

HOOSIER SURVEYOR

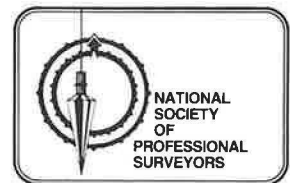


QUARTERLY PUBLICATION OF THE
INDIANA SOCIETY OF
PROFESSIONAL LAND SURVEYORS, INC.

VOLUME 24
NUMBER 2
FALL 1997



AFFILIATED WITH THE
AMERICAN CONGRESS ON
SURVEYING & MAPPING



ISPLS past presidents (1963) Nelson Prall of Bedford participates in old-instrument (stiff-legged) set-up contest at ISPLS summer picnic at Brown County State Park using equipment he used in the field for actual surveys during his long career.

Don't Be Left Behind!

Zaenkert Surveying Essentials (Authorized Trimble Dealer) Presents:

The NEW GPS TOTAL STATION® 4400

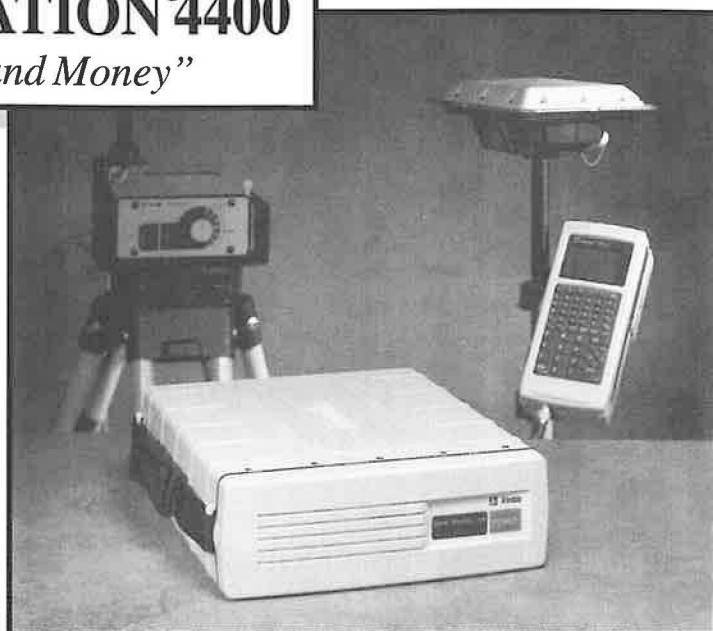
"The GPS Solution to Save Time and Money"

The More Affordable, Even Faster, Real-Time GPS Surveying System

The GPS Total Station 4400 breaks new ground in the affordability, productivity and portability of dual frequency real-time GPS surveying systems.

- Centimeter accuracy, real-time positioning
- Super-trak signal processing technology
- Automatic OTF (on-the-fly) initialization

CONSTRUCTION LAYOUT, TOPOGRAPHIC SURVEYS, CROSS SECTIONS, PHOTO CONTROL, BOUNDARY CONTROL, the list is endless...

