkansas Territory had been marked on the ground.

By 1840, the States of Missouri and Arkansas became disenchanted with the line as surveyed in 1823/24. It is not

Mile Point Zero (continued)

clear why, but it may have had something to do with the complaints Mr. Brown stated in a letter to William Rector, the Surveyor General written shortly after his return to St. Louis. Brown stated he regretted not making more observations along the line and prayed small deviations from the 36-30 would be forgiven due to the extreme circumstances in which he and his party found themselves. Brown was not seeking forgiveness; he was seeking extra funds (which he received) to finish the survey (he had already been paid for) down the St. Francis, then East to the Mississippi. Apparently, the powers that be in Little Rock and Jefferson City were not in a forgiving mood. By 1843, both States had passed legislation authorizing a new survey between the states. A former Missouri Governor and former Surveyor General for Illinois and Missouri, Daniel Dunklin was appointed a Commissioner for Missouri. Basil Gordon, who had been working with the Corps of Engineers in Jefferson City and prior to that had worked on some railroad projects, was the other. Arkansas also appointed two commissioners to look after their State's interest: Mr. Davis Thompson, a State Senator from Phillips County and Gen. John Clark, a Senator from Chicot County. Mr. Gordon was the surveyor but his resume was lacking experience working with the General Land Office and the United States Public Land Survey System. Basil Gordon was not and had not ever been a United States Deputy Land Surveyor.

So twenty years after Joseph Brown's survey, another crew, lead by an engineer/surveyor accompanied by three political observers set out to survey the state boundary. The "commissioners" struggled upstream along the meandering St. Francis from the Southwest Corner of the boot heel, which they had just established. On Monday, November 20, 1843, they congregated on top of that geological peculiarity known as Crowley's Ridge, a 150-mile long hill that rises above the surrounding flat delta like a huge, undulating serpent. Here the river bisects the ridge, forming a deep cut with a high bluff of light colored clay, from which the place gets its name: Chalk Bluff. For two days he dried out his men and instruments in camp on the high ground there (at a point where twenty years later a major civil war engagement would be fought) and looked for enough midday sun to make his celestial observations. In the next four days, he found enough clear sky to make two sextant observations of the sun to determine his latitude. There was a difference in the two observations of 6.9 seconds, which translates to about 700 feet on the ground. But as Gordon put it, "the sextant is graduated so as to read to 15 seconds, so that the discrepancy ... is easily accounted for." He averaged the readings and called the result good enough.

By Friday November 24, 1843, Basil Gordon was ready to make his corrections and determine the actual location of Mile Point Zero, but first he had one more, small chore to do because his surveying instrument was out of adjustment. That

was probably to be expected since it had been "sunk in a lake of the St. Francois River." Retrieving it from those murky, cold backwaters of the swamp had certainly not been a picnic, either, and now he tried to figure out where the telescope was pointing in relation "to the poles of the compass," to be able to run in a cardinal direction.

On Saturday, Gordon had solved the problem, and he measured North from Chalk Bluff to his calculated position for that illusive parallel of latitude 36˚30'. Then he turned and ran East, crossed a small creek, and landed on the "top of bank of the Saint Francois River, where a mound was raised." Two marked trees witnessed this mound of sandy silt, 4 feet high and six feet in diameter, with a wooden post in the top and "at least a peck of charcoal" in its base. Ignoring the fact that this point was not in the center of the River, he "consider[ed] the Mound on the bank of the Saint Francis River, as the starting point..." or Mile Point Zero, thence, took off West. He would cross the wandering river 4 more times, until, incredibly, he hit that same ash tree Joseph Brown had landed on 20 years (almost to the day) earlier.

(continued on page 6)

Mile Point Zero (continued)

There's something about being in that particular part of the country in the depth of winter, which makes a surveyor want to seek a warm, dry place. So on December 7, 1843, after struggling to cross the Black River numerous times, Gordon "suspended operations due to the inclemency of the weather," and headed back to St. Louis. And if those swamps were hard on surveyors in the dead of winter, they were equally hard on the Commissioners. Before Basil Gordon could plan his return trip two had died, John Clark of Arkansas and Daniel Dunklin for Missouri. It would be another year and a half before these commissioners could be replaced and he could continue the survey. On May 16, 1845 Arkansas Commissioner Davis Thompson accompanied by his new associate John E. Graham meet with Basil Gordon and Missouri's new Commissioner George Penn to continue the survey of the Arkansas-Missouri state line.

From 2006 to 2008, the Missouri Department of Natural Resources, Missouri Land Survey, in conjunction with the Arkansas Commissioner of State Lands, had worked with Jim Mathis, a local surveyor, to determine exactly where Mile Point Zero was and re-survey the State Line from there west to Mile Point 23. Needless to say, that mound of sandy silt raised by Surveyor Gordon on the bank of the St. Francis River was no longer there. In fact, even the riverbank itself was no longer there. In the mid-1960's the Corps of Engineers straightened out and re-channeled the river from the state line north for several miles as the Wilhelmina Cut-Off. Mile Point Zero's precise location, determined from corners to the west, a single remaining line tree marked in 1843, and the location of a creek mentioned in the original survey, now falls on the east toe of the spoil bank that runs along the east bank of that man-made channel.

And so, on January 24, 2009, this handful of erstwhile surveyors set out to plant an engraved brass marker in a concrete pedestal at Mile Point Zero. Huffing up the river bank and over the spoil bank with 80-pound sacks of concrete was hard work, but the tedium was relieved when one prankster quietly dropped a briquette of charcoal in the bottom of the excavation, claiming it was Gordon's, "Look a half a piece of the peck and a half, it even has grill marks". Another dragged up the shell of a recently demised armadillo ('possum-on-the-half-shell), which was promptly named "Rusty", a witness to the corner.

Three Rivers Community College, Diversified Technology program under the direction of Michelle Weimer, generously contributed the engraving on the cap, which reads "Mile Post 0, the initial point of Basil Gordon's boundary of 1843." And just where is that engraved brass cap in relation to the rest of the world? It turned out that Mile Point Zero is 780 feet south of the actual latitude of 36°30' – John Hardeman Walker would be proud.

Dedicated to the memory of O. Dan Lashley, PLS, (1947-2008) who envisioned this little excursion.

Forensics in Surveying

by Donald Wilson, LLS, PLS, RPF

Surveyors are investigators when it comes to the discovery and collection of documentary, physical, and parol evidence. To be a competent investigator in any field demands inquisitiveness, diligence, patience, and attention to detail. Part of the process also requires the preservation of evidence and careful note taking. There is no place for guesswork; facts raise no doubts and evidence does not lie.

Some of the guidelines followed during a proper investigation are noteworthy here. Most investigators do not work alone; they incorporate the observations and conclusions of others into their reasoning. Most investigators try to learn as much about a site as possible before arriving there. Deed research done beforehand tells field investigators what to look for and what they might find. Further research may be necessary if there is conflicting evidence or if additional questions arise.

One should always be aware of false readings. Metal items will give a reading with a metal detector, but only uncovering, followed by observation, will insure it is the monument sought. Similarly, words and phrases in title documents can be misleading, and only a complete chain of documentation back to the origin, compared with the adjoining descriptions, will lead to the correct combination of statements.

To be a competent investigator in any field demands inquisitiveness, diligence, patience, and attention to detail.

Investigators also take copious notes and photographs. The are vitally important at future times for refreshing the memory, or to document the conditions and circumstances as they were at the time the investigation took place.

Many failures in the investigative process can be attributed to lack of patience and thoroughness, premature conclusions without proper support, and lack of imagination.

Consider the situation where there is a deed with abutting calls only and an area recitation of “one acre, more or less”. The deed was traced back in time to an estate from which three parcels were conveyed as a subdivision of a larger tract, but two of the deeds, including the one in question, had not been recorded. Field investigation by three different surveyors uncovered no physical evidence at the site.

The estate contained a list of grantees for the sales, which identified the first time each of the parcels was described. Since there was no public record, these grantees were searched, their heirs and successors determined, and, eventually, an individual was found who had “a lot of old papers in her attic.”

Reviewing the papers produced the original deeds, which confirmed that there had never been a public record. How much time did this all take? Three years, working intermittently. The original deed contained a complete metes and bounds description — an acreage of one acre and 120 square rods (1314 acres). Based on this description, the surveyor found evidence at all four corners of the site. However, marking an acre as stated in the found deed would have been wrong, and giving up too soon would not have solved the problem. With perseverance, the goal to locate the parcel and produce a survey plat was accomplished. Some things simply take longer, and demand more diligence than others.

Field investigation involves forensics too. Consider an estate divided in 1875 into two parcels which has incomplete and conflicting, metes and bounds descriptions. Only by finding evidence on the ground can a proper conclusion be reached as to which of the conflicting pieces of evidence is acceptable. The difference in question was 20 rods (330 feet), and the site was destined to become a shopping center.

Initial reconnaissance by compass and pace revealed nothing, nor did the second visit using a compass and four-rod chain. The third and fourth visits utilized additional data from abutting parcels, while the fifth and sixth visits involved three searchers, including two surveyors.

A traverse was established through the area and corner evidence located on all of the abutting parcels. Back in the office, several theoretical positions were computed for the points in question. Then, further detailed search conducted with a rake to remove the overburdening of leaves and material, revealed a stone.

The position of the stone was located and compared with the remaining data, and the high point selected on it was found to be within 0.012 feet of being on line between two other stones marking the same line. It took seven and a half days with two and three people at a time to find that one piece of evidence on the entire site. Without the stone, the next available evidence would have been distance, which would have been erroneous by 20 rods, and one would have no way to prove this.

There is no substitute for thoroughness. Even though the odds sometimes stack up against being successful, one will never know for certain until one follows theories and possibilities to the very end. Sherlock Holmes has many times been quoted as saying, “when you have eliminated the impossible, whatever remains, however improbably, must be the truth.”

As seen in the “Georgia Land Surveyor”, May/June 2008

MO Colleges/Universities Where Land Surveying Coursework is Available

The following list will be updated quarterly as new information becomes available.

Longview Community College - Lee's Summit, Missouri
Contact: David Gann, PLS, Program Coordinator/Instructor - Land Surveying MCC - Longview, MEP Division
Longview Community College
Science and Technology Bldg.
500 SW Longview Road
Lee's Summit, Missouri 64081-2105
816-672-2336; Fax 816-672-2034; Cell 816-803-9179

Florissant Community College - St. Louis, Missouri
Contact: Ashok Agrawal
Florissant Community College
3400 Pershall Road
St. Louis, Missouri 63135
314-595-4535

Missouri State University - Springfield, Missouri
Contact: Thomas G. Plymate
Southwest Missouri State University
901 So. National
Springfield, Missouri 65804-0089
417-836-5800

Mineral Area College - Flat River, Missouri
Contact: Jim Hrouda
Mineral Area College
P.O. Box 1000
Park Hills, Missouri 63601
573-431-4593, ext. 309

Missouri Western State University - St. Joseph, Missouri
Contact: Department of Engineering Technology
Missouri Western State University
Wilson Hall 193
4525 Downs Drive
St. Joseph, MO 64507
816-271-5820
www.missouriwestern.edu/EngTech/

St. Louis Community College at Florissant Valley
Contact: Norman R. Brown
St. Louis Community College at Florissant Valley
3400 Pershall Road
St. Louis, Missouri 63135-1499
314-595-4306

Three Rivers Communitiy College - Poplar Bluff, Missouri
Contact: Larry Kimbrow, Associate Dean
Ron Rains, Faculty
Three Rivers Community College
2080 Three Rivers Blvd.
Poplar Bluff, Missouri 63901
573-840-9689 or -9683
877-TRY-TRCC (toll free)

Missouri University of Science and Technology - Rolla, Missouri
Contact: Dr. Richard L. Elgin, PLS, PE
Adjunct Professor
Department of Civil Engineering
1401 North Pine Street
211 Butler-Carlton Hall
Rolla, Missouri 65409-0030
573-364-6362
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University of Missouri-Columbia, Missouri
Contact: Lois Tolson
University of Missouri-Columbia
W1025 Engineering Bldg. East
Columbia, Missouri 65211
573-882-4377

Missouri Southern State College - Joplin, Missouri
Contact: Dr. Tia Strait
School of Technology
3950 E. Newman Rd.
Joplin, MO 64801-1595
1-800-606-MSSC or 1-417-782-MSSC

MO DNR and the Missouri State Fair

Something to look forward to is the Missouri State Fair. The Missouri Department of Natural Resources has always promoted the Profession of Land Surveying and the Professional Land Surveyor at the State Fair. This is because of a small bunch of people tucked away in Rolla called the Land Survey Program. This year MSPS and DNR are working on an agreement to let MSPS use a part of the yard at the Woman's Building for an MSPS display booth. The Woman's Building is located near the front gate across from the racetrack and has a large front yard. MSPS will need volunteers to staff the booth during the day, especially during the high traffic days. If you are planning to attend the fair and can spare a couple of hours at the booth, please contact Co-Co-Chair, Chris Wickern of the MSPS Public Relations Committee, Media/Public Relations Sub-Committee/Public Appearances Sub-Committee. Or, let Sandy know of your intensions and she will get your name to Chris.

