

MISSOURI SURVEYOR

A Quarterly Publication of the
Missouri Society of Professional Surveyors

Jefferson City, Missouri

June 2007



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CALENDAR OF EVENTS

2006-2009

July 13-14, 2007

Board Meeting and Minimum Standards Workshop
The Resort at Port Arrowhead
Lake Ozark, MO

October 4-6, 2007

50th Annual Meeting and Convention
Tan-Tar-A Resort,
Golf Club and Marine
Osage Beach, MO

December 1, 2007

Board Meeting, MSPS Office
Jefferson City, MO

May 8-10, 2008

Spring Workshop
Lodge of Four Seasons
Lake Ozark, MO

May 7-9, 2009

Spring Workshop
Lodge of Four Seasons
Lake Ozark, MO

John Alan Holleck, Editor



Notes from the Editor's Desk


by John Alan Holleck



It is already June and I am sitting here wondering where the last five months have gone. I am sure that I have mentioned before but when I was a kid, time seemed to be nearly suspended, crawling ever so slowly forward. Now that I am older (much) time seems to be barreling forward at break-neck speed. Of course, the study of physics teaches us that neither scenario is possible—leaving string theory out of this discussion, however. Enough ruminating, why not proceed to the contents of the June issue of the *Missouri Surveyor*.

Long-time MSPS member Roger Brenizer's grandson Benjamin, son of MSPS member Matthew Brenizer, portrayed William Clark during a Famous Missourians Day at his grade school; his speech and picture open this issue. This is followed by an interesting discussion entitled "State Plane Coordinates Misunderstood" by Emma Dale Wright. Next in a humorous aside, we feature "The wisdom of Larry the cable guy..." submitted by Abi Boeckman. A plea for participants in the NSPS Certified Survey Technician program by former State Land Surveyor, Robert E. "Bob" Myers follows, including upcoming test sites. With an eye to our electronic age, "Why Surveyors Need Data Protection & Disaster Recovery Plans" by Ramon Ray of Small Business Technology offers some insight. "Land Survey Monument Is Alive" discusses a patent pending devise attachable to monuments that will gather topographic data near its location. A biography of Michael Freeman who was recently appointed to the APELS Board follows in order (mine). Finally, Knud Hermansen's "Digital Data Transmission—Security & Safeguards," which was co-written by Carlton Brown, rounds out the first half of the June issue and treats an important subject to surveyors.

Occupying the coveted "center of issue" is the picture of the signing of the Surveyors Week proclamation followed by a facsimile of the "Proclamation." (Editor's aside: Please note Rich Barr standing next to Sandy dressed in his traditional Republican garb; blue blazer, grey slacks and a striped tie.) Next is "Hazards of Old: A Work of Fiction" by Earl F. Henderson, a Colorado surveyor, about surveying during the War Between the States. This is followed by the MSPS Scholarship Committee report concerning the awarding of two scholarships this year. The recipients are Jeremiah Kasinger of Trenton and Cody Swearingin of Gainsville. Congratulations to the Committee and the two young men. Next, is an article by Norman Miller, Surveys Manager for the Iowa Department of Transportation entitled "Improper Location." Interestingly, from reading journals from around the country Improper Location continues to be "our" worst vice. Rounding out this issue, Christopher N. Ambou, a young Georgia surveyor, wonders if "Tomorrow's Surveyors" are being ignored by a generation gap of older, established surveyors.

As usual, Sandy and I hope that you enjoy this new issue of the *Missouri Surveyor*. If not, since it is your statewide voice, please express your comments in the form of a Letter to the Editor. It is our aim to provide the best quarterly journal of all the state surveying associations and societies. Without your support and feedback, our efforts are wasted. Further, original article submissions are always welcome and encouraged. Thank you for allowing me to harangue you from my soapbox. 

THE MISSOURI SURVEYOR

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President's Message



by F. Shane Terhune

Greetings fellow Surveyors;

It has been a busy spring here in the Northwest corner of the state. We are also dealing with an over abundance of rain to slow down our field work. I always like to share an important life lesson when given the opportunity, and I learned an important one last weekend. Never pull a camping trailer down the road without checking the toilet to make sure someone did not leave it full. Things tend to slosh all over going down a rough road and make a mess. You get the picture. On

to more important subjects.


We had a great turnout for the one-day spring workshop. The attorneys who spoke, Eric Harris and Joe Willerth, did a good job of keeping things interesting and relative to Missouri laws and statutes. The audience had excellent questions and lots of lively discussions. Normally, when you have an attorney in a room full of surveyors it can get ugly, but that was not the case. I heard almost all positive comments about the program, and also about the food and drinks served, and other important things. It was interesting to see many of the familiar faces, but lots of new faces also in attendance. I hope this is a sign that we are reaching the field and office persons not yet Land Surveyors, but who have a desire to become one someday.

The day before the workshop, a MSPS Board meeting and golf game was held. Proceeds collected from the generous golf game participants were enough to pay for one additional non-traditional student scholarship to be given out this fall. These scholarships are awarded to persons already employed in the Land Surveying profession, and need help with tuition costs to attend classes necessary to eventually qualify for the LSIT exam. I know first hand what it is like to juggle a family, finances, working every day and attend courses at night. I was fortunate enough to have had an employer at the time who helped out with tuition costs, for which I am still grateful.

A good deal of time during the board meeting was spent discussing education issues. Several of the colleges in the state are seeking to develop two and four-year degree programs in surveying and technology. The general consensus is for the Board of Registration to increase the number of Surveying course work hours for admittance to the LSIT exam. The 12 credit hours required in Missouri is very low compared to other states. I expect more to develop on this subject in the coming months.

The 50th annual MSPS Convention will be held the first week of October at the Lake this year. I urge everyone to attend this important milestone in our history. We have been seeking persons who attended the first annual convention. If you have knowledge of one of these persons let us know.

I am entering my 29th year of surveying and look back on all the changes that I have seen in that time, and contemplate what surveying will be like in 2057. Will surveyors even need to leave the office or will all the work be done with remote measuring and robotics from the office? We have sure come a long ways from using a steel tape and transit, and working out of a car for a survey vehicle.

That's all I have for now and I hope to see you all on down the line. 

Cover photo: The Land Survey program had a request to locate the boundary between Missouri and Illinois on the EADS bridge. This request was during the time they were renovating the bridge deck. That day we met with a MoDOT Engineer and City of St. Louis surveyor. The survey crew from the LSP was making GPS observations to determine the position of a control point for the survey to locate the state boundary in the Missouri River on the bridge.

Famous Missourians' Day

by Roger L. Brenizer, PLS



On April 26, 2007, the fourth grade classes at Creekmoor Elementary in Raymore, Cass County, Missouri, staged Famous Missourian's Day. Benjamin Lee Brenizer portrayed Captain William Clark of the Lewis & Clark Expedition. Benjamin is the Son of Matthew L. Brenizer, PLS (Former Deputy County Surveyor of Cass County, Missouri) and Grandson of Roger L. Brenizer (Former County Surveyor of Cass County, Missouri.) Each participant in Famous Missourian's Day was dressed like the famous individual they portrayed and each student had a button painted on the back of their hand, which simulated an on switch. When touched by a passerby, the student would begin to recite who they were and why they were famous. Benjamin's recital was as follows:

- "My name is William Clark.
- I was born August 1, 1770, in Caroline County, Virginia.

- I am a frontiersman, explorer, adventurer, military leader, land surveyor and hunter.
- I enjoy cock fights, shooting tournaments and hunting.
- I studied astronomy and map making.
- My father was in the Revolutionary War.
- When I was 14, I became a militiaman and was in several campaigns against the Indians.
- I was best known for being one of the captains of the Lewis & Clark Expedition, 1804-1806.
- I drew the expedition's maps and animals we saw.
- In 1807, President Thomas Jefferson appointed me Principal Indian Agent of the Louisiana Territory.
- In 1808, I married Julia Hancock and had 5 children.
- When she died, I remarried and I had 2 more children.
- In 1822, I was named Superintendent of Indian Affairs in St. Louis, Missouri.
- I died September 1, 1838, in St. Louis.
- I was known for fairness and honesty by both whites & Indians." 🇺🇸

William Clark

by Benjamin Brenizer

Do you know anything about William Clark? I know lots of things! Let me tell you his life story from when he was born to when he died.

William Clark was born August 1st, 1770, in Caroline County, Virginia. Clark grew up on his families Virginia plantation and moved to Louisville, Kentucky when he was 14. In his early life, Clark's interests were wildlife, foxhunts, cockfights, shooting tournaments, and hunting. He studied astronomy and mapmaking. He was in the army and was a frontiersman. Also, when Clark was 14 he became a militiaman and was in several campaigns against the Indians. He was the 9th child of a Revolutionary war hero, George Rogers Clark. He also spent most of his life in the woods.

Clark was about 6 feet tall, talkative and outgoing, and had red hair. He was familiar with the habits of wild animals. He drew a little. He was also a land surveyor. When Julia Hancock was 12, Clark decided that he would marry her on her 15th birthday. He married her on January 5th, 1808, and had five children. His wife died so he remarried and had two more children.