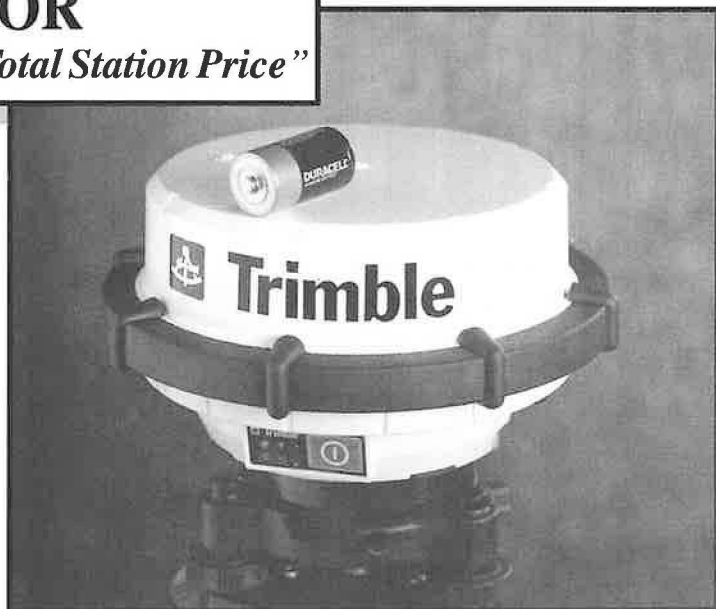


4600 LS™ SURVEYOR

"The Affordable Introduction to GPS at a Total Station Price"

The 4600LS is a fully integrated single-frequency GPS survey instrument for productive control and topographic surveys. The 4600LS is light weight and easy to use.

- Line-of-site not required
- Day or night operated
- One button operation



For more information or a FREE in-house consultation contact:



Zaenkert
Surveying Essentials

GPS SALES/RENTALS • LEASE TO OWN

1-800-262-4992 (513)738-2917

1997 OFFICERS AND DIRECTORS

Perry Cloyd - President
4488 Glenwood
Edinburg, IN 46124
RES: (812) 526-2227 BUS: (812) 526-6209

Richard Miller - President-Elect
827 Front Royal Drive
Indianapolis, IN 46122
RES: (317) 888-6696 BUS: (317) 272-0108

Richard Hudson - Vice President
574 North 50 West
Valparaiso, IN 46383
RES: (219) 462-2946 BUS: (219) 462-1158

Dan Woo - Secretary
1344 S. Broken Arrow Dr.
New Palestine, IN 46163
RES: (317) 861-5672 BUS: (317) 253-4996

Doug Herendeen - Treasurer
1356 S. Buttercup Drive
New Palestine, IN 46163
RES: (317) 861-6298 BUS: (317) 573-4615

DIRECTORS / TERM EXPIRES JAN 1998

E. Donald Bengel
73 E. Division Rd
Valparaiso, IN 46383
RES: (219) 465-0988 BUS: (219) 462-0690

Rich Hudson - Vice President

Doug Herendeen - Treasurer

Les Weber
700 Weber Rd
Albion, IN 46701
RES: (219) 636-2462 BUS: (219) 636-2462

TERM EXPIRES JAN 1999

William Clark
3128 Walnut Drive
Vincennes, IN 47591
RES: (812) 882-8239 BUS: (812) 888-5865

Perry Cloyd - President-Elect

Chris Marbach
3220 Southview Drive
Elkhart, IN 46514
RES: (616) 699-5224 BUS: (219) 266-1010

Dan Woo - Secretary

TERM EXPIRES JAN 2000

John Bauer
3812 S. Main Street
New Castle, IN 47362
RES: (317) 526-6730 BUS: (317) 321-0631

E.R. Gray, III
P O Box 1357
Columbus, IN 47202
RES: (812) 546-5193 BUS: (812) 379-1525

Rick Miller - President-Elect

Jeff Souder
4862 S. State Road 60
Pekin, IN 47165
RES: (812) 967-3734 BUS: (812) 883-4604

ADMINISTRATIVE OFFICE

Dianne S. Bennett, Executive Director
55 Monument Circle, Suite 1222
Indianapolis, IN 46204
(317) 687-8859

ISPLS is a Not For Profit Corporation

EDITORS NOTE

Deadlines for copy for various planned issues of the Hoosier Surveyor are as follows: Winter - December 31; Spring - March 31; Summer - June 30; Fall - September 30.

The Hoosier Surveyor is published quarterly by the Indiana Society of Professional Land Surveyors, to inform land surveyors and related professions, government officials, educational institutions, libraries, contractors, suppliers and associated businesses and industries about land surveying affairs.

Articles and columns appearing in this publication do not necessarily reflect the viewpoints of ISPLS or the Hoosier Surveyor staff, but are published as a service to its members, the general public and for the betterment of the surveying profession. No responsibility is assumed for errors, misquotes or deletions as to its contents.