WOW! I'm an LSIT!! (uuhh – NOW what do I do?)

by Jerry Anderson, PLS

At a recent gathering of Land Surveyors, it was mentioned than many Land Surveyors In Training aren't sure what path they should take to prepare for the Professional Land Surveyors exam.

Some, I'm told, as soon as they meet the requirements to take the exam, take it "cold", with little or no advance preparation, just to get an idea of what the exam is like.

In my opinion, that is a terrible waste of time and resources! Just filling out the application is quite an undertaking. Then the test and grading facilities are used to evaluate a test that is likely to have a failing grade. If, by chance or good fortune, you DO manage to pass the exam (when in doubt, choose 'C') you will be unleashed on an unsuspecting public as a Professional Land Surveyor.

When I was learning to fly, I had over 100 hours of dual instruction and 200 hours of solo, with hundreds of successful night landing. I felt that I was a competent pilot. The requirements to take the FAA check ride were:

- log at least 40 hours of flight
- have at least 20 hours of flight with an instructor
- have at least 10 hours of solo flight

I pestered my instructor to sign me off to take the check ride, pointing out that I had far surpassed the time requirements. He replied that he had no doubt that I could ace the check ride – but that his task was NOT to get me a license. His task was to make me a PILOT, and I wasn't quite there yet.

I feel the same about someone becoming a surveyor. Your objective should not be to become licensed. The objective is to become qualified, through a satisfactory mix of education and experience as a competent and professional Land Surveyor!

Perhaps my experience will be helpful to others.

I took my first PLS exam in Alaska in 1974. Fortunately for me, two weeks prior to the exam, I was working on a project that required my presence 10 hours a day, but only required my participation for 10-15 minutes every couple of hours. We were setting anchor bolts in bed-rock, and the drilling was slow but precise.

I was determined to be prepared for my exam – sixteen hours worth. I had eight years of field experience, all but six months as a crew chief. I was technically proficient with the instruments of the period, and was the beneficiary of some great mentors. Two of the most important things they taught me were:

1.) If we don't have time to do it right, when will we ever find time to do it over?

2.) We do the most complete and competent job possible, going the extra mile and taking those redundant measurements. Any alternative is simply unacceptable.

Your objective should not be to become licensed. The objective is to become qualified, through a satisfactory mix of education and experience as a competent and professional Land Surveyor!

Every available textbook on land surveying that I could get my hands on was not just read, but studied. I worked every math problem at the end of the chapters, and completed every quiz. Sun shots and star shots were taken on known Coastal Geodetic monuments, tide gauges and river flows were monitored.

Of course the literature has been seriously updated in the last forty years, but even the old editions I had in the early 70's would enable you to pass the exam today. Here's a partial list of the books I used:

- SURVEYING Theory and Practice. Davis, Foote & Kelly, 5th edition 1966
- Boundary Control and Legal Principles. Curtis Brown, 2nd. edition, 1969
- Evidence and procedures for Boundary Location; Curtis Brown (1st edition)
- Manual of Surveying Instructions for the Survey of the Public Lands; GLO 1902
- Manual of Surveying Instructions for the Survey of the Public Lands; GLO 1947
- Boundaries and Adjacent Properties, R.H. Skelton, 1930
- Clark on Surveying and Boundaries, 3rd edition 1959
- Elementary Surveying, Breed & Hosmer, 8th edition, 1945

WOW! I'm an LSIT!! (uuhh – NOW what do I do?) (continued)

- Higher Surveying, Breed, Hosmer & Bone, 8th edition 1962
- Field Engineering, Text & Tables, Searles, Ives & Kissam 22nd edition, 1949
- Route Surveys & Design, Hickerson 4th edition 1959
- The Civil Engineers Handbook, International Correspondence Schools (My favorite!)

The last two were in my field case at all times – of course that was when we were still doing our computations with a set of logarithm tables and a slide rule. Later I got a Curta Mechanical calculator. I could derive square roots & use actual functions and numbers.

You will notice that the list is heavy with engineering texts. I had four years experience with the Bureau of Public Roads, and four years with a private firm that did a lot of highway design and right of way acquisition, so lot of engineering problems were encountered.

Don't dismiss the engineering books as being irrelevant to boundary surveying – they are not. How many boundary surveys have a railroad or a highway right of way involved? That's right, almost all of them. A good understanding of construction and design practices will serve you well. As I review the above list, they are pretty much in order of importance.

GPS technology was not available until many years later. The library of the modern surveyor is incomplete without a copy of "GPS for Land Surveyors" by Jan Van Sickle 2nd edition.

A working familiarity with "Blacks Law Dictionary" and researching case law is extremely valuable. Attend some trials, and become familiar with courtroom procedure. Your chance of escaping the witness stand throughout your career is somewhere between "slim chance" and "fat chance".

Missouri Surveyors should also be thoroughly versed in the "Original Instructions Governing Public Land Surveys, 1815-1855" by J.S. Dodds, and "A Manual of Land Surveying", a treatise upon the survey of Public and Private Lands, by F. Hodgman, 1913.

Along with your studying, shadow the oldest & most experienced LS – or the one you respect the most. (Usually one & the same) Ask questions, discuss the days work, and find out if s/he has any insight on any portion of the work you didn't completely understand.

If you think you understood the how and why of everything that was done, you weren't paying attention. Ask your mentor about alternative methods of doing the same task. Remember, the only "dumb question" is the one you're reluctant to ask.

One reason I recommend the oldest surveyor in the firm, is that they'll have a lot of "war-stories. Knowing how we did things in the days before distance meters, total-stations data collectors and HP calculators is invaluable! Could you conduct a survey if your batteries went dead? The war-stories may be repeated from time to time, depending on the age and verbosity of your mentor, but there's a wealth of information in them.

So what do you do if you're not working in some aspect of the Surveying Profession? That's what Saturday's and vacation days are for. Select a surveyor who runs a one or two person shop, and offer to work a few days for free, just as long as you can tag along and ask a lot of questions.

Trust me, you won't work for free even through the first day if you're willing to pay attention and anticipate what you might be able to do without being told. Just be quiet when s/he's head-scratching, drawing sketches in the field book or punching the calculator.

If you think you understood the how and why of everything that was done, you weren't paying attention. Ask your mentor about alternative methods of doing the same task. Remember, the only "dumb question" is the one you're reluctant to ask.

Follow the pattern of asking what you're going to be doing that day, go do it, and then discuss what you did. It never hurts to hope for a long drive to and from the jobsite.

About a week before taking the LS exam, make some final notes on what you've learned. Then put your mind in neutral, and take a break! The day before the test, review your notes, get a good night's sleep and go ace the exam!

When you're done with the exam, get up and walk out. Don't go back for review and start second-guessing yourself. If you've followed my counsel, you are well versed in survey practice and law, and your initial answer will most likely be the correct one.

After your initial LS licensure, you may want to become licensed in a couple neighboring States. Don't try to recreate the wheel all over again. Spend a day in the Courthouse or a law library with a yellow pad going through the State statutes and regulations.

You'll find that the laws and regulations are fairly uniform

(continued on page 12)

WOW! I'm an LSIT!! (uuhh – NOW what do I do?) (continued)

from State to State – at least in the public lands states. I have little experience in the metes & bounds states, I would anticipate some significant differences. Hawaii is in a class all of its own!

Write down anything in the law that differs from what you'd expect to find, or that you wouldn't normally have to deal with. Get a good night's sleep, a good breakfast while you review your notes and go ace the test!

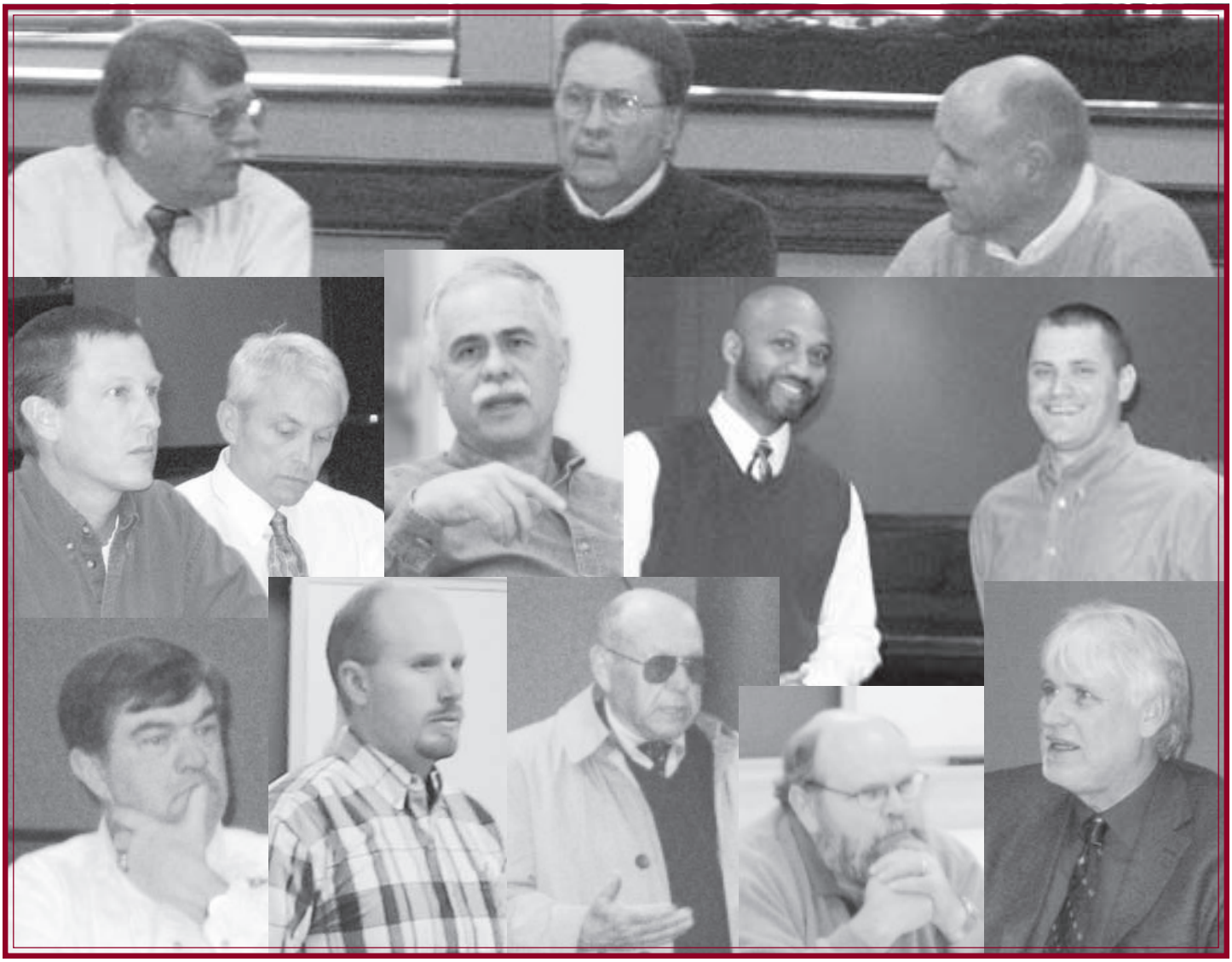
I have taken and passed two full LS exams, four state-specific exams, one oral exam, and one 20-question multiple choice test in the back of the book on becoming licensed in that state. They mailed me the booklet; I took the test at home and mailed it back!

The "study-like-crazy-get-a-couple-days-rest-and-ace-the-exam" method has never failed me. Happy Surveying!