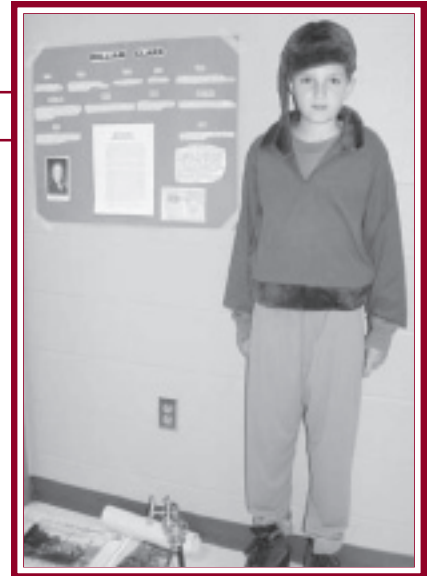
President Thomas Jefferson purchased the Louisiana Territory and asked Meriwether Lewis (Clark's friend) to explore the territory and pick one strong woodsman (hunter). There were also other people on the expedition too, but the captains were Lewis and Clark. Lewis chose Clark. Clark was in charge of making the expedition's maps and drawing the animals they saw. Each time the expedition met an Indian tribe they held a meeting. First, the expedition's soldiers did drills to show off their training, uniforms, and weapons. Then a captain did a speech that said the U. S. now owns this territory and wants to be friends. U. S. traders want you to trade with them and not with other countries. The U. S. wants

to help make peace among all the Indian tribes who are fighting with each other. After the speech, the Indian chiefs had their turn to talk. They replied politely and welcomed the visitors. Clark was in charge of asking the Indians questions that some people wanted to know. A few members of the corps met the Blackfeet Indians. The meeting ended with a fight. It was the only time the corps fired upon and killed Indians. Clark wrote in his journal about a bird that was unknown to scientists. Scientists then named the bird after what Clark called it (a nutcracker). The expedition reached the Pacific and headed back east.

Clark died September 1st, 1838, in St. Louis, Missouri. He was 68 when he died. Clark was known for his fairness and honesty.

Here are some cool facts about Clark and the expedition. The expedition traveled over 8,000 miles over a period of 2 years, 4 months and 10 days. The expedition saw 80 plants and 122 animals that had never been seen by the English. Together, Lewis and Clark wrote more than 1 million words in their journals. Throughout the expedition, Lewis and Clark never argued.

William Clark is not only known as a famous Missourian, but also as a famous American! Did you learn a lot? Did you enjoy my paper? I hope you did! 🇺🇸



State Plane Coordinates Misunderstood

by Emma Dale Wright

In my 30 plus years since college graduation, I have been fortunate enough to live in some of the Midwestern, eastern and southern states of the United States, to visit states in a larger portion of the United States as well as a few countries in Europe.

As a technically trained person, I have found myself to be quite cognizant of surveying practices and procedures in the areas that I have visited. I have seen survey crews in Minnesota using grain shovels to remove snow from a control point location while I was going ice fishing, and have photographs of vermessungspunkts in Germany and a Primo Meridiano monument in Rome, Italy.

Most recently, as a practitioner and instructor in surveying matters, it has come to my attention that there may be a significant misunderstanding of state plane coordinates.

A review of available record documents related to some of my projects as a practitioner led me upon a non-scientific and random review of records for use in my instructional endeavors. Subsequent discussion of the preliminary results of that search with students

has revealed that many of the students have been introduced to those same misunderstandings by their supervisors.

The state within which I practice has statutorily defined state plane coordinates to be metric with specifically defined zones, origins and scale factors. The minimum standards for property boundary surveys in this state require that specific information be included within

any subdivision plat that utilizes state plane coordinates and that plat distances are to be in horizontal surface feet, while state plane coordinates are to be in meters. In addition, the statutes state that no surveys are to be recorded unless they comply with the requirements of the adopted state plane coordinate system.

Several county and city planning departments within my state of practice have adopted subdivision regulations requiring placement of state plane coordinates on all new subdivision plats. Additionally, the surveyor's certification for subdivision plats must state that the plat complies with our state's minimum standards for property boundary surveys.

My preliminary research of these randomly selected plats indicates that less than one third of them comply with state statutes and administrative regulations related to state plane coordinated. A recent professional society seminar

presentation by another surveyor in our state showed that roughly 3 out of 4 subdivision plats were initially deficient for coordinates in his metropolitan area.

Deficiencies noted are coordinate listed in feet instead of the prescribed meters, failure to list the name and coordinates of the Geographic Reference Station used as the basis for the survey, failure to list the coordinates of that station and failure to show either a tabulation of the traverse from reference station to the subdivision or the GPS relative positional tolerance of the tie to the reference station.

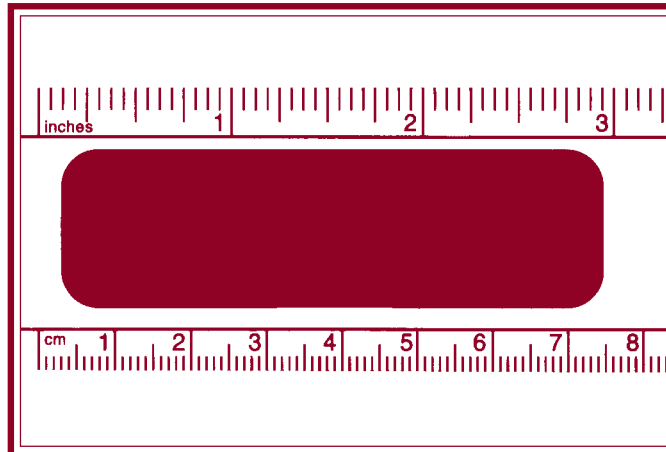
At first, these deficiencies appeared to be administrative or documentary defects only, however, a further review of the data on the review plats revealed that the coordinates listed were actually surface coordinates, not state plane coordinates. The basic concept of state plane coordinates is that there are two locations within a zone that have scale factors of exactly one (remember, elevation factor must be applied to scale factor to determine grid factor, and grid factor applied to surface distances yields grid distances and

coordinates). Between these two points, state plane distances are less than surface distances and beyond these points state plane distances are larger than surface distances. **This difference applies regardless of whether the state plane coordinate system is defined to use units of meters or feet.**

One plausible explanation of the plat distances and the inversed distances being the same is that the preparer of the

plat converted state plane coordinates in meters to surface coordinates in feet, conducted the survey on the surface in feet and merely picked off surface coordinates from the resultant drawing (This is, of course, in an area that has adopted metric state plane coordinates). For proper publication of surface distances and state plane coordinates a transformation method must be used. For example, in Autodesk's Land Desktop, the Projects menu contains a Transformation submenu that allows definition of a point in state plane and local coordinates and the Labels menu contains a submenu for geodetic labels.

If a subdivision plat that you are reviewing (whether it be yours or someone else's) lists distances that match the distance obtained by inverting the listed state plane



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State Plane Coordinates Misunderstood (continued)

coordinates, you have one of two situations. First, you are on the line of scale factor exact or second, the data on the plat is incorrect. A detailed reading of your local state plane coordinate statutes, regulations or manual of practice will provide the answer as to which of these situations you have found.

Following the recent NSPS/ACSM meeting in St. Louis, one surveyor who attended the geodetic seminars was discussing readjustments to the control network and said that one of the geographic reference system stations he reviewed had moved 1.22 feet due to readjustments. I asked him to use metric dimensions when discussing state plane coordinates, as our state and all its neighbors have adopted the metric coordinate system. I then summarized the plat information that I had discovered illustrating misconceptions about our coordinate system.

A few days later, while talking with another local surveyor, I was thanked by him for mentioning state plane coordinate misconceptions at the recent meeting. He went on to say that he had been thinking about his firm's procedures and

concluded that their gps measurements are always on our state plane system, but their survey crews use those coordinates for surface measurements by total station also. Their procedure did not account for transformation from grid to ground, and he was reminding himself to be sure to set the grid factor in the gps controller **at the beginning of the project.**

There is a national debate regarding whether GIS should be under the supervision of professional surveyors. The primary use of state plane coordinates is to coordinate all surveys to a common reference system and subsequent use in mapping or GIS.

There have also been presentations made at our professional society seminars regarding both state plane coordinate procedures and

evaluation of whether gps surveys meet our state's minimum standards for property boundary surveys.

If we professional surveyors are to comply with local surveying standards and to obtain jurisdiction over GIS systems, should we not be sure that we correctly understand state plane coordinates? 🇺🇸

There is a national debate regarding whether GIS should be under the supervision of professional surveyors.

THE WISDOM OF LARRY THE CABLE GUY . . .

- 42.7 percent of all statistics are made up on the spot.
- 99 percent of lawyers give the rest a bad name.
- He who laughs last, thinks slowest.
- Depression is merely anger without enthusiasm.
- A clear conscience is usually the sign of a bad memory.
- How much deeper would the ocean be without sponges?
- What happens if you get scared half to death, twice?
- Why do psychics have to ask you for your name?
- Just remember — if the world didn't suck, we would all fall off.
- Light travels faster than sound. That's why some people appear bright until you hear them speak.

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Surveying Technicians Needed

by Bob Myers

Looking for a better future. This is a great time to become certified as a survey technician. MSPS is seeking to find survey technicians who are willing to take that additional step in their career development. Employers are interested in employees with known technical skill certified by the National Society of Professional Surveyor. Join this challenging national movement and become a Certified Survey Technician.

Are these jobs in your future?

Survey Office Manager

Certified Survey Technician IV, Office
Certified Survey Technician IV, Field

Survey Crew Chief

Certified Survey Technician III, Boundary
Certified Survey Technician III, Construction

Survey Technician/Aide II

Certified Survey Technician II, Field
Certified Survey Technician II, Office

Survey Technician/Aide I

Certified Survey Technician I, Entry Level

Testing for the CST will be held at the following sites in Missouri.