Editorial Advertising Offices
55 Monument Circle, Suite 1222
Indianapolis, IN 46204
(317) 687-8859
Web Page: www.ispls.org/ispls/

HOOSIER SURVEYOR

VOLUME 24 NUMBER 2 FALL 1997

CONTENTS

Masthead	1
President's Thoughts	2-3
ISPLS Board Meeting Highlights	5
Purdue GPS Class on TV/Surveying Now Geomatics Engineering/New Surveying Courses Purdue Calumet	7
U.S. Dept. of Interior, Bureau of Land Mgmt	8-11
Marion Co. Surveyor's Office Participates in HARN '97 ..	12-13
Tribute Surprises Veteran Surveyor, Stan Shartle	15
The Surveyor & The Internet /B.O.R. News	16-17
ISPLS Annual Picnic/CIC Golf Outing	19
Look Out!/Completed Careers	21
ISPLS 46th Annual Convention, W. Lafayette	22-23
Personal Finances	25
Classified/Calendar/New ISPLS Members	26

Committee Assignments (1997)

STANDING COMMITTEES

BUSINESS MANAGEMENT

Doug Herendeen - Chair
Perry Cloyd
Richard Hudson
Richard Miller
Dan Woo

BY-LAWS

Ron Hansell - Chair
Jeff Myers

CHAPTERS

Ted Darnall - Chair
Michael Arena

CONVENTION COORDINATING

Doug Herendeen - Chair
Brad Cramer
Alvin Paul
Daniel Pusey
Kenneth Smith
Ronald Wharry

EDUCATION

Anthony Gregory, Chair
David Best
Charles Graham
Richard Hudson
John Irr
Carol Morman
Charles Peoni
John Porter
Randy Sexton
Ronald Wharry
Brian Wood

ETHICS

Richard Hudson - Chair North
David Blankenbaker - Chair South
Chuck Coyle
Mark Gardner
Alvin Paul
Bill Pettitt
David Pilz
John Porter
John Saylor
John Schneider
Jeff Souder
William Tanke
Ryan Wischart

GOVERNMENT AFFAIRS

Gary Kent - Chair
Wes Day
Jeffrey Myers
Jeff Meyerrose

HOOSIER SURVEYOR

Ken Curtis, Editor
Ron Hansell
Dennis Grumpp

MEMBERSHIP

David Pilz - Chair
Larry Manning
Jeff Myers
William Pettitt
Jamie Poczekay
John Porter
Brenda Owens

NOMINATIONS

Don Bengel - Chair

PROFESSIONAL PRACTICE

Randy Miller - Chair
Brad Cramer
Jeffrey French
Kenneth Smith
John Stephens
Ron Wharry

PUBLIC RELATIONS

Ronald Wharry - Chair
Paul Bender
Dave Best
Kris Conover
Ted Darnall
Vic McCauley
Bradley Ott
Alvin Paul
Jamie Poczekay

PUBLICATIONS

Ryan Wischart - Chair
Michael Crawford
Kenneth Curtis
Charles Graham
Dennis Grumpp
Alvin Paul
Charles Peoni

SCHOLARSHIP

Robert Gross - Chair
Paul Bender
Bryan Foust
John B. Irr
Orwic Johnson
Paul Sanders

STANDARDS

Wes Day - Chair
Hershel Manhart
Jeffrey Meyerrose
John Saylor
William Tanke

AD HOC COMMITTEES

UNIVERSITY COOPERATION

Anthony Gregory - Chair
Dave Best
Art Haase
Steve Johnson
Boudewijn van Gelder
Richard Hudson - Facilitator

ISPLS SURVEY HISTORY

Bradley Ott - Chair

ISPLS TECHNICIAN

Rick Miller - Chair
Kris Conover
Benjamin Kuhn
Gordon Richardson
Edward Sweetland