Jerry Anderson is in private practice in southern Missouri, with frequent projects in other states. He has been surveying since 1965 and is licensed as an LS in eight States. However, four of those licenses have been placed on inactive status.

You can contact Jerry at landsurveyor@starband.net

MSPS Committees at Work



State-Specific PLS Exam Committee Meets

by Dr. Richard Elgin, PLS, PE

The Missouri Board's State-Specific Land Surveying Exam Committee recently met on the campus of the Missouri University of Science & Technology. Chaired by Dr. Richard Elgin, the committee is made up of eighteen Professional Land Surveyors from different practice backgrounds and geographic areas of the State. The committee meets periodically to review the appropriateness of the materials and syllabus of the State-Specific exam, which is one of the exams required for licensure as a Missouri Professional Land Surveyor. The group also reviews each question in the bank of questions used on the exam and also writes new questions. "The Board appreciates the time and dedication of this group," said Mike Gray, PLS, Chairman of the Land Surveying Division of the Board. "The Board's purpose is to make the exam complete, fair and appropriate and to assure competence of those who we license. This group helps us achieve that goal," he added.

Exam content and the percentage of subject areas included on the exam is based on the definition of Land Surveying (from Chapter 327 of RsMo) and "what surveyors do." For the past two years, the exam content was established as follows:

Missouri Minimum Standards	21%
Resurveys on the USPLSS	20%
Calculation Problems (on the USPLSS)	17%
The GLO in Missouri	16%
Missouri Board Rules	12%
Missouri State Plane Coordinates	9%
Missouri Riparian Boundaries	5%

On behalf of the Board of Registration, Dick Elgin conducted the Missouri State-Specific Exam Workshop on January 31st in Rolla.

Pete Stevens looks on as Mike Gray gives a Board of Registration report to the participants of the 2009 State-Specific Exam Workshop.

The Exam Committee reviewed these percentages and agreed they were still appropriate.

Are You Smarter Than a Missouri S&T Sophomore?

by Dr. Richard L. Elgin, PLS, PE
Adjunct Professor of Civil Engineering, Missouri University of Science & Technology, Rolla, Missouri

Here's a problem, taken verbatim from a recent Missouri University of Science & Technology (MS&T, formerly UMR) Civil Engineering 001, "Surveying" Final Exam. The Exam is closed book, open calculator. The general equation for elevation along a vertical curve was given on the exam (see below), and none other. Using only your calculator, give yourself about 10 minutes and work this problem. (This would be a good NCEES "Principles and Practice" problem.)

For a curve system, the azimuth from the PC to the PI is 140°40', delta is 52°52' left and the PT station is 96+96.96. The degree of curvature is 8°00'00". At 91+42.85 is a BVC for a vertical curve whose length is 1500 feet. For the vertical curve, g(1) is +8.7% and g(2) is -3.3%. Compute the horizontal coordinates and elevation for station 95+11.26. The coordinates for the curve's RP are: 10,000.00 north, 8000.00 east. The BVC elevation is 555.55 feet.

$$Elev = \frac{g_2 - g_1}{2L} x^2 + g_1 x + Elev\ BVC$$

Editor's Note: Solution will be in the June issue.

Ohio Trig-Star Awarded Second Annual Trig-Star Scholarship

by NSPS Trig-Star Committee

Jonathan Wilson of Jefferson, Ohio was selected as the second annual winner of the Trig-Star Scholarship by the NSPS Trig-Star Committee at their meeting in July of 2008. The amount of the scholarship award was $5,000. Jonathan's selection was based on recommendations, an essay, and high school transcripts that he submitted in conjunction with his scholarship application. The scholarship is available to high school seniors who have participated in the Trig-Star contest at any time during their high school career. The scholarship was developed by the NSPS Trig-Star Committee as a way to reward contest participants whether they were state or local winners or not. Also, one of the requirements is that the scholarship winner must enroll in a surveying and mapping curriculum at a college or university. This provides for further promotion of careers in surveying and mapping to high school seniors.

Jonathan, who graduated from Jefferson Area High School in 2008, won first place in the State of Ohio's Trig-Star contest his senior year. After winning the state contest, Jonathan received a formal statement of congratulations from the Ohio House of Representatives, under the sponsorship of Representative Deborah Newcomb. Upon high school graduation, he is set to enroll in the Geomatics Engineering program at Ohio State University. Jonathan is proof that the Trig-Star Program is an excellent tool to assist in the recruiting of future surveyors.

The NSPS Trig-Star Program, which has been in existence for more than 20 years, provides a means to promote the surveying and mapping profession to high school students. The programs purpose is to (a) promote the study of trigonometry in high school and to promote excellence in the subject by honoring the individual students demonstrating superior skills; (b) acquaint the high school trigonometry students with the use and practical application of trigonometry in the surveying profession; and (c) build an awareness of surveying as a profession among high school students with superior math skills, and among high school counselors and math teachers. Currently, there is active participation in the Trig-Star contest in 33 states. As a result, thousands of high school students, counselors, and math teachers learn about surveying and mapping as a career. The program is currently delivered by local sponsors who work with the various local high schools.

If you would like to participate in the process of recruiting the future surveyors of the next generation, you should consider getting involved in the NSPS Trig-Star Program. You would be able to work with talented high school students by administering the Trig-Star test at local high schools, and by promoting the NSPS Trig-Star Scholarship Award. Information about how you might get involved in the Trig-Star Contest, and how you can provide a donation to the Trig Star Scholarship Award can be found at http://www.nspsmo.org/trig_star/index.shtml.

Short Buying

by Wilhelm A. Schmidt (retired land surveyor, getting a "crash" course in economics by watching CNBC)

For starters, a disclaimer: I am not an economist. Yet, I dare say that if the notion of short buying does not get me a Nobel Prize in economics, given the current financial milieu – I was about to say millennium, which it is to some - nothing will.

The notion is best described as the opposite of short selling. This is the practice of selling something you don't own. If you are puzzled by this practice, you are obviously a long-term investor, not a trader of stocks. Traders routinely do not own a stock they wish to sell. Since owning it is referred to as a long position, not owning it is, logically, being short. Traders get those who are long to lend them the stock. The loan generally occurs without the owner's explicit knowledge. If his/her account is in a street name, ownership is registered in the name of the brokerage firm, and "ownership" is only an entry in his/her account.

Now, what is short buying? It is the practice of buying something for which you don't have the money.

Having acquired the stock by just asking for it, traders then sell the stock, wait for its price to drop, repurchase it at a lower price and return it to its rightful owner – who is none the wiser for it, or poorer. Well, not exactly! He/she still has the stock but it is worth less. The smarty that traded it made what it has lost. You see, the trade is really a bet that the price of the stock will decline. The "owner" is probably too naive to anticipate the decline, or hopes that any decline will be small and temporary. Remember, he/she is not a speculator. Once in a while, the price of the stock does go up, the short seller loses money and the legitimate owner has at least a paper profit. Nothing ventured, nothing lost!

There is one more wrinkle to this practice. Short selling used to be allowed only on an up-tick (as it once upon a time appeared on the ticker tape). The sale prior to it had to be at a price higher than the one before. But this rule has been scrapped. Since the prior sale was proverbially covered, the short sale of the stock after a down-tick is now naked. The result is that there is no check on the decline in the value of the stock. Its price can readily spiral downward. Lately, so-called hedge funds have taken advantage of this kind of trade, and made billions in the process of driving the market to the brink of disaster.

Now, what is short buying? It is the practice of buying something for which you don't have the money. (And you thought economics was difficult to understand!) You are short the cash, so what do you do? You can raise it by selling something else you do own. The smarter thing to do is to ask someone to lend it to you – a friend for a small amount, to tide you over, a bank for a large amount, to buy a house, for instance. Smarter yet, at least for an intermediate amount, is to buy on credit. Banks and large stores are more than willing to extend it, usually for an exorbitant fee, unless you pay it off quickly. When a brokerage extends credit, it is called margin, meaning you only have to put up a small percentage of the cost of a stock or a commodity. Buying investments, especially on credit, is a bet that their value will not decrease.

Lending institutions usually want some collateral to offset the loan. It could be any property, but mostly it is whatever you buy with the loan. This property is legally the lenders. If it is a car, and you don't make your monthly payments, it can be repossessed. If it is real estate, it can be foreclosed upon. In that case, you lose whatever you already paid down, and the bank ends up with the entire property. If it is stock, you can get a margin call whenever the value of the stock drops below a percentage proportional to the margin, and perhaps you have to sell it at a loss. Needless to say, short buying is not without its dangers.

But a bank doesn't want the property, nor does a brokerage house depreciated assets. They used to assure themselves the return of the capital by lending only to those who were credit-worthy. Usually, that meant having a sufficient income to make regular payments. Unfortunately, this rule has fallen by the wayside: borrowing has gone naked. In the late 90s, the federal government mandated the issuance of mortgages to anyone (call it equal opportunity indebtedness), at rates kept artificially low. Additionally, it allowed for the combination of the commercial and the investment functions of banks. The commercial divisions no longer kept mortgages, but sold them. (No one knows who has them anymore.) They were then pooled and marketed as prime investments. The pooling spread – and masterfully hid - the risk inherent in these investments.

Worse yet, the government amplified the risk by requiring that the value of the properties be marked to the market. The raise in interest rates to stave off inflation and the resulting inability of a relative minority of borrowers to make the increased mortgage payments led to a drop in their value. The institutions that held these pools of mortgages, here and abroad, thereupon foundered, overnight it seems. To the chagrin of nearly everyone, fortunes dropped and lending froze to the point that an unexpected recession could turn into a depression.

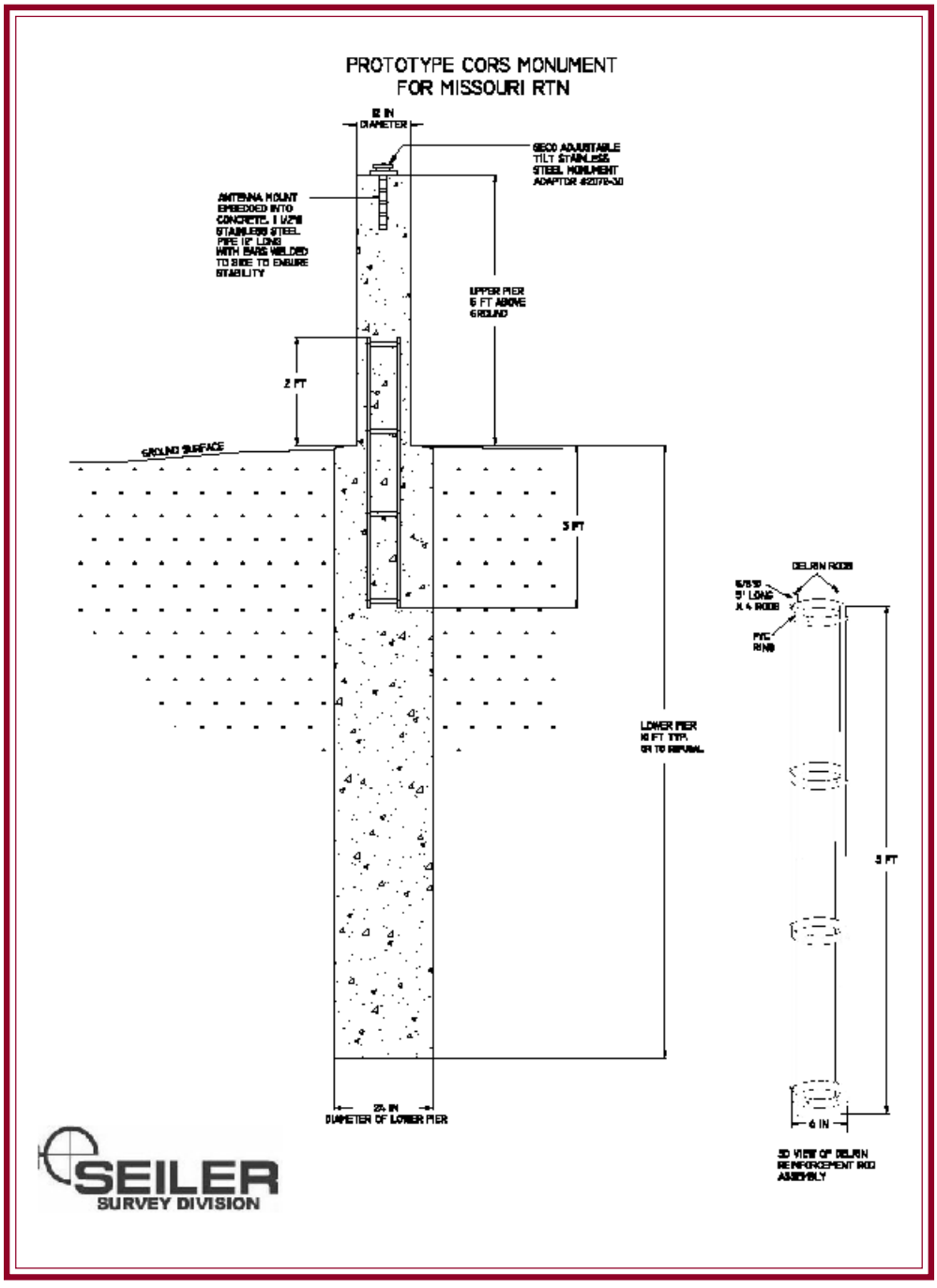
"Neither a borrower nor a lender be" seems the sage advice in this circumstance. Of course, following it really would land us in a depression. The cure for this malady is, ironically, a walloping dose of the disease that brought it on. Therefore, the government is doing all it can to facilitate what I euphemistically – you might well think facetiously - call short buying. Call me unpatriotic, but I wouldn't be caught doing it naked.