Longview Community College, Kansas City MO
June 16, 2007
Registration deadline May 26, 2007

Missouri State University, Springfield MO
August 18, 2007
Registration deadline July 28, 2007

Tan-Tar-A Resort, Osage Beach, MO
October 6, 2007
Registration deadline Sept. 15, 2007

Florissant Valley Community College, St Louis MO
December 1, 2007
Registration deadline Nov. 10, 2007

For additional information and registration forms contact the MSPS Certified Survey Technician Committee.

Bob Myers P.E., L.S, Chairman and CST Coordinator
myersre@rollanet.org

Clarification of Board Rule 20 CSR 2030.8020 — Professional Land Surveyor — Professional Development Units

Missouri surveyors are now required to keep up with changes to the Missouri Minimum Standards for Property Boundary Surveys. Effective January 1, 2006, an amendment to our continuing education rule (20 CSR 2030-8.020) requires a licensee to have completed a course in Minimum Standards before being eligible to renew his/her license. Since 1996, section one of the rule has required that "each licensed land surveyor, as a condition for renewal of his/her license, shall complete a minimum of twenty (20) professional development units (PDU) each two-year period immediately preceding renewal". The new section requires that:

"(A) Of the required professional development units, licensed professional land surveyors shall complete a minimum of four (4) professional development units in Minimum Standards (20 CSR 2030, Chapters 16, 17 and 19) during the four (4)-year period immediately preceding renewal."

Since a law can't be retroactive, the licensing Board agreed that it would not require the four (4) professional development units in Minimum Standards as a condition for renewal until December 31, 2009, which is a full four (4) years from the effective date of January 1, 2006.

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: Ken Eichman
Longview Community College
Science and Technology Bldg.
500 Longview Road
Lee's Summit, Missouri 64081
816-672-2283

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

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 Community 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)

University of Missouri-Rolla - Rolla, Missouri

Contact: Distance & Continuing Education
University of Missouri-Rolla
conted@umr.edu
103 ME Annex
Rolla, Missouri 65409-1560
573-341-4132

University of Missouri-Rolla - Rolla, Missouri

Contact: Surveying Courses in Civil Engineering
Dr. Bill Schonberg, Chairman
University of Missouri-Rolla
Dept. of Civil Eng.
civil@umr.edu
1870 Miner Circle
Rolla, Missouri 65409-0030
573-341-4461

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

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Why Surveyors Need Data Protection & Disaster Recovery Plans

by Ramon Ray, smallbiztechnology.com

If the businesses who have recently gone through Katrina, Rita or 9-11, knew that their businesses would have their paper files and computer data destroyed, many of them would have ensured their data was backed up and that they had a disaster continuity plan in place.

Unfortunately, no business, especially those who go through data loss each month, knows what's going to happen to their business the next day or the next year.

Disasters are not the only reasons for data protection and disaster recovery plans. Employee theft and other crimes, and hardware or software failure is another reason it is necessary to backup your data and ensure you have a plan in place to put your business operations back in place when necessary. Would you be in a

panic if you came into your office tomorrow only to find that the hard disk where you kept years worth of client data and records was missing? Would your business survive if a water pipe burst, flooding your business and destroying

client files and servers? What would happen if a server holding thousands of critical files suddenly stopped working?

A disaster recovery plan, ensuring business continuity, is more than just concentrating on your data, computers, telephones and files, but also concerns succession planning, employee emergency meeting locations, temporary office relocation and other considerations. However, the focus of this article is on the aspect of business continuity for your business' technology and more importantly your critical data.

- Create a daily and systematic back up of all data and program files. Often times business owners will back up the files they create but neglect to back up the programs used to create the files. Maybe you have the original CDs of Microsoft Word or can easily buy them, but what about a specialized image management or graphic creation program? If you don't have the original software of a program, make it part of your back up strategy.
- Analyze your paper files and scan the critical files. In the future consider using less paper and/or systematically scan all critical incoming paper for digital storage and backup.
- Backing up your data is only one half of your backup plan. The other half is to ensure that your backup files are stored off site. If you have your data backed up and store the backup files in your desk drawer, if a fire destroys your

office then the backup data you have carefully done will be lost.

- There are several options to consider when backing up your data:

Backing up to removable media like CD or tape is a popular method of data backup. If 5 backup tapes or 3 CDs are needed to backup all your data, ensure that someone is taking out CD number 1 and inserting CD number 2 and etc., for example.

Backing up your server(s) to a redundant or mirrored server(s) is another option that provides even more security and robust backup. Recovering data from a CD or tape

means that you might spend hours first restoring computer programs, then putting the data back on a server. Don't forget the time it might take to install the operating system. Having two servers automatically synchronized reduces down time and

ensures that if one server goes down the other server can be brought into action in minutes.

Another option to consider is imaging your hard disks. An imaged hard disk is a mirror copy of another hard disk. When a computer's hard disk goes down you simply take the bad hard disk out and insert the good, imaged hard disk. Because each imaged hard disk is optimized to work with specific hardware configurations, you must use the same type of computer system on the same hard disk image.

Online backup services send your data, via the Internet, directly to an off-site storage location. In the event you need your data you can request a CD or you can download the data via the Internet.

As part of your back up plan remember your mobile computers. If your staff is using notebook computers or other mobile devices their data needs to be backed up as well.

Continuous Data Protection (COP) is a type of data protection that you should be familiar with as it offers an almost 100% secure system of protecting your business data. All client computers are backed up to servers. All servers are synchronized and replicated to onsite servers and all servers are remotely backed up to off-site storage locations. Backup only solutions offer a limited backup solution, while a COP is more comprehensive and ensures all your data is backed up all the time.

Disasters are not the only reason for data protection and disaster recovery plans.

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Why Surveyors Need Data Protection (continued)

Managed Service Providers (MSP) provides a range of technology services that enable you to outsource most (if not all) of the management of your technology service to someone else. You can concentrate on your business, and they manage your technology. Part of the service they provide is data protection via a COP or some other robust service. In the event of an emergency, your staff could move to a hotel miles away and through the Internet access your data just as if you were in your office.

Other Considerations

As part of your overall technology disaster recovery plan consider how fast your telephone service can be restored. If your telephone lines go down, what procedures will you need to implement to switch to cellular phones or setup a temporary phone system?

As many New Orleans businesses experienced in the recent catastrophe of Katrina, after accounting for human life, finding office space was high on the priority list. Do you have contingency plans to relocate?

Fax machines, copy machines and other basic office necessities are critical in the days after a disaster, so ensure you have plans in place to quickly get a new supply.

Remember to consult your local computer consultant/solutions provider for help.

Dell Storage advises that you audit your internal backup plans and implement procedures where none exist and make sure that your recovery system contains no single points of failure. The best disaster recovery plan can't recover data that hasn't been backed up. ■

As seen in the *Empire State Surveyor*.
January-February 2006



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 University of Missouri-Rolla. 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 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 Jim Mathis, 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". Two years ago, based a poll of Missouri Professional Land Surveyors, the exam content was established as follows:

Missouri Minimum Standards	21%
Resurveys on the USPLSS	19%
The GLO in Missouri	16%
Calculation Problems (on the USPLSS)	15%
Missouri Board Rules	13%
Missouri State Plane Coordinates	10%
Missouri Riparian Boundaries	6%

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

Land Survey Monument is Alive

by John Scott Minor

A Carnegie-Mellon (Mechanical Engineering, Tepper) and University of Akron (Surveying Engineering/GIS) graduate has an international pending patent on a real-time data-distribution device, which is to be attached to a surveyor's boundary corner/control point markers. Product availability is scheduled for second quarter 2007. With this device, termed an "Intelligent™ Topographic Device™ (ITD™), the possible types of data collection are extensive and varied, well beyond merely those related to surveying.

Once deployed, the ITD network provides sensor opportunities for: automatic communication with sensor populated clothing allowing for everything from exercise analysis to Internet-enabled remote hugs as pressure sensors on your shirt send the response to your significant other's; real-time open parking space locations with rent-ahead-and-hold capability; smart-road traffic alerts for ice, accidents, or construction and real-time flow analysis for driver re-routing; real-time medical monitoring with data moving from ITD to ITD as a patient walks or runs – with real-time alerts coming back should the patient show signs of medical concern; house-by-house weather forecasting; and highly granular real-time display of toxic agent releases for homeland security response and evacuation analysis.

A land surveyor will provide the GPS (global positioning system – this equipment is required as a prerequisite for deploying the ITDs) coordinates and meta data history (data defining the logic of the millimeter accuracy boundary or control point location) electronically to the ITD as the ITD is placed, sealed and buried, on top of the location pin (usually a steel rod). Battery life for the \$49.95 (target price) unit is expected to be 20 years when used only for pin location. The surveying organization's monthly access fee is \$29.95 plus

a connection hardware fee of \$399.00 each per office and communications distance extension requirement. ITDs will initially come pre-packed in quantities of 12, and all orders are prepaid and can be placed over the Internet via credit card. Orders can be placed immediately, but shipping may take six to eight weeks as the manufacturing pipeline gets fully implemented. At the end of that period, orders can be turned around in a few days. Once volumes reach discount levels, device prices will fall sharply.

All data from and to the ITD is encrypted at several security levels to minimize hacker attack. As well, the ad hoc mesh network topology is self-healing and automatically reroutes data to working ITDs should their neighbor ITDs be made inoperable for any reason. Personal and commercial/industrial client-controlled data access

requires a logon ID and password at the cyberutility.net portal. Personal and public data and location-based-search are free.

"We are excited by the opportunity in this emerging market," said Scott Minor, Chief Executive Officer, CyberUtility, LLC. "We believe it is time to bring the survey marker into the 21st century, and to significantly reduce the field time for surveyors in looking for boundary corners and control points. In addition, we facilitate the delivery of real-time sensor and location-aware-search services to a time-constrained need-it-now population."