SOCIETY LIAISON

Jeff Souder - Chair
Larry Fisher
E.R. Gray, III
Dave Smoll

COUNTY SURVEYORS ASSOCIATION

INDIANA STATE BOARD OF REGISTRATION

Wes Day - Chair
Doug Herendeen
Gary Kent

INDIANA HISTORICAL LANDMARKS

Ken Anderson - President
Jeff Souder - Vice President
Vic McCauley - Secretary
Nelson Prall - Treasurer
Jerry Martin
E.R. Gray, III
David Blankenbaker

INDIANA SURVEYORS HISTORICAL SOCIETY

Haldon Ashton - President
Robert Gross - Secretary/Treasurer
Dan Pusey
Rich Hudson
Ken Anderson

NSPS GOVERNOR/ GREAT LAKES COUNCIL

E.R. Gray, II
Don Bengel, Alternate

GIS/LIS COMMITTEE

Dan Pusey - Chair
Ken Anderson - Hoosier Hills
John Bauer - Central District
Hershel Manhart - North District
Vic McCauley - South District
Bryan Catlin
Bill Clark
Art Haase
Larry Manning
Don Plumb
Boudewijn van Gelder

PRESIDENT'S THOUGHTS

by Perry D. Cloyd, PLS, Edinburgh, IN

As you read these, my last "President's Thoughts", please bear with me, there have been so many events worth comment, I may from time to time "leap" from one idea to another. I would, therefore, like to take a moment to acknowledge events which I

believe to be important to sustaining our vision for this society as well as being instrumental in the progress of this society and the advancement of surveying in general.

Through efforts of our Indiana Land Surveyors Registration Board and support from ISPLS, an additional position was added

to the Land Surveyor's Board. ISPLS had the honor of recommending three surveyors for appointment consideration by Governor O'Bannon. I am proud to announce Governor O'Bannon has appointed E.R. Gray, III, to represent surveyors and protect the public as our newest member of our Board of Registration. I believe he will serve our profession well. Recommendations by ISPLS Board of Directors for this position totaled approximately eight candidates of which the three most often recommended were relayed to the Governor's Office for consideration. It speaks very well of our society and the profession of land surveying to be able to easily produce so many qualified candidates. In addition, ISPLS was requested by Governor O'Bannon's office to recommend three surveyors for appointment consideration to the Farmland Preservation Task Force. Again, many candidates were brought forth and the three most often recommended were forwarded for consideration.

The society has worked hard to react to judicial decisions affecting surveyors and has supported legislation to correct the problems at the source of these decisions. We are currently working to provide general housekeeping relative to existing legislation as well as our registration act. All of which affects the daily operations of surveyors. There is a great deal more effort involved in this process than most may realize. I encourage each of you to become more involved with the legal/legislative activities of our society through inquiries, expression of your thoughts and experiences, and your personal involvement with the local and state government.

We continue to have a great deal of involvement from our local chapters. They sponsor events for our continuing education as well as our entertainment. I am very pleased with these efforts. It is my belief the society is only as strong as our grass roots support. It is our local chapters which provides this support as a voice to the state society and a local platform for growth and development. This year Indiana surveyors had their first annual picnic sponsored by the Initial Point Chapter. The day proved to be a success and loads of

fun. Many events were scheduled, plenty of food was prepared, items were provided by firms and vendors which were awarded by drawing to picnic attendees and prizes given to participants who scored highest in various survey related contests. On behalf of ISPLS, I offer a thank you and congratulations to the Initial Point Chapter on a job well done! The Central Indiana Chapter has sponsored a golf outing open to all surveyors. I have been informed this year there were 52 participants and approximately \$500 raised for scholarships. I wish to applaud this effort as well and hope it continues to be a success. These efforts should go as an example to the other chapters that there are many dimensions to the growth and development of our membership and we should feel free to explore them.