MoDOT Real Time Network

by Tom Bryant and Pete Decker

In April 2008, the Missouri Department of Transportation awarded Seiler Instrument Company the contract to supply the equipment for and build a network of Continually Operating Reference Stations (CORS) that provide Real Time Network of Global Navigation Satellite System (GNSS) corrections. The contract specified that Seiler Instrument Company provide a completely operational system, not just a room full of equipment. Seiler Instrument Company supplied the equipment, built the monuments, installed the antennas and receivers, positioned the bases and, along with MoDOT surveyors, preformed tests to prove the reliability and accuracy of the network. The network consists of Trimble NetR5 GNSS Reference Stations and Trimble GPSNet and RTKNet software; however, the contract specified that all existing MoDOT GPS equipment must be able to use the network.

The system is to enable MoDOT and others to get precise locations using GNSS equipment. The objective is to provide real time kinematic (RTK) data to state agencies, public safety entities, utilities, and public users via the Internet. Expected uses include surveying, data collection for geographic information systems, construction layout, GPS controlled grading, automatic vehicle location and asset management. Other possible future uses include automated road salting, unmanned mowers and snow plow guidance.



District Six, which surrounds Saint Louis, was chosen to be the pilot project, with construction starting in June 2008. It was determined that five new stations and the existing CORS station at Seiler Instrument Company's headquarters, SIHQ, would be enough to cover the area. All the sites are on MoDOT property and consist of fixed concrete pedestal monuments. To construct these monuments, we drilled a two-foot diameter hole ten feet deep and filled it with concrete. A non-ferrous rebar cage was inserted into the concrete and a one-foot diameter Sonotube was positioned over the rebar cage and filled with concrete. A one and one-half inch-diameter stainless steel pipe was inserted into the concrete to hold a Seco precise leveling mount. An R8-2 Trimble GNSS antenna was mounted on the Seco mount. An aluminum disc was also placed in the base of each pillar to provide a benchmark for future height modernization efforts.

(continued on page 20)

CONGRATULATIONS!

PLS's Licensed January 5, 2009

Joshua E. Bettis, Jonesboro, AR

Lyndon J. Bragdon, Kansas City, MO

Carl E. Burnett, Bolivar, MO

James Owen Nelson, Nixa, MO

Paul Harris Rydlund Jr., Belle, MO

Bryan C. Vorwerk, Saint Peters, MO

John Paul Webster, Odessa, MO

Timothy Blair Wiswell, Kansas City, MO

Steven Paul Wright, Breese, IL

Gregory A. Wyatt, New Canton, IL

LSIT's Enrolled December 12, 2008

James Patrick Barganier, Belleville, IL

Anthony Derboven, Higbee, MO

Thomas James Highfill, Fenton, MO

Dennis S. Hyman, Arnold, MO

Thomas A. Reynolds, House Springs, MO

Robert Cory Spence, Saint Louis, MO

Robert J. Woosley, Bolivar, MO

MoDOT Real Time Network (continued)

St. Clair County, Illinois has a CORS station (SCCB) running on the courthouse in downtown Belleville, Illinois that is a partner in the Seiler Instrument Company VRS network. They agreed to stream data to the MoDOT network. This cooperative effort improved coverage in the downtown St. Louis area, which will be useful when the new Mississippi River Bridge begins construction.

This is what happens when you forget your physics and fluid mechanics classes!

The monument at St. Clair after the concrete pour.

After logging data for a suitable period of time, a network adjustment was performed, holding SHIQ, which is a Cooperative CORS station with the National Geodetic Survey, as the fixed point. We then tested the network for reliability and accuracy, and MoDOT opened the network to the public in early October 2008.

Construction then moved to the Kansas City area, where we investigated many sites and decided on eight stations, seven of which are on MoDOT property and one of which is on Seiler Instrument Company's property in Belton. This network is enhanced by the addition of a cooperative effort with Shafer, Kline and Warren, who put up a station at their office in Lexana, Kansas. This station greatly helps the coverage of the Kansas City metropolitan area. During this phase, stations were also constructed in Columbia and Jefferson City. These stations were opened to use by the public in late December 2008.

We then turned our attention to the southwest part of the state and selected, constructed and installed twelve stations surrounding Springfield. Some of these stations are rather isolated—Wasola and Manes in particular—and while those stations may not be in the middle of nowhere,you can certainly see nowhere from them. However, they are in critical locations to provide coverage for the area.

Each CORS is connected via the Internet to a central server running Trimble GPSnet and RTKnet software. The stations consist of a Trimble NetR5 GNSS receiver and a Trimble Zephyr Geodetic Model 2 antenna on a stable concrete pedestal mount at a physically secure location that has reliable sources of power and Internet communication. Typical spacing of the CORS is 20-50 kilometers.

In addition to the Real Time corrections, static data for all the stations is stored and is available for download to end users.

Even though the base stations are made by Trimble, the system is open and supports many

MoDOT Real Time Network (continued)

This photo shows what the St. Peters station looked like upon completion and decorating by the crew at that office.

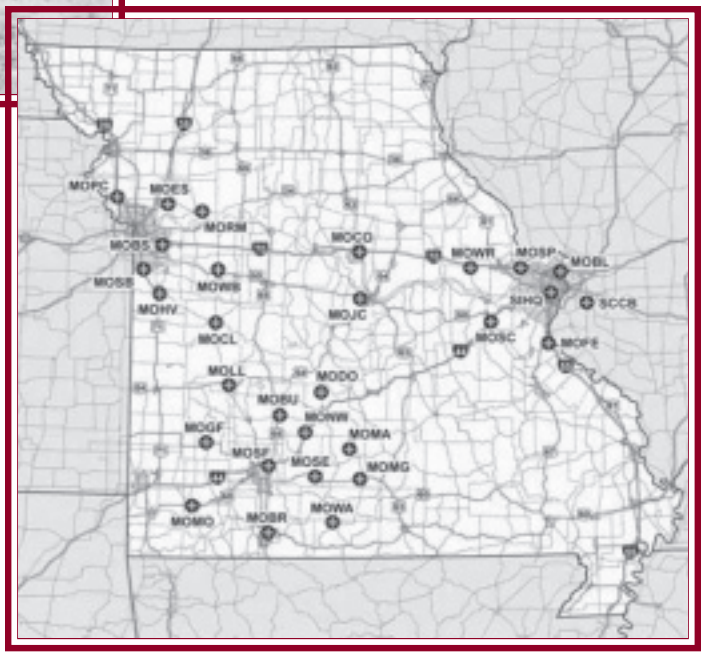
different correction streams and types of receivers and data collectors. To date, we have successfully connected Trimble, Topcon, Leica, Navcom and Sokkia receivers, and Trimble, TDS, Carlson, and Leica data collectors.

All that is needed to access and use the MoDOT RTN is a GPS or GNSS receiver, data collector that supports NTRIP corrections, a cellular phone with a high speed data plan that can connect to the Internet, and of course, a user name and password from MoDOT.

To obtain your user name and password, go to http://gpsweb.modot.mo.gov , download and fill out the form, get it notarized, and send it by mail to MoDOT.

Our next phase is to connect St. Louis and Kansas City along the I-70 corridor and St. Louis to Springfield and Joplin along the I-44 corridor. By the end of summer 2009, we will have the center region of Missouri covered with CORS stations. MoDOT's long-term goal is to operate a state-wide system of networked, high precision, RTK reference stations. MoDOT intends to make free access to this system available to surveyors and others in the area after MoDOT ensures that its needs and the needs of its other government partners are met.

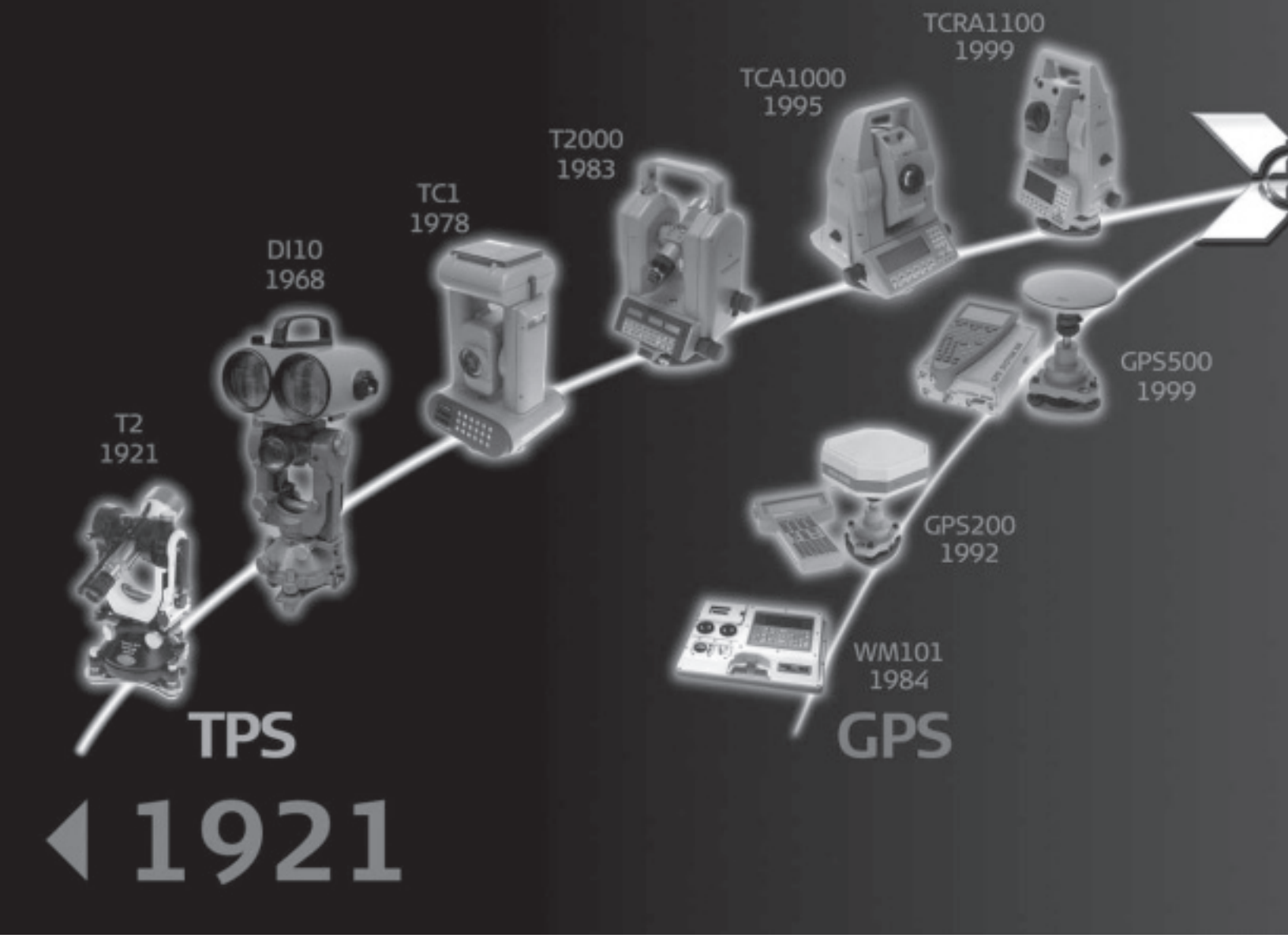
For more information please visit http://gpsweb.modot.mo.gov or contact Tom Bryant at tbryant@seilerinst.com or Pete Decker at Kevin.Decker@modot.mo.gov.