For more information: scott.minor@cyberutility.net, or see www.cyberutility.net 

Intelligent™ Intelligent Topographic Device™ and ITD™ are trademarks of CyberUtility, LLC. All other trademarks and registered trademarks are property of their respective owners.

Personal and public data and location-based-search are free.

The MSPS Scholarship Committee has finalized a scholarship application for a "Non-Traditional Student Scholarship". The amount of the scholarship is \$500 and deadline for applying is July 31, 2007.

For a copy of the application,
contact the MSPS office at
573-635-9446 or
email mssp@missourisurveyor.org

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Michael C. Freeman Appointed to the Land Survey Division

Michael Freeman of Hermitage was appointed by the Governor to the Land Survey Division of the Missouri Board for Architects, Professional Engineers, Professional Land Surveyors and Landscape Architects. Mr. Freeman was confirmed by the Senate Committee on Gubernatorial Appointments on May 2, 2007.

Mike Freeman has more than twenty-five years experience in the land survey profession. He was affiliated with the Bentley Title Company from 1979 to 1987. From 1987 until present Mr. Freeman operates Freeman Land Survey in Hickory County, Hermitage, Missouri.

Mr. Freeman is a past president of the Missouri Association of County Surveyors having been elected as the Hickory County surveyor in 1988 and serving continuing in that position. He has been a member of MSPS since 1983. He is currently Vice President of the Hermitage R-IV School Board and past president and member of the Hermitage Lions Club. He is an active member of the US Navy Reserve holding the rank of Senior Chief Petty Officer. He participated in US Military Operation Noble Eagle/Enduring Freedom from 2001-2002 and is presently serving as Battalion

Training Chief for NMCB-15 in Belton, Missouri with the responsibility for organizing and training over 500 personnel.

Mr. Freeman has a Bachelor of Arts degree in Drury College where he majored in Business Administration and Accounting. He has over 20 credit hours in Land Survey, Engineering and Soil Science from the University of Missouri-Columbia, University of Missouri-Rolla and Missouri State University.



Michael Freeman replaced Thomas J. "Jim" Mathis whose term expired in 2006. Mr. Freeman's term extends until September 28, 2010. He serves with John Teale and Mike Gray who will assume the duties of the Chairman of the Division. 🇺🇸

ANNOUNCEMENT

29th Annual Land Surveyors' Review Course

Cosponsors:

Missouri Society of Professional Surveyors
University of Missouri-Rolla

August 14 through 17, 2007 ◆ Campus of University of Missouri-Rolla ◆ Rolla, Missouri

Topics Include: Preparation for the NCEES exam, Legal Principles, Resurveys on the U.S. Public Land Survey System, Error Analysis, Route Surveys, Celestial Observations, GPS Surveys, Instrumentation, Control Surveys, Photogrammetry, State Plane Coordinate Systems.

Course includes evening problem session and practice NCEES-like exam and exam review.

Credit: Missouri Board preapproved for 3.6 CEU's or 36 PDU's.

Instructors: Dr. Richard L. Elgin; Dr. Joseph Paiva; Norman Brown.

Fee: \$795.00. Does not include room or board. Includes extensive notes.

Contacts: Administrative: Sue Turner, Engineering Continuing Education, University of Missouri-Rolla, Rolla, Missouri 65409. 573-341-4132. Technical: Dr. Dick Elgin, 310 East 6th Street, Rolla, Missouri 65401. 573-364-6362.



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Item	List Price	Monthly Lease Price
Topcon GTS-236W, 6" Accuracy, Wireless, Laser Plummet	\$6,290.00	\$135.16
TDS 200NX Recon w/ Standard Software, tripod bracket, & cable	\$1,519.00	\$31.01
Heavy-Duty Wood/Fibgls tripod	\$188.00	\$2.59
Single Tilting Prism	\$178.00	\$2.19
8ft Prism Pole	\$155.00	\$1.70
Total:	\$8,330.00	\$172.65



Engineer's Kit

Lists at **\$7,348**, you pay only **\$5,295** for package price or **\$152.49** a month!

Item	List Price	Monthly Lease Price
Nikon DTM-332 total station with On-Board Data Collection	\$6,495.00	\$139.58
Heavy-Duty Wood/Fibgls tripod	\$188.00	\$2.59
Single prism & prism pole	\$366.00	\$3.92
Nikon 9 pin download cable	\$100.00	\$1.89
Nikon Connex Software for download & data manipulation	199.00	\$4.51
Total:	\$7,348.00	\$152.49



Contractor's Kit

Lists at **\$7,517**, you pay only **\$5,495** for package price or **\$158.25** a month!

Item	List Price	Monthly Lease Price
Sokkia SCT6 Construction total station	\$4,999.00	\$108.00
TDS Recon w/ Layout Pro, includes cable, & bracket	\$2,095.00	\$45.93
Heavy-Duty Wood/Fibgls tripod	\$109.00	\$1.98
Mini Prism package	\$159.00	\$2.56
8ft Prism Pole	\$155.00	\$1.70
Total:	\$7,517.00	\$158.25



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Banks and commercial lease companies have no interest in the performance of your equipment after the Lease contract is signed. The Hayes 'Worry-Free' Lease cancellation option guarantees that we are going to do everything in our power to keep you productive and happy with your equipment, so you will continue 'Worry-Free' Leasing as a permanent way to solve your surveying equipment financing needs.

Example monthly rental cost for a 4-month project on a \$10,000.00 system

Industry Average	'Worry-Free' Lease	Average Savings
1st mo. \$1000	1st mo. \$1000	0
2nd mo. \$1000	2nd mo. \$288	\$712
3rd mo. \$1000	3rd mo. \$288	\$1,424
4th mo. \$1000	4th mo. \$288	\$2,136



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Digital Data Transmission – Security & Safeguards

by Knud E. Hermansen & Carlton Brown

There are few surveying and engineering firms that have not had to transmit or been asked to transfer surveying and engineering data in electronic format. The requests for electronic surveying documents rather than paper documents are expected to grow.

Many procedures employed by a firm to insure data accuracy and integrity using paper documents are now outdated in the digital age. In this age of data transmission, illicit data swapping, data alteration, and even entire counterfeit digital documents can be produced without easy detection. Image-editing tools can make pixel by pixel changes that alter the font, color, intensity, size, shape, and placement information without visual recognition. Accordingly, new procedures must be considered and employed.

Any procedure for the transmittal of digital data should address four aspects: 1) authentication, 2) data integrity, 3) end-to-end accountability, and 4) fraud prevention or detection of fraud.

Authentication addresses whether the document is genuine. Previously, the use of a watermark on paper, seal, signature, etc. was used to authenticate the document issued by the surveyor or engineer (though not necessarily the contents of the document). Thus a plan that contained a seal and signature of the professional issued in the stream of commerce could be relied upon. The presence of the seal and signature provided authentication to the reliant party that the source of the plan was a professional.

While a seal and signature can be used to authenticate a document's source, the seal and signature does not address data integrity. Data integrity deals with the validity of the data within the document. For example, were the format, color, lines or words within the document added or altered after leaving the creator's possession but before being used by a reliant party (e.g., public). In the past, the difficulty of alteration without removing or defacing the signature and seal made authenticity and data integrity almost synonymous. This is not true anymore.

End-to-end accountability addresses the ability of both the sender and user to guard against unauthorized modifications or additions to the digital data. In the past, end-to-end accountability was assuaged by use of the United States Postal Service. While there are numerous examples of postal service misfeasance, the number of problems were so low as to give both the sender and receiver considerable comfort.

Now, data is sent through numerous routers and third parties. Data corruption occurs along with viruses, worms, and trojan horses that can attach to the file and infect computers and systems. Fortunately, this problem is being addressed by inexpensive anti virus software, firewalls, etc.

Finally, fraud detection or prevention deals with both making it difficult to perpetuate fraud on the one hand, and easing its detection if fraud is present on the other hand. In the past, the high cost of printing or skill of the forger made undetectable fraud unlikely. Now, the availability of inexpensive software that does pixel by pixel changes has made undetectable fraud likely.

Accordingly, a procedure for the transmittal of digital data should address three concerns (assuming the professional and user have anti-virus software and firewalls): 1) assurance of the unaltered substance of the document; 2) the authenticity of the sender; and 3) the inability or impracticability of falsifying or altering the contents without detection.

There are several procedures and techniques that are available to the surveyor and engineer to deal with one or more of these concerns.

Imbedded Information — Historically a watermark, seal, or signature was used to authenticate a document. Only the sender had the paper, seal, or unique signature. (For a watermark detection, a reader would hold the paper up to a light source to view the watermark in order to authenticate the document.)

Rather than imbed a logo in the paper fabric, digital imbedding places security identifiers in the data that are unique to the sender and vary with the digital document (i.e., digital watermarking). Digital watermarking injects information within the transferred document that is read by security software. The digital watermarking often consists of imperceptible or unnoticeable vectors within the digital elements found throughout the document or sometimes concentrated within a decorative motif. In other words, it may be in the form of pseudo-random digital noise in the data or part of a decorative element. In any event the code, wherever found can only be detected and decoded by special software. The content of the motif or the aggregate of the imperceptible changes can only be detected and read by the receiver's software. The software will verify the authenticity of the document and identity of the sender, thereby making alterations detectable to the user. Even if a forger is aware



(continued on page 18)

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Digital Data Transmission (continued)

that imbedded information exists, there is little likelihood the forger can identify the code or how to vary the code to match the changes that have been made by illicit actions. Using a simplified example, an imbedded digital code attached within this article may contain the word or letter count for the entire document. If the end user's count of the words or letters in the document they have received does not match the word or letter count within the imbedded code, the user can presume alterations have been made.

Imbedded digital codes have the advantage of allowing the receiver to authenticate the document, provide a forensic analysis if the document has been altered, and determine the identity of the issuer by the contents within the imbedded information. The disadvantage of imbedded information is that the sender and receiver must have the appropriate hardware and software to mal(e and interpret the imbedded information. For additional information about imbedded digital information, the reader can view websites of some of the companies that use this technology: www.digimarc.com. <http://www.enseal.co.uk>, <http://www.mediasec.com>.

Digital Signatures — Digital signatures are a form of cryptography (transforming messages into seemingly random forms of data and back to the original form again). Digital signatures have two different keys: 1) private and 2) public. The private key is generated by software in the possession of the sender. The public key is used in software in the possession of the receiver that interprets the encrypted message. The private key turns the data into seemingly unintelligible form during transmission, while the public key turns the unintelligible form back into readable form. The

public key can be sent to the end user or published on an online repository usually maintained by a trustworthy third party. A simplistic example would be for the sender's private key to be a series of numbers or code that generate the number 13. The public key would be the number 13. If the sender's document did not generate the number 13, it could not have been sent by the proper party.

Fixed Format — Probably the most common manner of secure digital transmission is done by fixing the form of the data into a proprietary format. Adobe Acrobat is probably the most widely recognized proprietary format for transmission of digital data. In the case of Adobe Acrobat, fixing the format of the data requires the purchase of proprietary software. On the other hand, reading the proprietary format is done by a free reader available to anyone for downloading.

Summary — Surveyors and engineers that are sending digital information should consider adopting some of the software safeguards outlined in this article. Commercial

software is available that not only fixes the format but provides digital signatures and other security measures that can be employed in digital document transfer. ■

Knud E. Hermansen is a professional land surveyor, professional engineer, and attorney at law. He is a professor in the College of Engineering at the University of Maine.

Carlton Brown is a professional land surveyor and professional engineer. He is an assistant professor in the College of Engineering at the University of Maine.

Commercial software is available that not only fixes the format but provides digital signatures and other security measures that can be employed in digital document transfer.

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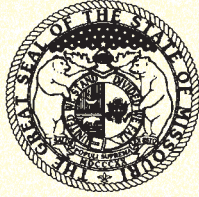


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Left to Right: Sandra Boeckman, Rich Barr, MSPS President F. Shane Terhune, Governor Matt Blunt, Mark Lindenmeyer, Joe Clayton, Don Martin, Darrell Pratte, Ron Kliethermes, Mike Flowers and Richard Howard.





Office of the Governor
State of Missouri
Proclamation

WHEREAS, for much of civilized human history, people have depended upon surveyors to resolve questions of land boundaries and to provide the framework for the development of vital infrastructure; and

WHEREAS, surveyors are instrumental in the formation and layout of property boundaries that provide our citizens with the enjoyment of property ownership; and

WHEREAS, professional surveyors are an integral part of construction projects, providing the information necessary for contractors to build structures in their proper place; and

WHEREAS, continual advancements in surveying instrumentation require surveyors to not only be able to understand and implement methods of the past, but also to learn and employ modern technology in finding solutions to meet the challenge of the future; and

WHEREAS, the Missouri society of Professional Surveyors will continue their mission to ensure that the general public and offices of record receive superior land surveying as part of their observance of National Surveyors' Week in March.

NOW THEREFORE, I, Matt Blunt, GOVERNOR OF THE STATE OF MISSOURI, do hereby proclaim March 18-24, 2007 as

SURVEYORS WEEK

IN TESTIMONY WHEREOF, I have hereunto set my hand and caused to be affixed the Great Seal of the State of Missouri, in the City of Jefferson, this 14th day of March, 2007.



Handwritten signature of Matt Blunt in black ink.

Governor

Attest:

Handwritten signature of Robin Carnahan in black ink.

Secretary of State

Hazards of Old A Work of Fiction

by Earl F. Henderson, PLS

Not long ago I had an occasion to peruse some old archival documents in my father's attic. While doing so I came across a letter written by my Great-Great-Grandfather during the Civil War to his wife-to-be, my Great-Great-Grandmother. I hadn't known until reading that letter that surveying was in the family history. It's very touching and I thought I'd like to reprint it here for people to appreciate the hazards of surveying during those times compared to the considerably less deadly hazards we face today.

August 15, 1862 My Dearest Savannah,

It is my deepest hope that you are enjoying this hot, steamy, sultry summer in our native Charleston and that this war has not encumbered that beautiful countryside nor your

father's plantation, the lovely Apple Blossom Manor. This damned war is going to be the death of us all. It seems ages since last I was able to take in the pleasure of your beauty. I must apologize for my horse. Whence I mounted him and he spun on his quarters thus putting you off like a cannonade, airborne into that mud puddle. I was most embarrassed. But being that our company was

marching hence, I had no time to retrieve you from your sloppy perch lest I myself join you in such a condition and delay the company. Had I only known then that I would be spending so much of my time sloshing through such swamps and mud in pursuit of this war I would have gladly entered therein to retrieve you. Please forgive my horse, Scout, as he did not, I am earnestly sure, have the intent for such a calamity. I had hoped to take the memory of our last kiss with me into battle and draw courage from its vision, but alas I can not rid myself of the sight of you as I rode away to war. I will always cherish that image.

I have been assigned to the First Infantry of Carolina surveying division and as such have had many the opportunity to traverse the countryside of our great, and very new nation. I pray that our endeavour to rid ourselves of the yankee tyrants will succeed. The dangers of the survey corp are not as great or as numerous as those of the infantry but they can be as deadly.

We are not often engaged in battle but we must be wary of the possibility of running up on the enemy unbeknownstedly. Sargeant Jezachiah was unfortunate

enough to enjoy such an encounter just two short months ago. He was lead chainman and upon breaking through a gamble of underbrush found hisself smack in the middle of a small enemy encampment. In his haste to defend hisself and expunge the glorious South of as many of them damn Yankees as he was able, he quite by accident shot hisself in the foot. I was on the other side of the underbrush and had not yet been made aware of the encounter until this shot and its subsequent reaction alerted me, thus allowing me the opportunity to beat a hasty retreat and escape the clutches of the enemy. Sargeant Jezachiah was not so fortunate as I, since he had thus been wounded and could not escape. He has since become a prisoner of war and I have made application with the Captain for him to receive a medal for saving my life at the cost of his freedom.

I can blame my lack of battle experience on my father's insistence that I study the mathematics, of which I found an acute ease. Surveying is an acquired taste of skill and knowledge, but once a person achieves the grasp of it, is quite the enjoyable profession. I should like to make application with our county to continue this profession once this war is ended. I believe that I can thus

provide a suitable livelihood for you and our children, the first of which I would like to name Jezachiah in honor of the man who gave his freedom that I might not be captured by the yankee vermin.

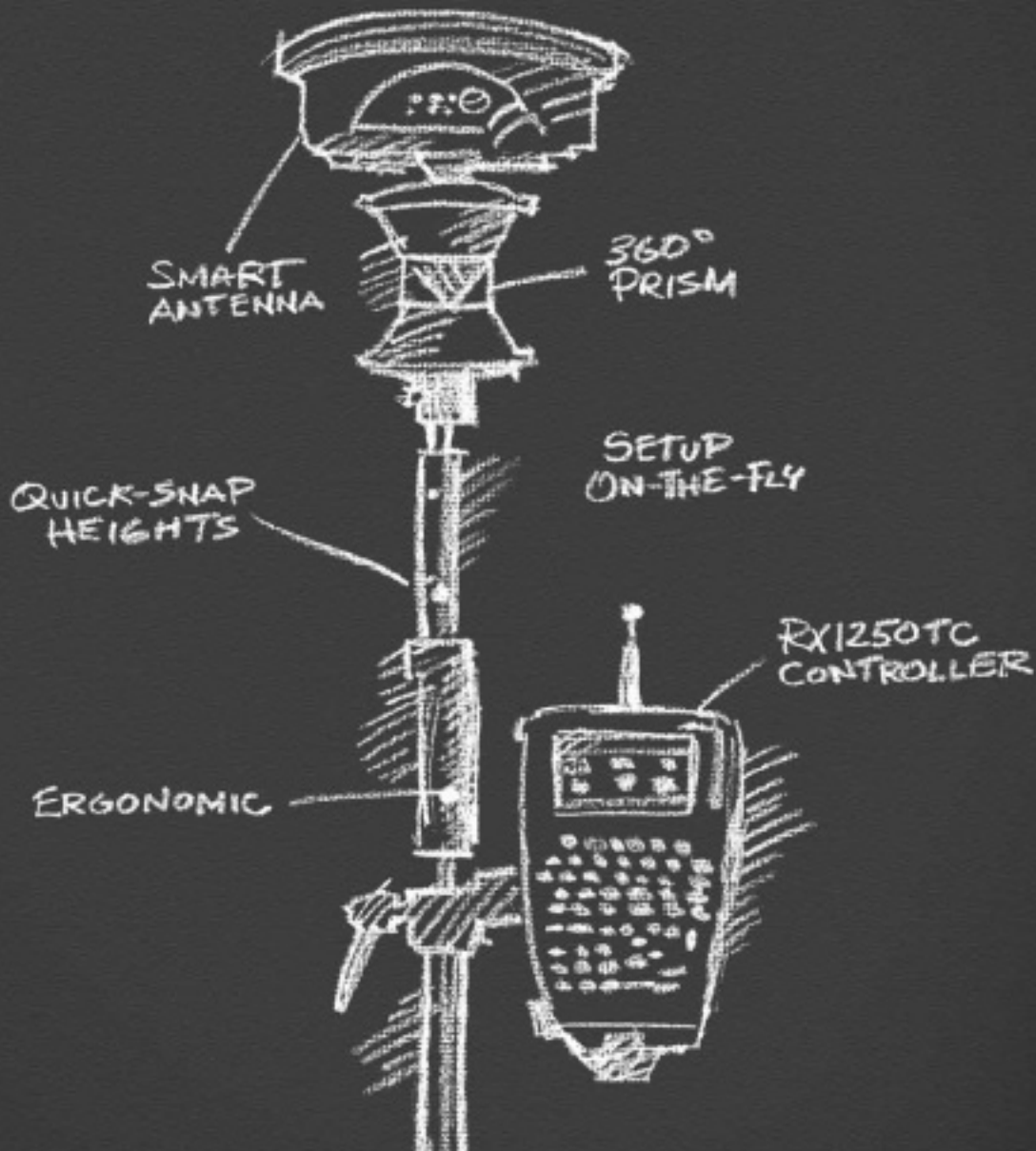
But don't be drawn in to a melancholy about your dear departed, for I take great pains each day to maintain a vigilance to ensure my safe return to your bosom. Vigilance is necessary as the dangers are many and varied. Last year we lost our able and promising chainman, Private Hannibal when he, totally inadvertently I assure you, stepped upon a loaded bear trap while completing a traverse run through a wood. His leg was at once severed just below the knee. I was grateful that we were not within earshot of any enemy encampments or vicarages. He has since, I am told, been fitted with a wooden leg and returned to his home in the Alabama territory with several medals attesting to his bravery.