The following map shows the network as it stands today. The St. Louis, Kansas City, Columbia, and Jefferson City areas are up and running and available for public use. The Springfield area is up and waiting on final adjustment before opening it to public use.

Defining industry standards for over a century

Isn't that Wild?



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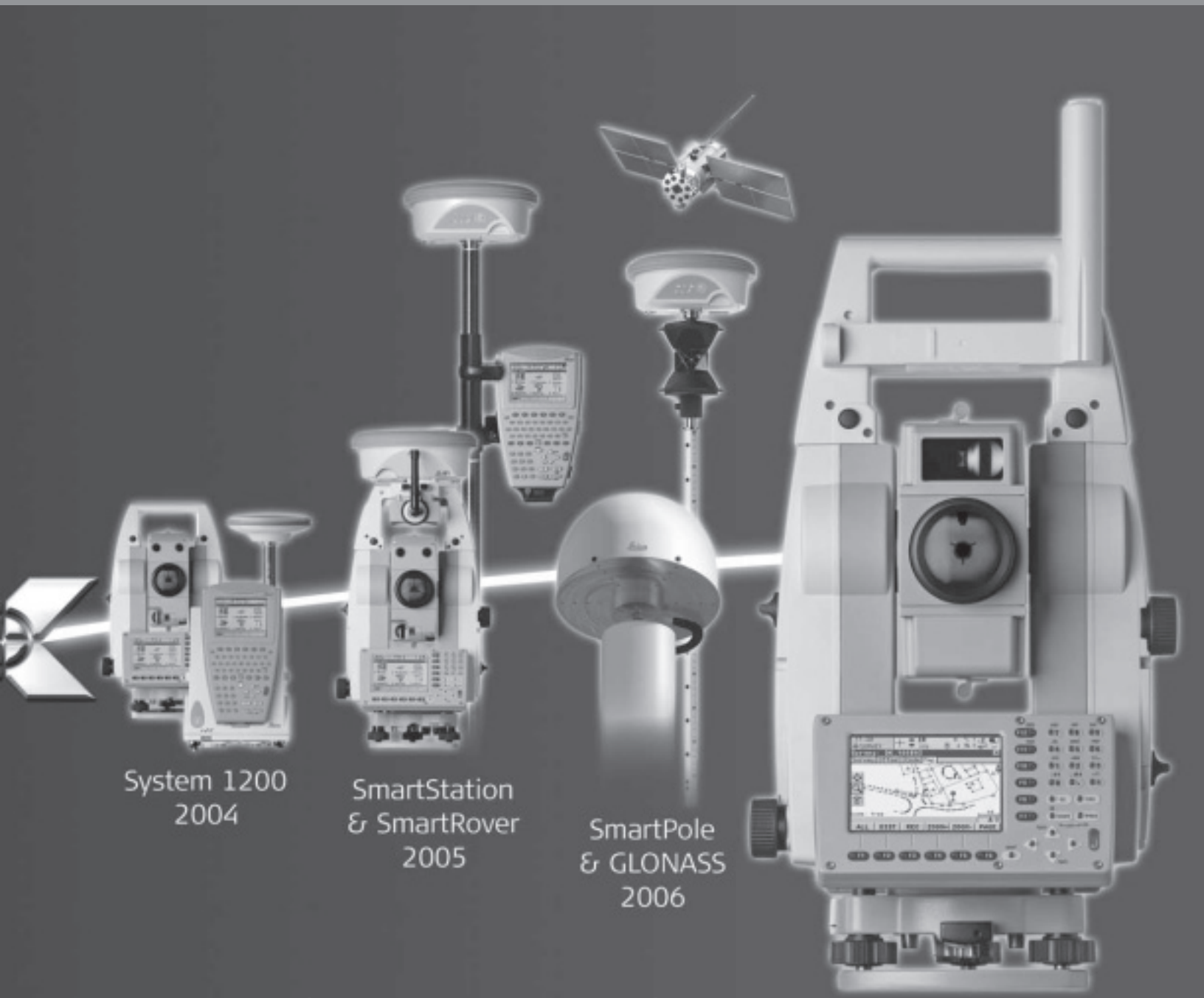


The pioneers and visionaries of the survey world – this is simply an indisputable fact!

From building the foundation of modern surveying with the development of the legendary T2 to revolutionizing the industry with the introduction of the world's first total station with integrated GPS, Leica Geosystems has positioned itself as the premier manufacturer of surveying equipment in the world.

A thirst for innovation, combined with a keen sense of entrepreneurship and an unwavering dedication to quality, has kept Leica Geosystems as the leader in the surveying industry throughout the decades.

2008+

If You Ever Wondered Why . . . Ask Mike!

by Michael Whitling, PSM

Why are most Glow-in-the-Dark items green, and why do they glow?

A phenomenon named phosphorescence is responsible for the light most Glow-in-the-Dark items emit. Phosphorescence occurs when light absorbed by an object is slowly released and can be observed even after the light is removed. If not tampered with, the light the object emits is dim, and is always pale blue in color. The reason for the green is that chemists had a bright idea to spark interest in this phenomenon and to make it visually stimulating. They discovered that when they mixed fluorescent dye with the phosphorescent material, the object emitted a glowing, brighter green, or sometimes red, light. The phosphorescent material absorbs the light, and slowly emits a pale blue light, that in turn is absorbed by fluorescent dye. The light now emitted is green or red light, depending on the type of dye used, giving hours of enjoyment for young and for old alike.

Why do your fingers and toes get wrinkly after being exposed to water for a long time?

The outermost layer of our skin has sebum, which lubricates and waterproofs our skin. The sebum keeps the water out when we wash our hands or take a quick shower. But when our skin is exposed to water for a longer time, such as swimming or washing dishes, the limited amount of sebum gets washed away. Once the sebum is washed away, water enters the outer layer of the skin by the process of osmosis. So why do finger tips and toes get wrinkly and not the rest of the body? Because most of our body is covered with hair and each hair follicle constantly pumps out sebum; but our palms and feet don't have hair; so the protective layer of sebum gets washed away quickly. The extra water that enters your skin makes it swell up in some places, which gives it that wrinkled look. So, the wrinkled look is not because our skin has shriveled but because it is overly clogged with water.

Why when you knock someone out are you said to "clean someone's clock?"

"Clock" has been slang for the human face since the mid 19th century, based on the supposed resemblance to the face of a clock. "Clock" has also been slang for "To punch in the face or strike violently" since the early 20th century. The writer O. Henry used "fix someone's clock" as a slang term "to finish someone" in 1908. In the world of fisticuffs, "clean" has been slang for "vanquish" since the early 19th century. So putting it altogether, although it didn't come along until 1959, comes "clean someone's clock". Just when you think you have it all straight, I also found that in railroad slang when an engineer applies the air brakes in an emergency he is said to "clean the clock" as the speedometer needle drops to zero. You can see how that might just be a metaphor for stopping someone in his tracks (pardon the pun).

Quick Facts

A rainbow can occur only when the sun is 40 degrees or less above the horizon.

James Madison was the shortest president at 5 feet 4 inches.

Opium frequently was used as a painkiller by army doctors during the U.S. Civil War. By the end of the war, according to conservative estimates, 100,000 soldiers were addicted to opium — at a time when the total population of the country was only 40 million.

Dolphins sleep with one eye open.

Sharks and rays share the same kind of skin: instead of scales, they have small tooth-like spikes called denticles. The spikes are so sharp that shark skin has long been used as sandpaper. In Germany and Japan, shark skin was used on sword handles for a non-slip grip.

To clean tarnished copper bottoms of pots and pans, spread a little ketchup onto the bottom. Let it sit for about one minute. Wipe it clean and rinse.

A healthy cow gives about 200,000 glasses of milk in her lifetime.

The first European travelers in a hot-air balloon were a sheep, a duck and a rooster. The 1783 maiden flight lasted eight minutes.

First toilet in the White House: 1825, installed for John Quincy Adams.

Before she became an actress, Margaret Hamilton, who scared millions of children as the Wicked Witch of the West in the movie "The Wizard of Oz", taught nursery school and kindergarten.

(continued on page 36)

MSPS Mentoring

by Daniel L. Govero PLS

An MSPS Mentor is one who is willing to offer guidance, encouragement, friendship, support and advice on surveying, business, and other fundamentals to help promote the surveying profession, the individual business, or career. He is willing to establish a communication with other Surveyors, Land Surveyors In Training, or individuals involved in the Surveying Industry. This can be accomplished by phone, email, or in person. He is willing to share his experiences and expertise with others as needed.

Anyone who is willing to participate in this mentoring program should send information to Sandy Boeckman at MSPS.

Thank you.

Walking the Footsteps of the Colonial Surveyor

Why setting additional corners is not always the correct answer!

by Milton Denny, PLS

Let me paint a picture for you as a professional surveyor. Picture yourself standing in front of a stone monument about ten inches square, protruding out of the ground one foot. This monument is shown on an old plat you have obtained that indicates it has been in this location since 1806.

Now look at the ground around the monument. Hidden from your view by two hundred years of change are the footprints of the original surveyor. You are standing directly in his footsteps. It almost makes the hair on the back of your neck stand up. The decision you are faced with is, do I accept the stone or plunk an iron pipe in the ground one foot away? Or, do you try to find reasons to accept the location of the stone when your computer shouts out to you, plunk in a new pipe.

The answer is not only stand in the footprints of the original surveyor, but to walk in his shoes and to understand how he did his work. Our forefathers surveyed in a very different world. Different equipment, accuracy standards and land value — these all play a role in understanding his work.

The contents of this article are dedicated to the early surveyors that dragged their survey chains from one end of this country to the other. The hardships endured are almost unimaginable, from the harsh conditions in the winter to the tropical heat in the summer.

They had to live outside most of their lives wrapped in a buffalo rug at night to stay warm, on an almost starvation diet of hard tack bread and whatever meat they could kill. Many hardy soles dedicated their 40-year careers to surveying the land, and are buried in an unmarked grave nearby where they died.

Many surveyors suffered the indignity of having to borrow money to finance a years work only to find out when finished paying all expenses, including the crew's wages, that there was no money left to support a family or finance the next contract. Most lost their families from maltreatment and after forty years of work they ended up old, broke and in poor health.

There is no hall of fame for these great Americans. In fact, their names can only be found in some dusty archives or on an old plat. What a great debt we owe the men that suffered from the same affliction that most of us suffer from — the love of surveying.

Maybe in some small way the information contained in this article can shine the light of respect on their careers, because they all deserve the Medal of Honor. They gave their all so this great country could sell the land and become the great nation it is today.

Accuracy of Original Surveys

The conclusions presented in this article are part of my ongoing research work on the subject of accuracy of distance measurements. All the information provided deals only with distance measuring tools. The author acknowledges that other factors such as magnetic declination and compass accuracy affect the final correctness of original surveys. These tools will be addressed in future additions of the Walking in the Footsteps series. I think we need to define a few terms (based on ACSM definitions) before we start to develop our conclusions.

Accuracy — degree of conformity with a standard or accepted value. Accuracy relates to the quality of a result, and is distinguished from precision which relates to the quality of the operation by which the result is obtained.

Precision — the degree of refinement in the performance of an operation, or the degree of perfection in the instruments and methods used when making the measurements. A measure of the uniformity or reproducibility of the results. Precision relates to the quality of the operation by which a result is obtained, and is distinguished from accuracy which relates to the quality of the results.

Note: Based on the above definitions we are going to focus on the precision of measuring devices and not on the accuracy. The precision shown for each period is based on the equipment and surveying information shown on the survey records and plats from the time period. Additional information presented is found in the books quoted and used to help draw conclusions. I acknowledge that there are exceptions to all these conclusions. This information is presented to help surveyors understand the conditions and tools used to perform original and retracement surveys.