I have thus been promoted quickly through the ranks on our survey crew. I was most recently promoted to Chief of Party when Lt. Nehemiah, while reconnoitering a field which

Surveying is an acquired taste of skill and knowledge, but once a person achieves the grasp of it, is quite the enjoyable profession.

(continued on page 24)

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Hazards of Old (continued)


had recently seen a terrible battle, happened upon an unexploded cannonball and was kilt into many pieces. We were forced to bury what we could identify in a small grave. Pray for him, my beloved, that he will be reassembled in heaven.

Soon after this unlikely occurrence I had occasion to be bitten on the arm by a Copperhead snake. It put me in quite a state for several days and nights, but I have since recovered briskly. Don't you fret my darlin', as the swelling has subsided and I am regaining the use of that hand somewhat.

I must close now, my dearest, as we must prepare to depart on the morrow for our next assignment in the Indian territories. I am told by our guide, a trapper with only three fingers and a curious bald spot on the top of his head, that they are of the friendly sort and enjoy trading goods. It is thus that I hope to provision our company for our work and acquire laborers to unburden the men.

Low these many months of separation have been most difficult for me, but I remain true at great exertion. I can but only imagine the burden upon you, my Beloved. Be aware that my thoughts are always of you, to a distraction, and that I shall not tarry whence the time comes that I am

released of this war and can return post haste to the warmth of your company and the promise of our union (and not that damned yankee kind of union neither). So until that time arrives, please make company with my mother at our own plantation of Tara every so often, that she may be made aware of my accomplishments through you. And know that I shall not rest in my vigilance lest I may ne'er again enjoy thy enchanting beauty.

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Scholarship Committee Report

by John Stevens, Don Martin and Darrell Pratte, Chairman

Of the 35 applications received for this year's Robert V. Pirrie Memorial Scholarship, 11 had indicated a real interest in Land Surveying. This makes the process of awarding the scholarship extremely difficult, we generally only have 1 or 2 that state unequivocal interest in Land Surveying. With this many qualified applicants the committee could not limit itself to just one award; Mr. Jeremiah Kasinger of Trenton and Mr. Cody Swearengin of Gainesville have been named as the recipients of the award for this year. Each will receive a \$1500.00 scholarship from the Missouri Society of Professional Surveyors.

Mr. Swearengin plans to attend Missouri State University, West Plains, working toward a degree in Applied Sciences. When asked how this scholarship will help you attain your future goals Cody responded, "With this scholarship I will be able to reach my goal which is to become a certified land surveyor." Swearengin will be working for Rose's Land Surveying, out of Mountain Home, Arkansas, this summer in order to gain some experience and save a little money for college.

When Mr. Kasinger was asked why it is necessary for him to receive this award his reply was straightforward, "My ultimate goal is to pursue a career in surveying. For the past year I have been working with a local land surveyor." That local surveyor is Richard Hattesoehl of Hattesoehl Surveying, LLC in Trenton, Missouri. Richard wrote a very favorable letter on Jeremiah's behalf highlighting the young man's abilities, not only as a dependable employee, but also as a reliable, self-motivated person.

Both these young men are "A" students finishing up their high school studies in the "Top 10". Both seem committed to a career in Land Surveying. Both had glowing recommendations from their school counselors. The committee had other applicants just as committed, just as able, with recommendations just as powerful. If the committee had the resources to award \$11,500.00 our jobs would have been a whole lot easier this year. 🇺🇸



May 7, 2007


Missouri Society of Professional Surveyors
P. O. Box 1342
Jefferson City, MO 65102-1342

I wanted to thank you for sending me your recommendations for land surveyors to serve on the Land Survey Advisory Committee with the Missouri Department of Natural Resources. Of the five you recommended, we received letters of interest and resumes from Ray Riggs, Bob Thompson and Stan Emerick.

I am pleased to inform you that I have appointed Mr. Riggs and Mr. Emerick to serve on this committee representing the land surveying industry effective May 1, 2007. I am retaining Mr. Thompson's resume for consideration for any vacancies on this committee when they occur. Additionally, I have appointed Cara Detring to represent the title industry and Darrel King to represent the general public. With these appointments, all five positions on this committee are currently filled.

Again, than you for your recommendations and your support of the Land Survey Advisory Committee.

Sincerely,
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Improper Location

by Norman Miller, PLS

If you've spent much time in boundary work you've frequently been in a situation such as I recently found myself. I needed to locate the center of section 14. It could have just as easily been a section corner or a lot corner in a subdivision. I knew this one was going to be a challenge before I left the county records office. There I found three survey plats. The oldest was by the county surveyor more than 100 years ago when he surveyed from the south quarter corner to the center. As some county surveyors practiced, he made an open circle on his plat at the center and left the rest to our imagination. The section was settled and fences are built in accordance with his survey during the next 100 years bringing us to the next record survey. When I viewed the second survey I knew that there would be decisions to make. The surveyor did a good job of showing the situation of the fences at the center relative to a new monument he placed at the bearing intersection of the quarter section corners. There was an old fence corner noted 30 feet north and 20 feet east of the new monument that the third surveyor accepted a year later as the center of section. The two surveyors had different opinions of where the center of section was located and I had the task of following them some 20 years later and deciding which one I would accept. The iron still stood isolated from the fences that stood as they always had since anyone could remember.

So it goes nowadays. When I began my career as a rear chainman in 1974 we were thrilled to find just one monument marking a corner for the lack thereof otherwise. In 2006 we are still thrilled to find only one monument marking a corner for a different reason. All too often we find two or more. The difference between 2006 and 1974 seems to be that some of today's surveyor's are very concerned with the issue of improper location. This phenomenon is not only a state issue; it has become a national issue and a matter that has now recently been litigated.

How did surveyors become so concerned with the issue of improper location? As I heard one of our contemporaries say, "We have become very good at measuring our mistakes more accurately." If your career path followed mine, you grew up into a professional right along with tremendous advances in measurement technology. We became very proud and sure of our abilities to measure better and to determine the tiniest differences with our newest equipment. We became able to determine more accurately and more quickly if the surveyor whom we followed did his survey properly. It became relatively easy to capture data from an entire section, upload

it to a CAD program and instantly see that the preceding survey monuments were improperly located. Either they could not measure very accurately or their methods violated the rules for section subdivisions.

Perhaps we should take a step back and review what our commission is. The first statement in Iowa code Chapter 193 mandates that the Iowa licensing board act in the protection of the public interest. This is also what each land surveyor is charged to do. We swore to not take this charge lightly. Is the public interest best served when we find several monuments where there should be but one? Is the public interest best served when we find 3 US land corner certificates filed during a twelve month period on three separate monuments representing one corner which a bed blanket would cover — or three monuments at a lot corner that can be covered by a baseball cap? Is it possible that the public interest is best served when a monument is rejected for improper location rather than accepted for its practical location based on evidence of establishment? Is it possible that the interest of the public is at stake when long standing evidence of establishment is set aside in favor of a professional game of darts at a boundary corner?

Accepting evidence of a corner based on establishment is a principle that pre-dates the section line roads in Iowa that wiped away many of the original corner monuments and left us with a degree of uncertainty at most original corner locations. Accepting a monument based on evidence of establishment is a principle supported by Iowa code Chapter 650 which a surveyor is charged to use as a guide in Chapter 355. Iowa's 40-year marketable title law also supports it. It is support by Federal law as well as the Bureau of Land Management's Manual of Surveying Instructions. Chapter 18 of the US code quotes a 1942 Florida court stating; "Where a surveyor did not follow statutory rules in making a survey of reestablishing the lines, they are to be run as the surveyor ran them and not as he should have run them." Federal law says establishment is the key to retracement rather than improper location. There are two ingredients to establishment. The first is the act of marking the boundary. The second is acceptance of the marked boundary by coterminous land owners over time. Protection of public interest requires that establishment not be set aside in favor of rules that recite how it should have been done, 2" total stations, statewide GPS networks or coordinate geometry

(continued on page 29)



Improper Location (continued)

software that publishes bearings to the hundredth of an arc second.

The case of *Dykes v. Arnold* in Oregon has come into the national spotlight recently. The case is about two surveyors who left separate monuments at the center of section. One surveyor placed a monument where it should have been properly located; the other accepted a monument improperly located by a county surveyor in 1899 that had been used for establishment of the interior boundaries of the section, almost the identical situation I found at the center of section 14. Quoting from a column written by surveyor and attorney Jeffery Lucas in the 2006 November issue of *POB Magazine* regarding *Dykes v. Arnold*: “For .. all of my other colleagues who think that a section that has been ‘stubbed in’ is an illegal subdivision of a section and that such an illegal subdivision must be corrected after the fact, the court in *Dykes* basically said: ‘You’re wrong!’ As the court rightly observed, all types of irregularities took place during the initial subdivision of the public domain into townships and sections. Just as many, if not more, irregularities took place in the subsequent subdivision of the sections. The federal government recognized this and passed the Act of 1805 whereby, absent fraud, original lines run and corners set, regardless of mistakes, errors, or irregularities, stand as the true corners of the townships and sections. The question is not where the corners would fall if a technically correct survey were conducted. The question is where were the corners set by the original subdividing surveyor, regardless of errors or irregularities.”

To make this point, the *Dykes* court looked to Michigan law and the case of *Adams v. Hoover*. Quoting the *Adams* court with approval, the *Dykes* court stated: “The court effectively regarded the county’s survey, as the first to locate the center of the section, to be an original survey and the post marking the center to be an original monument. Consequently, to locate the center of the section, the same rule applied that would apply to relocating a “lost” monument: “The question is not how an entirely accurate survey would have located the lots, but how the original survey stakes located them.” Citing the “public’s need for finality and uniformity of boundaries and land titles” and observing that any other approach “could unsettle boundaries throughout the entire Section[,]” the court held that the 1950 survey “should be left in repose” and given legal effect.”

Iowa code admonishes surveyors to follow Federal rules

and instructions. Most of us are well aware of the rules for establishing corners and re-establishing lost corners. The Bureau of Land Management policy on bona fide rights of land owners comes from the Statute (36 Stat. 884; 43 U.S.C. 772) and reads in part as follows:

“That no such resurvey or retracement shall be so executed as to impair the bona fide rights of claims of any claimant, entryman, or owner of lands affected by such resurvey or retracement.” This portion of the statute is highlighted in the Bureau’s Manual of Surveying Instructions 1973 and it represents the basic tenet of protecting valid private rights.

The Manual at sec. 6-13 through 6-16:

6-13. Bona fide rights are those acquired in good faith under the law. A resurvey can affect bona fide rights only in the matter of position or location on the earth’s surface. The surveyor will be concerned only with the question of whether the lands covered by such rights have been actually located in good faith. Other questions of good faith (such as priority of

occupation, possession, continuous residence, value of improvements and cultivation) do not affect the problem of resurvey except as they help to define the position of the original survey.

6-14. The basic principles of protecting bona fide rights are the same in either the dependent or the independent resurvey. Each is intended to show the original position of entered or patented lands included in the original description. The dependent resurvey shows them as legal subdivisions, the independent resurvey as segregated tracts. Each is an official demonstration by the Bureau of Land Management according to the best available evidence of the former survey. There is no legal authority for substituting the methods of an independent resurvey in disregard of identified evidence of the original survey.

6-15. The position of a tract of land, described by legal subdivision, is absolutely fixed by the original corners and other evidences of the original survey and not by occupation or improvements, or by the lines of a resurvey which do not follow the original. A conveyance of land must describe the parcel to be conveyed so that it may be specifically and

(continued on page 30)

Improper Location (continued)



exactly identified, and for that purpose the law directs that a survey be made. Under fundamental law the corners of the original survey are unchangeable. Even if the original survey was poorly executed, it still controls the boundaries of land patented under it.

The surveyor should neither rigidly apply the rules for restoration of lost corners without regard to effect on location of improvements nor accept the position of improvements without question regardless of their relation or irrelation to existing evidence of the original survey.

Between these extremes will be found the basis for determining whether improved lands have been located in good faith or not. No definite set of rules can be laid down in advance. The solution to the problem must be found on the ground by the surveyor. It is his responsibility to resolve the question of good faith as to location.

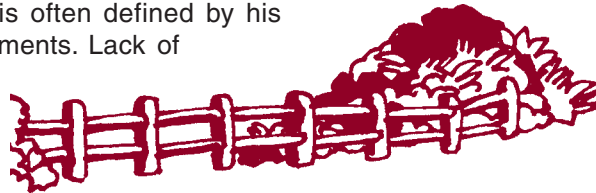
6-16. It may be held generally that the entryman has located his lands in good faith if such care was used in determining his boundaries as might be expected by the exercise of ordinary intelligence under existing conditions. The relationship of the lands to the nearest corners existing at the time the lands were located is often defined by his fencing, culture, or other improvements. Lack of good faith is not necessarily chargeable if the entryman has not located himself according to a rigid application of the rules laid down for the restoration of lost corners where (1) complicated conditions involve a double set of corners, both of which may be regarded as authentic; (2) there are no existing corners in one or more directions for an existing distance; (3) existing marks are improperly related to an extraordinary degree; or (4) all evidences of the original survey which have been adopted by the entryman as a basis for his location have been lost before the resurvey is undertaken.

These requirements are essential to protect boundaries that may not have had an exact measurement when originally established, but those boundaries are accepted in order to prevent the technicians from moving long established boundaries. Professional land surveyor decisions are not based on measurement alone and if it were the case; no private landowner would be secure in his/her boundaries as each new measuring device would change them.

Another very important section of the Manual is at 6-28:

6-28. Once it is accepted, a local point of control has all the authority and significance of the identified original corner. The influence of such points is combined with that of the previously identified original corners in making final adjustments of the temporary points. The surveyor must therefore use extreme caution in adopting local points of control. These may range from authentic perpetuations of original corners down to marks which were never intended to be more than approximations. When a local reestablishment of a lost corner has been made by proper methods without gross error and has been officially recorded, it will ordinarily be acceptable. Monuments of unknown origin must be judged on their own merits, but they should never be rejected out of hand without careful study. The age and the degree to which a local corner has been relied on by all affected landowners may lead to its adoption as the best remaining evidence of the position of the original corner. The surveyor must consider all these factors. However, he cannot abandon the record of the original survey in favor of an indiscriminate adoption of points not reconcilable with it.

The field note record of the resurvey should clearly set forth the reasons for the acceptance of a local point where it is not identified by actual marks of the original survey.



Recognized and acceptable local marks will be preserved and described. Where they are monuments of a durable nature, they are fully described in the field notes and a full complement of the required accessories recorded, but

without disturbing or remarking the existing monument. New monuments are established if required for permanence, in addition to, but without destroying the evidence of the local marks.

It might be fair to compare the acceptance of an established boundary with the acceptance of a child into a family only for the purposes of this discussion. The unmonumented corners are conceived by the original government survey. The corner location remains unborn. The corner is born by the first authorized placement of the monument, properly or improperly located according to rule. We know what the new child should look like, but sometimes it doesn't look like we expect. Its owners still accept it with all its imperfections. When it is 10 years old they don't discard it and start over because they now own it and it has become a part of them.

(continued on page 32)

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Improper Location (continued)

It is established by law. No one would dream of taking someone's child away and starting over. No one should dream of properly relocating an established corner monument or boundary, particularly a person licensed to protect the public interest.

The point in writing this is not to criticize or rebuke anyone who may determine a corner to be lost and who re-establishes it by proper methods. It is simply to remind that there are land surveyors past and present who practice location by establishment rather than proper or improper location and they have legitimate and lawful reasons for doing so. Public interest should require that a survey does not create uncertainty and/or dispute. A professional survey should leave behind one monument for one corner if at all possible. Before a professional surveyor even considers placing a second, third or fourth monument the affected property owners should be given the opportunity to resolve the discrepancy in accordance with chapter 650.17 that binds their agreement upon their heirs, successors and assigns. The boundary line agreement provision in Iowa law is a way land surveyors could provide a value added service by assisting owners with the option to agree to a resolution whereby the line would become certain and fixed for the future thereby protecting the public interest.

I can almost hear a few of my colleagues making a counterpoint that there is no place in the profession for making legal determinations; that we are required to properly locate the line as it should have been and let the legal professionals settle the disputes thereby created. After all the Iowa Supreme Court not so many years ago in Heer v.

Thola stated; "Based on the wording of section 650.14 and these policy considerations, we hold that the establishment of title by acquiescence is effective only on a finding by the court that the requirements for acquiescence have been met. This finding must also establish a definite line."

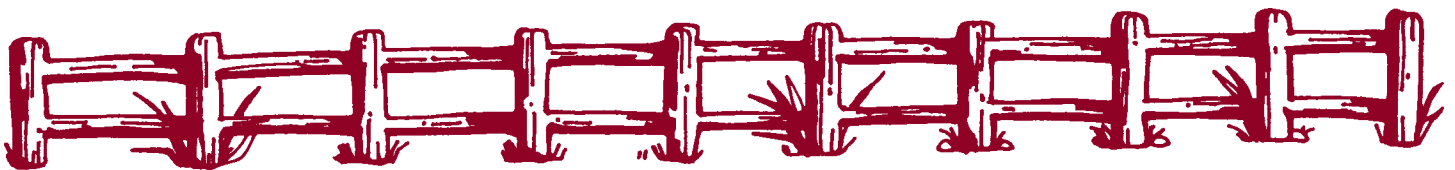
The court always has the highest and final authority of establishing title in matters of litigation. There are other levels of legal authority however where owners and surveyors are players. A boundary agreement binds coterminous land owners to a line such that the possibility of litigation is greatly reduced along with the liability of a surveyor. This is a solution where another level of legal authority is sufficient. Surveyors may not wish to make legal determinations (opinions) but

they make them every time they set a corner monument. Whenever a surveyor commences a survey anywhere other than at the original post and mound or at the original subdivision stone in the street intersection now replaced by a manhole they must make legal determinations. As the BLM Manual says, it is surveyor's responsibility to resolve the question. Public interest requires it and our profession must provide it. 🇺🇸

The point in writing this is not to criticize or rebuke anyone who may determine a corner to be lost and who re-establishes it by proper methods.