Accuracy of the Survey Chain

I have owned original survey chains since 1969. It took me awhile to figure out that chains were made both 33 and 66 feet long and also made in 50 and 100 foot lengths. It did not take me long to place a steel tape next to a chain and find out that it measured longer than the original manufactured length. Since starting to build chains in 1995, I have checked the length of many original chains from many different time periods. The following are some conclusions I have drawn from this research.

(continued on page 26)

Walking the Footsteps of the Colonial Surveyor (continued)

Chain wear from use — the biggest problem with any chain is the wear that develops between the point where the links and the rings join together. Very early chains with three rings between links had about 410 wear points dependent on how many rings and partial links were used to join the handles to the chain.

On early chains that had round rings, the wear developed slower because the rings could turn. Chains after 1830 also used oval rings, and this increased the wear because the ring could not turn. I have never checked a 66-foot chain — that showed signs of being used in the field — that was not at least two inches longer than it should be. Many chains that I have checked for length, that show signs of considerable field use — are 6-8 inches longer than their original length. I do not find many chains longer than eight inches, but I do find where the surveyor had removed a link to get the chain back to within one link of being the correct length.

I think the unwritten standard of care was that the chain should be within one link of being correct. I believe that the surveyors knew they were measuring long, but there was plenty of land, the land was cheap, and they did not want to short anyone's acreage.

New old stock original chain — I have had the opportunity to check a number of chains that were still in their original packaging and never been used in the field. The results of placing them on my check bench show that they are within ¼ inch of being the correct length. The 1914 English book Stanley's Surveying Instruments states:

Examination and Adjustment of Chains — Respectable makers send out chains tested to within half of one of the small links of standard, that is within quarter of an inch, but in use this error may increase either by the bending of the long links of the chain, when it becomes shorter, or in the more general case of friction from wear and from strain, by which is becomes longer.

The fact that chains have had trouble retaining their correct length has been known for a long time. This can be contributed to both the links and the rings (the rings between the links are also called short links or jump links). There are two types of rings — those that are round, and those that are oblong. In a chain where the rings are round the wear occurs mainly at the end point of the links, while the wear on a chain with oblong rings occurs at the end of the links and also at the ends of the oblong rings. This is because the rings cannot rotate and distribute the wear throughout the ring.

The fact that chains have had trouble retaining their correct length has been known for a long time.

Accuracy by Time Period

Let's examine each time period based on the development of technology used to build measuring equipment.

Early English Accuracy 1620-1720

The need for the accuracy we have come to expect was not necessary for the estate and manor surveys being done in England during this time. Most early plats only show lines to hedgerows and stones piled along the boundaries. I have never been able to find evidence of an actual corner points being set for a property corner. Many of these early surveys were done with a wooden pole, and many of these poles have been of different lengths. The plats of estate or manor surveys many times show the distance to the nearest pole and the angle to the even degree.

The surveys that were done with a survey chain show the same dimensioning on the plats at the surveys done with a pole, distances to the nearest pole and angles to the nearest degree. There are some that also show the distance to the one half pole. The truth is, in most cases it is impossible to determine the type of equipment used on a survey.

Conclusion: Based on the need of this time period relating to accuracy and the equipment used, I have determined that most of these early surveys had an accuracy between 1:100 or less at the lower end to 1:200 feet for the better surveys.

Colonial Accuracy 1720-1800

Keeping the fact in mind that the Colonial surveyor was a direct descendant of English surveying, for the most part using the same equipment and books of instruction, the results would likely be the same. A few differences that would affect Colonial surveying was the less accurate wooden compass and chain made in a blacksmith shop not having the benefit of any accuracy standard provided by the government. Most early Colonial surveys also show the distances to the nearest pole or half pole and direction to the nearest degree.

In my collection I have a number of wire handle Colonial two pole chains, one of these chains measures about one and one half fee short of being 33 feet. Because of the lack of standard to check a chain against, I am not sure the surveyor knew how short the chain was that he was using on the surveys he was performing. Most all Colonial surveys were original surveys. There seemed like an endless supply of land, so most were happy with an accuracy standard of about one foot per two pole chain.

Walking the Footsteps of the Colonial Surveyor (continued)

Philadelphia Regulators/ Pennsylvania Chain 1720-1800

One other wrinkle that can affect the accuracy of field surveys is in some major cities such as Philadelphia where a different measurement standard was used. The city was surveyed by Thomas Homes with a standard of 100 feet 3 inches per 100 feet. Another item worth considering is the Wing/Pennsylvania chain. This chain was 66 feet long but contained 80 links per 66 feet instead of 100 links as the Gunter chain.

Government Land Office 1796-1920

The Government Land Office surveys started in 1796 with the same equipment and procedures as used by the Colonial surveyors. In fact most of the first GLO surveyors were Colonial surveyors. It did not take long for the land offices to start writing letters of instructions to the field personnel spelling out the type of equipment to be used along with the field procedures.

Most of the work in Ohio was done according to Colonial practices. By the time the work in Indiana and Alabama was started in the very early 1800s, there was a need for conformity and standards if the work was going to be acceptable to the federal government.

The first major step forward was the set of instructions set out by Surveyor General Tiffin in 1815. While this set of instructions dealt mainly with the midwestern states, many other instruction sets were issued for different states as the states were subdivided by the GLO.

In 1855 the first of many manuals was published laying out complete procedures for how the work was to be performed. In general, the work would have a linear accuracy of one chain per mile. Since most of the work was being done with a two pole chain there is some confusion as to whether the instructions specified 33 feet per mile or 66 feet per mile. I feel that 66 feet per mile was to be the standard which spells out an accuracy of one foot in eighty feet. Not very high by today's standards but adequate by the standards of the time.

While New York is not a GLO state, I think many of these standards were used. They became the standard in many early college textbooks and were used in the Colonial states.

Steel Tape Surveying and Retracement Surveys 1900 to 1950

Along with the introduction of the steel tape came many changes to how survey field procedures were performed. One major change is taking into consideration the temperature on the survey tape. While temperature would have also affected a survey chain, the chain was such an inaccurate measurement device, temperature was not considered.

As the original GLO surveys moved westerly into flat terrain that allowed for long measuring devices, tapes of 300, 500 and even 1,000 feet were used with greatly improved accuracy. All of these improvements resulted in accuracy of a few feet per mile.

In this time period the need arose for retracement surveys or updated surveys of original lands. Improved procedures using plumb bobs, the hand level for checking plumbing of the tape, temperature correction and calibration of tape length led to greatly improved accuracy.

With the intervention of the electronic distance meter, many surveyors have been able to evaluate the accuracy of the work performed far above that with a steel tape. Much of the work with a steel tape was done in the accuracy range of one foot per mile or 1 in 5,000 feet.

I know many surveyors today who think the answer is found in the computer of the total station. The answer has always been, and always will be, in the field evidence and following in the footsteps of the original surveyor.

Where Does This Leave Us Today?

How does this original equipment affect a modern survey? Under normal conditions you can always expect to find distances to be longer than the recorded value. In a retracement survey, a value for the chain length should be established by measurement between existing monuments and used to find or prorate corners that need to be set.

In hilly country you need to determine if the surveyor measured along the ground or made some attempt to plumb the chain. This also can be determined by measuring between found corners. It is here where the true art of surveying comes into play. I know many surveyors today who think the answer is found in the computer of the total station. The answer has always been, and always will be, in the field evidence and following in the footsteps of the original surveyor.

Credits:

Much of the information contained in this article is from a book being written by Milton Denny called Surveying the Land: Survey Measurement Devices 1620 to 1920.

Milton Denny, LS is a professional land surveyor and frequent lecturer around the country. He can be reached at mdenny5541@aol.com.

Reprinted from the "Empire State Surveyor" (New York), Nov./ Dec. 2008

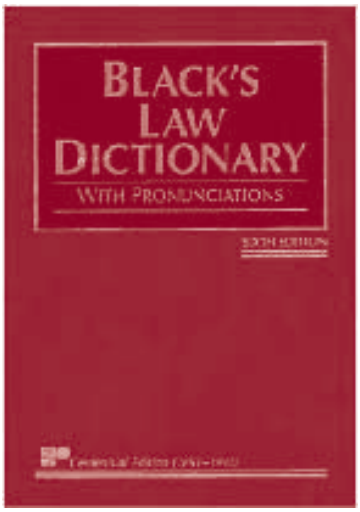
The Boundary Conflict That Wasn't
(Until they hired a Surveyor)

by Christopher M. Wickem, PLS, RLS, CFedS & John B. Stahl, PLS

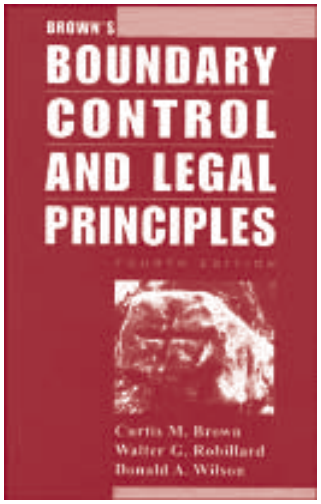
In the beginning, the US public Land Survey System was created. Surveys were conducted and monuments were set on the ground to mark the conveyance of property over a vast public domain. It wasn't long before attorneys, do it yourself owners, and a few surveyors began describing 5, 10, 20, 40 acre (or more) parcels of the US Public Land Survey System.

They based their descriptions on what they knew about the system, the plats and the field notes. We've all seen these descriptions created without benefit of a new survey. The plat said monuments were set at 40 chains and 80 chains. They understood that meant 2,640' and 5,280'. The scrivener understood a Section is 5,280' square and contains 640 acres. They understood a ¼ section is 2,640' square and contains 160 acres; a ¼-¼ section is 1,320' square and contains 40 acres. They didn't consider these to be 2,640'+/-, or 160 acres more or less. They dealt with them as the original government surveys measured and reported them.

Let's consider a description typically seen in many areas: "A portion of the NW ¼ of the NE ¼ of Section 9," The scrivener has referenced the subdivision of the Township and Range, the subdivision establishing the sections within, and the further subdivision of those sections. They did not visit the ground or have a new survey conducted. They didn't recheck the reported measurements; they had their survey before them. Our description continues with, "... being more particularly described as; "Beginning at the NE Corner of the NW ¼ of the NE ¼; thence South 660'; thence West 660'; thence North 660'; thence East 660' to the point of beginning, containing 10 acres." Is it a mete's description defining a parcel that is 660.00' x 660.00 feet? Is it a description by area? Or, is it protracted from the subdivision plat of the Township and an aliquot portion of the public land system?



Black's Law Dictionary, 6th ed., defines the Public Land System as, "Legal descriptions of land by reference to the public land survey." Our description does reference the public land survey. The survey plat and notes were a part of the original conveyance, making it a part of any subsequent conveyance, and the procedures used to establish the subdivision of sections are well established. *Brown's Boundary Control and Legal Principles, 4th Ed., 6.16,* defines parcels created by protraction: "Parcels of land or lots drawn from a subdivision map but not monumented on the ground by an original survey are said to be created by protraction." The subdivision of sections has always been accomplished by protraction from the original section corners from the survey. Protraction is a means that honors the intent of the original sub-divider, expressed on the plat, and is dependent upon the plat and field notes of the original survey. Our description of "660 x 660" is starting to look like it may well be an aliquot part.



We still can't say with certainty that this description is aliquot. We haven't fully determined what the intent of the parties was *when the boundary was created.* Does "intent of the parties" speak only to the current deed? Intent speaks to the *creation* of the boundary. We don't like to think of intent in those terms because that means that we might have to do research to resolve the question rather than reading the current language and just guessing. When patent ambiguities are found in the writings, then one must rely upon the rules of construction as the first clues for resolution. The rules of construction require that one place themselves as best as possible in the circumstances surrounding the conveyance. Once the patent ambiguities are resolved, the language is ready to be applied to the ground. Brown's Boundary Control and Legal Principles, 4th Ed., 11.12, lists the order of importance of conflicting elements that determine land and boundary location as: 1) Right of Possession (unwritten); 2) Senior Rights; 3) the Written intentions of the parties, Call for a survey on which the survey is based, Call for monumented corners; 4) Adjoiners; 5) Direction and Distance; 6) Direction or Distance; and, 7) Area.

What?

I thought we were supposed to determine the intent from the writings! No. The writings are only one step. If they are clear, concise and without ambiguities, then they should govern as the best expression of the intent. What did the survey notes and plats say? What did their vesting deed say? What were they attempting to accomplish by creating the

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The Boundary Conflict That Wasn't (continued)

boundary? Right of possession certainly can't be determined from the writings. What does the field evidence tell you?

This is where the physical evidence will tell us whether our "660' x 660'" 10 acres fits the ground and evidence as an aliquot part, or as a metes description. What we too often find is one method of describing land has been used in preference to another, and neither fits the field evidence. This doesn't signal any boundary issues to the land owner. It may be the appearance of boundary issues where none have before existed. Do we simply expose the appearance on our survey or do we apply the rules of evidence and the rules of law which were designed to resolve the conflict? We must remember that the all of the rules of law concerning boundaries were designed with one purpose in mind... determining the intent of the parties. The writings are only the first step. If they are clear, concise and without ambiguities, then they should govern as the best expression of the intent. However, when conflicted by patent or latent ambiguities, one must turn to the evidence which best expresses the intent.

There are three things which will express intent: 1) What the parties said they would do; 2) What the parties did; and, 3) Whether or not they were satisfied with the results. These fundamental principles are recognized under the law which defines them as: 1) Assent; 2) Good Faith; and 3) Satisfaction. Once the surveyor discovers evidence which fulfills these three requirements of law, the boundary location is known. Every boundary ever established will fulfill these three requirements.

There are three things which will express intent: 1) What the parties said they would do; 2) What the parties did; and, 3) Whether or not they were satisfied with the results. These fundamental principles are recognized under the law which defines them as: 1) Assent; 2) Good Faith; and 3) Satisfaction.

Several years ago, a surveyor showed me a description that attempted to describe the "intent" as: "one acre, more or less, commencing at the place where we stood in the garden yesterday." The written intention sure doesn't seem to be sufficient. A visit to the site made this ambiguous description something that might be manageable after all. A fence measuring about 208 feet x 208 feet had been built next to the old farmhouse. The fence and the improvements within appear to date from the time of the original conveyance. The best evidence of the parties' intentions just may be what you discover in and on the ground.

One additional consideration when dealing with intent is, that every boundary created must be "intended" to be created. This simple requirement can form the first test of construction for every instrument. Did the scrivener "intend" on following an existing boundary, or did they "intend" on creating a new boundary? To aid us in the answer, the courts have derived a simple presumption.

> "It has been held frequently by this Court that there is a presumption of law against a grantor retaining a long narrow strip of land next to one of his outside lines, when the description of the land granted approximates the description under which he holds. "Generally, in the absence of facts or circumstances explanatory, it will not be presumed that a party granting land intends to retain a long narrow strip next to one of his lines; but if the courses and distances approximate closely to a line or corner of the tract owned by the grantor - especially if the description in the deed corresponds, exactly or substantially, with the description in the title papers under which the land is held - it will be presumed that the lines mentioned are intended to reach the corners and run with the lines of the tract, though the trees marked and described have disappeared before the making of the deed." *Western Co. v. Peytona Co.*, 8 W. Va. 406 (418). *Clayton v. County Court*, 58 W. Va. 253(260); *Colliery Co. v. Campbell* , 72 W. Va. 449; *Ahner v. Young*, 84 W. Va. 336 (343)." *GAS CO. v. TOWNSEND*, 104 W. Va. 279, 139 S.E. 856 (1927)

With that presumption of law in mind and with the 660x 660 deed before us, was it the intent of the scrivener to create a new line or to follow an existing line in the record? If we go out on the ground and discover evidence that the line has already been run out, occupied and now is discovered to conflict with the statutorily perfect location of the mathematically defined or "theoretical" location, are we now charged with determining whether the parties "intent" was to define some "theoretical" (and unattainable) position, or is it their intent to follow the existing line as established in accordance with the rule of law? Is there evidence of their "assent, good faith, and satisfaction" in the existing location which is "intended" to establish their boundary? Probably. Did we do the necessary research and gather all the evidence? We most likely have our answer, if we did.

(continued on page 32)

The Boundary Conflict That Wasn't (continued)

The truth lies in the ground, and that's where it will be resolved. Conflict: created by scriveners, perpetuated and memorialized with monuments by surveyors.

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The truth lies in the ground, and that's where it will be resolved. Conflict: created by scriveners, perpetuated and memorialized with monuments by surveyors.

The Oregon Trail, by Francis Parkman

review by Wilhelm A. Schmidt, PLS

This book, I am told, used to be on high school reading lists. (If you have read it, raise your hand.) I only came across it recently in a used book stall in a local farmer's market. It caught my eye because I had just read *Chaining Oregon*, set during the years immediately following the influx of settlers into the Oregon territory over this trail.

The book is not about surveying. I spotted the word "survey" in it only once, used in its ordinary sense of looking something over.

Nor is the book, strictly speaking, about the Oregon Trail. When it was first published in 1849, its title was *The California and Oregon Trail*. But it covers the way west only on this side of the Rocky Mountains, about a third of its length, and then only because it provided a convenient route to the author's intended destination, the home ground of the "Ogillallah" (Sioux) Indians at the foot of the mountains.

The book is nevertheless interesting because it vividly describes the conditions which surveyors of the public lands encountered when they extended the grid system westward. It provides a first-hand account of the terrain, the weather, the fauna and the flora, how varied and rugged they were. It also portrays the Indians, the trappers, and the emigrants, how well or ill suited they were for life in the wilderness.

It provides a first-hand account of the terrain, the weather, the fauna and the flora, how varied and rugged they were. It also portrays the Indians, the trappers, and the emigrants, how well or ill suited they were for life in the wilderness.

The author of the book is Francis Parkman (1823-1893), an eminent American historian during the latter half of the 19th Century. Early in his college days at Harvard, he became interested in the French and Indian Wars. Later, in eight volumes written over a period of four decades, he expounded the conflict between the British and the French for control of what he called the American forest.

His interest in this conflict probably grew out of his boyhood experiences at his grandfather's estate in Medford, not far from Boston, which included a 4000 acre tract of primeval woodland. He was removed to it at an early age to spare him the rigors of city-life because he suffered from an undiagnosed neurological ailment that affected his walking and his eyesight. But that did not keep him from exploring the woods - nor from other strenuous activities throughout his life. The first was this trip to the mid-West.

Upon graduating from Harvard, in the spring of 1846, he and a college friend, Quincy Adams Shaw, embarked on "a tour of curiosity and amusement to the Rocky Mountains." (p. 1) They traveled by coach, railroad and steamship to St. Louis, Missouri, and then took a boat up the Missouri River to Ft. Leavenworth, Kansas. This was the "jumping off" place for those bound for the West. Here, Parkman and Shaw equipped themselves with everything they needed to survive the next few months and with trinkets they could present to the Indians. For safety reasons, they teamed up with four other men for the long ride on horseback across Kansas and Nebraska to Ft. Laramie, Wyoming.

Parkman's initial claim notwithstanding, this was not a pleasure trip. It was part of his education for a career as a historian of colonial America. "I had come into the country chiefly with a view of observing the Indian character. To accomplish my purpose it was necessary to live in the midst of them, and become, as it were, one of them. I proposed to join a village, and make myself an inmate of one of their lodges." (p. 98).

At Ft. Laramie, he heard that a war party was gathering and he "rejoiced" at the prospect of being able to witness the Indians' "rites" of preparing for war. Though, with difficulty, he found the intended meeting ground, it was completely empty. The Indians had relocated to another spot, where they could hunt the buffalo they needed to sustain themselves. As it happened, the war party never materialized. After another lengthy search, he found the village of the Ogillallah and stayed for about a month with one of its chiefs. He ate and slept with the Indians, smoked their blend of tobacco and listened to their feats of bravery. He accompanied the "wandering democracy" (p. 173) from camp site to camp site and hunted buffalo by "running" with the herd.

The idea Parkman formed of the Indians during his sojourn with them is anything but noble. He repeatedly refers to them as savages, even as "a troublesome and dangerous species of wild beast." (p. 231) The Indians do not acknowledge "any law but [their] own will." (p. 127) The foundation of their character is a "wild idea of liberty and utter intolerance of restraint" bred into them from their earliest days (p. 197). As a result, they are imbued with "jealousy, suspicion and malignant cunning" (p. 231) and "cannot act in bodies." (p.

(continued on page 36)

The Oregon Trail Review (continued)

122) They exhibit a "tranquility of self-control" (p. 223), but yield to "sudden acts [of] strange, unbridled impulses." (p. 225) They are at once rapacious and generous with the bounty of the hunt. (p. 228) Whether these observations do the Indians on the whole justice can be – and has been - debated. But in this book, they are stated as facts.

Parkman's description of the land over which he traveled is no less harsh. It consists of "rough prairie and broken hills." (p. 173) The prairie is a flat plain, but contains gullies hidden by grass so tall that it scratches a horse's belly. The hills (declivities) are craggy, and hem in valleys (defiles) so overgrown that they are hardly penetrable. Food and water are scarce. The heat in summer is unbearable; the storms are unpredictable and violent. Prairie dogs, snakes, insects and buffalo inhabit the prairie; elk, deer, sheep and grizzly bears the hills. Travel across this terrain by any means is slow and fraught with danger every step of the way.

Consider the fact that surveyors soon thereafter traversed this land. Some still do . . .

Consider the fact that surveyors soon thereafter traversed this land. Some still do – facing the same hardships, if not Indians prowling for scalps.

Trig-Star Sponsors Needed

by Tim Morgan

Trig-Star is an annual competition sponsored by the National Society of Professional Surveyors and you, the local sponsor. The program goal is to recognize and stimulate the best students of mathematics from among school districts across the United States utilizing a competition with awards. Your assistance is critical to ensuring the success of the Trig-Star program. Trig-Star can be a tremendous public relations event for the surveying and mapping profession. High school students, their parents, teachers, and the public see first hand some of the work undertaken by surveying professionals. It really doesn't take that much time and math teachers and administrators welcome you to their school. Just 2 class periods is all it takes. One for a short demonstration and introduction to the program and a second for the test. Don't worry, you don't have to be able to work the problems to grade the tests, there is an answer key included with the materials. You might even generate some business when parents, teachers and staff members need surveying work in the future. I have been contacted by counselors in Park Hills, Columbia and McDonald County looking for sponsors, but only a very few surveyors have jumped on the band wagon. There is plenty of time left. The local contest results must be turned in by May 1st. With your assistance we can maximize the exposure of the surveying and mapping profession to the next generation and create a strong positive image of our profession. Sign up now by contacting Tim Morgan, PLS 2635, state coordinator for Missouri at tmorgan@pontiaccove.com or by phone at 417-679-4798.

If You Ever Wondered Why . . . Ask Mike!

by Michael Whitling, PSM

The only two spots below sea level in the United States are Death Valley, CA and New Orleans, LA. Death Valley is 282 feet below sea level and new Orleans is 8 feet.

Almonds are the oldest, most widely cultivated and extensively used nuts in the world.

The body creates and kills 17 million red blood cells per second.

Hummingbirds live an average of 5 years. They are hatched from eggs that are so small that a penny would cover three of them. Hummingbirds are usually hatched in pairs in nests that average 1.5 inches in diameter.

If you have a 'Sister Joseph's Nodule', you have been diagnosed with belly-button cancer.

The highest temperature ever recorded in the world was 136.4 degrees Fahrenheit at El Azizia, Libya, on September 13, 1922.

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Reprinted from The Old Dominion Surveyor, December 2008

Humour in Surveying: The Conversation

by Earl F. Henderson, PLS

Work of Fiction (... but based on a true story)

I arrived at the site a few minutes late. I was kicking myself because it was such an important meeting and there were a lot of dollars at stake for someone. After all, the second story of the building was partially framed and I had been informed just yesterday that it was across the boundary line on to the neighbouring property. You probably already know this, but that is not where most developers want their building to be, on someone else's property.

The whole group had already assembled and had begun discussing the issues and I was late. That's not the best first impression, especially since I was the one they were relying on to sort out what had happened and who was at fault. Everyone was visibly nervous. No one wanted to be the scapegoat and they were all obviously manoeuvring and posturing so as to avoid having to pay for such a blunder. It isn't cheap to move a building, basement level and all. I could hear from a distance the anger and tension in their voices.

You probably already know this, but that is not where most developers want their building to be, on someone else's property.

As I walked up to that group I was struck by the fact that I was the only one wearing blue jeans and work boots. My boots were muddy too. It had rained and the site hadn't dried out yet.