- 1 Adams v. Hoover, 493 N.W. 2d 280 (Mich. 1993)
- 2 Dykes v. Arnold, 129 P.3d 257 (Or. Ct. App. 2006)
- 3 Heer v. Thola, No. 109 / 98 2282 (Ia. Sup. Ct. 2000)

Norman Miller is the Iowa Dept. of Transportation Surveys Manager where he began his survey career as a rodman in 1974. He became licensed in 1989 working as one of the district land surveyors until July 2006.





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Tomorrow's Surveyors

by Christopher N. Ambou, LS

I'm 27. Over the last five years (admittedly, the extent of my professional experience) I've followed closely the industry publications and the discussions amongst society members at chapter meetings as they pertain to the future of the profession and the much touted generation gap. It is notable that not much, if any, input from young surveyors has been sought or offered. Those of you with teenage kids know that it is often hard to relate to them; your priorities and attitudes may be vastly different. Rapidly changing technology and the expanded access to information and media has made growing up today much different from even 20 years ago. Perhaps young surveyors, those closer to the ages of the kids that will be entering college and who have more recently experienced that decision to become a surveyor, can offer some ideas. Because we're few in number and lack the confidence to express them, our opinions do not often surface. I'm not sure I've developed that confidence yet either but, like all surveyors, I have a few opinions.

Self oriented, introspective, quiet, independent, confident, outdoorsy — is that a word?... well, let's make it one temporarily — people seem to like labels so take your pick. I'm willing to bet at least three of those words describe a majority of the surveyors you know, maybe even you. They all describe me, and they describe most of the young surveyors I know. If this is true, and if most surveyors can be described with those words, then I believe we have found what is known as a target market.

I am the target market, I am some of those things, and now I'm a surveyor. So as the target market I'm left no other option than to commit to some intensive introspection.

How did I get introduced to surveying? I was sitting in geography class one day minding my own business staring out the window, dreaming of outdoorsy things, when my teacher approached me and asked me if I was interested in a summer job surveying. Now it should be noted that I had barely a notion of what surveyors did or how they did it, but as I was otherwise uncommitted I accepted the offer. It turns out my future employer had asked my teacher if there was anyone in his classes that he thought might make good survey help for the summer. So my teacher who knew I was outdoorsy, indelibly gullible, and of above average intelligence (after all, I could place all fifty states, except, on occasion, Maryland) presented me with what was to become a career

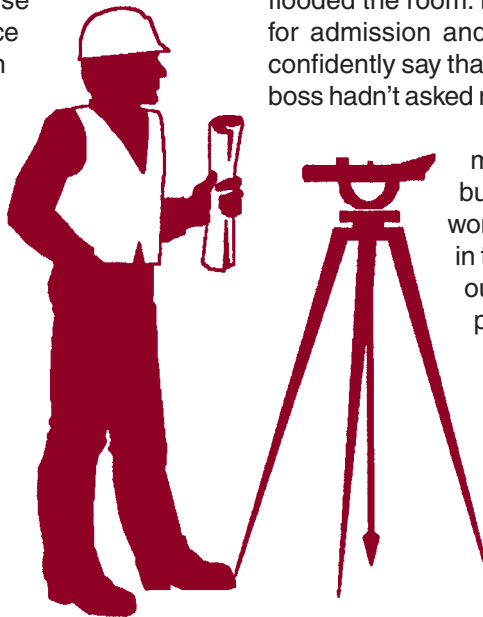
defining opportunity. Besides, the pay was good compared to other summer jobs for high school kids.

Why did I stay in surveying? I'm afraid that answer was not so easy. I kept up the summer surveying jobs through my last year of high school and my first two years at college, enjoyed being outside, looking for monuments, and really liked working with the technology, but truthfully, the job didn't seem all that fulfilling. My boss had a civil engineering degree and the rest of the staff had either no formal education or a two year degree. I wanted a college degree, so I chose civil engineering. That is until one day while surfing the Web I came upon the website for a university that offered a bachelor's degree in surveying. I didn't even know there was such a thing! It was if the clouds had parted and brilliant light flooded the room. I immediately downloaded an application for admission and the rest fell right into place. But I can confidently say that I would not be a surveyor today if my first boss hadn't asked my geography teacher about summer help.

I will be the first to admit that the target market that I have described is a small one, but short of redefining the very nature of our work, I don't think that it can or will be changed in the foreseeable future. The question to ask ourselves is; how do we find people who possess the personality traits that seem to be so dominant among those already in the field, making them more likely to take on this work and stick with it?

In my opinion, I believe we will not find those people with the Trig Star program (at least not at a rate commensurate with the effort being expended on it). Granted, I have not been involved in the Trig Star program, nor do I know of any that were (a fact

which tells the story as far as I'm concerned). This is not to say that this is a bad program or that it isn't worthwhile. If the goal for the program is to reward kids who are good at math or to provide a public service, then it seems like it fulfills those objectives well enough, but if we think that we're getting the cream of the mathematics crop to become surveyors I'd like to see some statistics to back it up. In reality, it seems to me that the idea that you should like math or be good at math that drives many young people away from surveying. Every day I add, subtract, multiply, divide and do a little trig, but do I need to be exceptionally good at math to do those things? The answer is no. Most young surveyors I know didn't even like math in school; I know I didn't. But we've now established this program, which is probably the first exposure many kids



(continued on page 36)

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Tomorrow's Surveyors (continued)

now established this program, which is probably the first exposure many kids have to surveying and surveyors, that is focused entirely on not only being good at math but being the best at math. We've fostered the idea about our profession, among those whom we hope to recruit, that only those who are good (or the best) at math can be surveyors, when that is simply not true. Math is something we do in order to complete our work; it is neither the focus nor the major portion of our work. How applicable will trigonometry be to the profession in the future anyway? I predict that in 20 years angle measurement will be a task rarely performed in a progressive survey office. Conventional work will be largely replaced by 3D imaging and GPS, and network adjustments will, by necessity, be done with least squares adjustments. Where did all the angles go?

In order to attract new surveyors we need to go find them one by one. Society has lost track of what surveyors do. Ask a teenager what an architect or an engineer does, and you may see a flicker of comprehension. But ask what a surveyor does and you may just get a dumb look. The only way to expose and retain young people to this job is to hire them while they are in high school or shortly thereafter, show them what we do and that they can make a good living doing it.

We need to expose the right kids to all the facets of the job. Most of us have more work in the summer than in the winter, but guess what? They don't. Maybe they like working at the grocery store for minimum wage, or maybe they fit our target market and would rather be outside making nine or ten bucks an hour. And here's the clincher, they really don't know what they want to do for the rest of their lives, since few teenagers have real work experience in a job that they could actually make a career out of. I dreaded people asking me what I was going to go to school for; I didn't know, but hardly anyone does, and most kids guess at a major and end up changing it based on if they like the classes or not. Using that method I should be playing professional flag football! But alas, I gave up that dream and became a surveyor.

It's easy to say with confidence what you're going to do when you get out of high school if you're already doing the job and understand what you need to know to do it.

Still, it will take a conscientious effort on our parts to bring these kids in. We have to look for them — talk to teachers, talk

to your kids and their friends, talk to young people who work for you now — find out if they know of anyone who might be looking for a career. Watch for the qualities that you see in your peers and in yourself. Get a booth at a career fair to offer jobs on the spot or at least interviews to kids who seem interested and ask questions. Don't let them walk away with the thought that maybe they'll stop by the office to apply, because they won't. It's much easier to get a job at the grocery store.

Taking on young people may take sacrifice. It's unlikely that you'll be able to ask the college kid with the biology major

who has worked for you the last three summers to return to work for you this field season, since he needs an internship in his own field anyway; or the 32-year-old that stopped by your office with a little experience and no education who was looking for a job — even though he seems very reliable, surely he can find


some other gainful employment. Such individuals have very little chance of sticking with this job and will not have anything to offer in the long run. We all have priorities, but if it is important to us that this career continues to be one that we are proud of, and one that continues to be important to society, we need to fill this very real generation gap. While us younger guys may not have years of experience under our belts, we do have a pretty clear picture of what makes the younger generation tick. So how about putting our heads together and going out to find tomorrow's surveyors? ■

Chris Amhourn holds a BS in Surveying from Michigan Technological University and is a registered surveyor in Minnesota and Alaska. From 2001 to 2004 he served as Project Surveyor for Bolton & Menk, Inc. in Minnesota. He has been employed since 2004 as Project for PDC, Inc. in Fairbanks.

American Surveyors Editor's Note: We are pleased to announce a new department, Surveyors Report, designed to serve as a platform for surveyors to express opinions on a wide variety of topics. Included this month are three thought provoking articles.

As always, readerfeedback is welcome!

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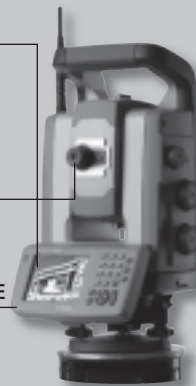
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