As I approached, I heard the end of Melissa's tirade, "I want to know what the !@#$/o happened to my building!" It's not hard to figure out that Melissa is the developer. She's also my client. My crew had staked the location of this building.

"I'm sorry I'm late, Melissa. It literally took me until now to figure out exactly how this happened."

"Well thank God someone knows what's goin' on here!" she said. "Clue us in!"

So here it is. The moment of truth. All eyes are on me. As I opened my mouth to speak, I heard, "All I know is that we built it where it was staked! I don't even know why I've got to be here! I've got work to do!"

"Shut up and let the man speak, Frank!" came shooting from Melissa. If you haven't already guessed, Frank is the contractor. That's what contractors say. "We built it where it was staked." It's sort of like a mantra.

"And besides, you're here because I TOLD you to be here! I'm paying you, right?" she added, "Get on with it!"

"Actually Frank, you didn't build it where it was staked," I said. "This has been a rat's nest to untangle but I think I've finally figured it out. See these nails I've got here? They're maybe six to eight inches long. We use them because they're so big and usually won't move once they are set in the ground. Besides, the ground has been frozen so we couldn't get anything else in.

Well Frank, we can go on over there to where the stakes are, the ones that are left that is, and I'll show you three things about how you built this building from the stakes. One, in building this thing, you knocked over half the nails. You may think the physical evidence is gone but we electronically save the location of all the points we stake for just such an occasion as this.

So we know where all the nails were even though they've been knocked out. Two, between the freeze, thaw, and equipment, some of these nails have been disturbed. In particular, on the west side of the building, the nails are all laying on their sides. It just so happens that the distance from the head of the nails laying on their side to the building corner coincides with the offset distance we discussed. But the nails weren't set laying on their sides. And third, when we were discussing this issue prior to stakeout, you requested a 15' offset, after much deliberation that is. You almost settled on a 10' offset instead, remember? Well the stakes are 15' but the distance from the head of the nail to the building corner is exactly 10'. That pulls the building 5' to the west of where it's supposed to be."

"So that's that? Problem solved? What the hell are the rest of us doing here?"

"Not so fast Mr. Anderson," I said. Mr. Anderson, as he preferred to be addressed, was the engineer, and keenly interested in ending this discussion and getting back to his business unscathed.

"What do you mean by that?" he said.

"Well, I've got to tell you that Frank's was not the only indiscretion in this situation. The civil design for the site doesn't show the correct building location."

"What are you trying to say?" he shot back.

"I'll tell you. It appears to me that the original site design showed a building that was 38' wide. Later, since there was room between the side setbacks, the building design was changed to make it 40' wide. On the civil drawings, the building was changed, as can be seen on Sheet C7 in the clouded area, but the side setback was left the same, at 10'. Consequently, the building is another 2' off."

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Humour in Surveying: The Conversation (continued)

"This is getting worse by the minute. Who has the Tylenol?" quoth Melissa.

"There's more," I said. "Charles' part has yet to be described."

"When will it end?" said Melissa.

Charles was the quiet, confident type. An architect. He had been patiently but attentively listening to the conversation so far.

"The building has an underground garage that actually extends out from the face of the exposed main level by two feet on the side. The building footprint that was provided to the engineer's office by Charles was for the foundation, which is the underground portion and not the main level, as is usual for a set of civil drawings. The civil drawings usually show what will be exposed at ground level. So the building has been shifted an additional two feet."

"They asked for the foundation drawings from us!" said Charles.

"Is that finally all?" asked Melissa.

"Unfortunately, no. There's one more culprit." "There's nobody left!"

"Yes there is. There's me," I offered.

All eyes perked. It isn't often that anyone in a conversation like this points the finger at themselves. I've learned over the years though that more business can be retained and will even be developed than will ever be lost if you admit to your mistakes, take your medicine, pay your dues, and move on. In the end, business people do value integrity and I've made much more money over the years by maintaining my integrity and paying for my mistakes because those same developers have hired me over and over again.

Melissa is a terrific example of that. She's been my client for many years because she knows that when I make a mistake I'll admit to it. She also knows she can count on me to tell her the truth about a situation, which is why I was in this conversation.

"What happened?" she asked.

"Well, let me show you the subdivision plat. See this side property line that looks darker than the other lines? The city wanted to maintain control of the potential development of the adjoining tract so they kept an out-parcel 1' wide along the length of the side of the property. It isn't dimensioned though except all the way at the back of the property and it doesn't show up well on the plat. It shows only as a darker single line. I missed it. And my party chief missed it, too."

"Is that finally all of it?" pleaded Melissa.

"Yes," I said.

"So, in the end, all of you are to blame?" she asked.

"Yes," I said again.

It isn't often that anyone in a conversation like this points the finger at themselves. I've learned over the years though that more business can be retained and will even be developed than will ever be lost if you admit to your mistakes, take your medicine, pay your dues, and move on.

"So we have a 5' error by the contractor, a 2' error by the engineer, a 2' error by the architect, and a 1' error by the surveyor adding up to a 10' error and my building is on the wrong property? What do we do about this now?"

"Not exactly," I said.

It was at that point that I noticed a glimmer of enlightenment in the eyes of the other "culprits".

"What do you mean?" she asked.

"It's like this. Charles made his 2' error when he gave the wrong building footprint to Mr. Anderson. Mr. Anderson compounded that error by 2' when he adjusted the building layout without adjusting the setback distance. I then compounded that error 1' further by laying out the building without noticing the 1' outparcel to the city. Then Frank comes along and blows the layout off the stakes by 5' and nullifies all of our errors!"

"Are you telling me that the building is in the right place after all?"

"That's exactly what I'm telling you."

"Well why didn't you say that in the first place?"

"We'll let that be a lesson to us all."

The collective sigh of relief was audible, and I was part of it.

As seen in SLSA Corner Post Fall 2008 and The Professional Surveyor Vol. 24 and "Georgia Land Surveyor" Jan/Feb 2009

The Relationship Between Survey, Plat and Deed

by Norman Bowers, L.S., & P.E.

Author's Note: *The two basic principles that seem to confuse new surveyors are first, understanding whether they are doing an original survey or a retracement survey, and second, on a retracement survey how to handle the discrepancy between the current measurements, the old surveyors plat, and the deed. We have to know these basic principles, or surveyors create chaos by setting double corners, and casting doubt on long established surveyed boundaries. The article in the last edition of Section Lines dealt with the two types of boundary surveys. This article will explain the relationship between survey, plat, and deed. I have a feeling that a number of surveyors may not agree with statements in this article. However, I will back up these opinions with court cases and references, and my guess is that those that disagree with me will have no basis for the disagreement other than "That is not the way I was taught to do it." If anyone that disagrees with me can back up their opinion with credible written references or court cases, I will be happy to issue a retraction. Decisions need to be based on statutes, standards and court decisions. Hopefully, this article will provide you the legal basis for understanding the relationship between the survey, plat, and deed.*

I have heard a lot of surveyors say that a survey is in error because it doesn't match the bearings and distances on the surveyor's plat. Just because of the nature of measurements there is always a difference between the measured distance and plat distance. When there is a difference (which is always), is the plat correct or the survey? The answer to this question is important, because if the survey controls, the monuments are correct, but if the plat is controls, the measurements are correct and the monuments are in error.

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Let's look at the chronology of events or an original survey from the surveyor's perspective to see if that offers an answer. First, the surveyor surveys the tract. Second, the surveyor balances his work and draws a plat that indicates what he thought he did. Third, the land owner prepares and records a deed restating the surveyor's legal description shown on the plat. In this scenario both the plat and the deed were intended to describe the boundary staked by the surveyor. Stating this another way, the plat and deed represent what the surveyor thought he did. On an original survey, the legal description on the plat almost always matches the deed, since the deed description was taken from the plat. The description on the deed and plat match. So it is easy for a surveyor to think the actual survey is in error. However, the key point is that the survey was done first and the plat and deed were prepared to describe the survey.

Let's now look at the original survey process from the land owner's perspective. He hires a surveyor to mark the boundary and write a legal description so he will never have a boundary issue. The landowner does not know how to read a legal description, and usually just thinks of the plat as evidence that a survey was made. He relies on the stakes on the ground to build a fence or otherwise occupy up to the line stakes. The landowner presumes the survey, plat and deed all match exactly, and are correct, and that the boundary is permanent. The landowner never thinks that if the stakes don't match the deed he will just move his fence to make the next surveyor happy. The key point here is the landowner relies on the stakes as set by the surveyor, not on the plat and deed. The landowner thinks the intent of the deed is to convey what was staked.

When I started surveying in the 1970's there was a big split among surveyors on whether your plat should show the balanced bearings and distances or actual field measurements. When using a steel tape and transit, it was not unusual in a rural survey to traverse around a section and miss closing by 3 feet. That 3 feet makes the closer 1:7000 — well within accepted standards at that time. However, if you balance the traverse and show the balanced distances and angles on the plat, you were not showing measured distances and angles. The legal description on the plat was written with adjusted bearings and distances, not the actual measured, and the resulting errors between actual and balanced measurements were restated in the deed. When field methods graduated to theodolite and EDM the error of closure was smaller, and the adjustments were smaller, but still few of the angles and distances on the plat and deed were actually as measured. With GPS we sometimes measure more accurately, at last over longer distances. However, we have coordinates with error ellipses — and no angles or distances are measured directly even though they are stated as such on the plat and restated in the deed. So no retracing surveyor should be surprised if he can't match the original surveyor's measurements as shown on his plat, even if the original survey was done last week. The question in my mind is why surveyors make such a big deal of not matching measurements.

Now back to the basis question: "If there is a difference between the survey, the plat and the deed, which one is in error?" A lot of surveyors would say that the survey was in error since it didn't match the plat and deed. This is a surveyor's mindset because surveyors are always looking for problems with measurements. But this question, in a way, is a trick question. To answer this question properly, we first need to determine if the survey was the original survey. If the survey we are retracing is the original survey it predated the deed, and the deed description was intended to describe

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Poepping, Stone, Bach & Associates, Inc., Hannibal, MO

The Relationship Between Survey, Plat and Deed (continued)

the survey. In this case the survey monuments and lines are correct, and the deed and plat measurements may not match and must yield to the monuments.

Since I always say decisions need to be made based on the law, let's review what the Kansas Supreme Court has ruled.

173 Kan 820 1953 In re Moore appeal: "Manifestly a new survey cannot be permitted to be employed as a means of disturbing vested rights acquired, as here, in reliance on an earlier survey (8 Am. Jur., Boundaries, § 102) and much less may those rights be thus disturbed in violation of a valid agreement between immediately adjacent property owners. Were the rule otherwise, there could be repeated surveys with the result that each would disturb rights acquired in reliance on a former survey. The very purpose of establishing official permanent boundary lines would be completely defeated."

34 Kan. 595 1886 Shaffer v. Weech: "Surveys are always inaccurate, and this inaccuracy arises partly from the imperfection of instruments and largely from the natural infirmities inherent in all men, which even the most skillful surveyors and chainmen cannot wholly overcome, and also largely from negligence and carelessness. No two surveys are ever alike; and while the map and field-notes of a survey may purport to show the exact elements of the survey in all their details and particulars, yet they never do so and never can. Hence the necessity for relying upon the actual survey as made upon the ground, and not conclusively upon the map and field-notes such survey."

74 K 557 1906, In re Richardson: "The primary rules for locating city plats upon the ground or lots of a platted city are the same as those for locating deeds upon the ground. They are, in order of precedence in application, as follows: (1) Find the lines actually run and the corners and monuments actually established by the original survey. (2) Run lines from known, established or acknowledged corners and monuments of the original survey. (3) Run lines according to courses and distances marked on the plat."

In summary, the answer to the basic question is that the plat always yields to the actual survey. If retracing an original survey the deed and plant yield to the actual survey. The retracing surveyor will never exactly agree with the original surveyor's distances and bearings, and so the correct measurements will never match the legal description on the deed. However, it is the retracing surveyor's job to stake the boundary set by the original surveyor, not to stake the deed. We illustrate this on the plat by showing the original survey lines as the boundary line, and we show how far off the deed lines are from the original boundary.

So, now if you are asked by a title person or an attorney why you held the original monuments over the called-for measurements on the surveyors plat or the deed, you can say you followed the rules set down by the Kansas Supreme Court for locating deeds upon the ground, and that original lines and monuments control over courses and distances.

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