The Indiana HARN is now a reality! I offer my congratulations on a job well done to the Office of State Geodetic Advisor, HERPICC, the GIS/LIS Committee and all supporting agencies. Finally, after 3 years of constant effort and 7 years of promotion and involvement by ISPLS members, a successful implementation of Phase 1 of the Indiana HARN has been completed. A grass roots effort established by ISPLS and the County Surveyors Association spearheaded the coordination of volunteers, contractors and many local agencies with the National Geodetic Survey. We should all be proud of the efforts of these groups and the success they have experienced.

The items listed above show the depth of professionalism and commitment by surveyors in our state and primarily within our society. An article in the Oklahoma State Board's "The Board Bulletin" identifies integrity with "commitment keeping" and has quoted O. Marquard as saying "Principles are long, life is short". Based on these statements, our membership has historically exhibited both integrity and commitment to principles. Overall it is apparent our surveying community participates a great deal in its own future. The items listed above reflect on the past and present participation and growth we as surveyors have experienced both professionally and personally. Through these efforts, we continue to grow together as friends and colleagues. As we gain trust and friendship, we will be better able to openly and honestly debate the path our profession will follow and a vision of our future.

The leadership elected by our membership has exhibited a consistent vision in leading this society to the position it enjoys today. They have provided an exceptional effort and achieved exceptional results. It is imperative we share a common vision. Through education and communication, I believe we can better understand the vision of our future which our society embraces. I would encourage each of you to picture the leaders in your lives such as parents, members of the clergy, teachers, and fellow surveyors. When you reflect on their influence in your lives, a pattern of effort reveals itself in their accomplishments. It is, in general, the same vision and philosophy we seek from ourselves, employees, teachers, our children's teachers, as well as our children and similar results should be the least we expect. It is our vision of

our future and consistent effort that get us through the lean times and work overload, and as a result yields the success we all strive to achieve.

Within our society, the financial success, the establishment of our own board of registration, our success in legislative activities and our respect for ourselves as surveyors and the respect gained from other professionals are a result of people who got us here by a consistent effort and a vision for the future. We as individual surveyors should ask "Where would I be today if not for the efforts of my surveying society?" And "had my society not become what it is today, what would the results have been?" These are two very serious questions and an effort to research the answer is necessary before an opinion is formulated. It is easy to complain and find fault in any operation, and easier yet to stand back and not participate in the events that effect our lives. It has been my experience that a majority of our membership takes the higher road of action and participation. We have been blessed with professionals who had a vision of our future and early on asked difficult questions and then worked hard to provide answers.

This society is exactly what that vision and consistent effort has made it. As it stands today, it is efficient, effective and very productive. This is fertile ground for surveyors to grow and develop. Along the same professional vein and with a similar vision of the future of all surveyors, the ISPLS Board of Directors has established the groundwork for surveyors to create a foundation to assist in our growth and development. In the past I have written my thoughts relative to the benefits of having our own foundation. Based on available research, many societies and

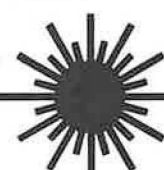
organizations have created foundations for purposes ranging from education to building maintenance. The catalyst for creating a foundation has been primarily for ISPLS membership to have access to the control of finances related to education, professional development, scholarship, promotions and public relations to name a few. A foundation offers some flexibility in fund raising as well as an opportunity to donate to the future of surveyors in Indiana. At the annual business meeting in January 1998 the concept of a foundation will be brought before the general membership for discussion and a vote. I believe this to be a "door of opportunity" which sits directly on the path our society has followed over the past several years. I urge each of you to give careful consideration, and ultimately your support, towards this effort.

In closing, I find it difficult to describe the pride I feel when I look at our society and its membership. I have been honored to be your president. My effectiveness and success rate as your president are directly related to the support provided by many very professional people from ISPLS staff to committee chairs to experienced surveyors offering help and advice. I have been impressed with each and every individual I have had the pleasure of meeting and working with. We are a diverse group having many different backgrounds, educational experiences and paths of development. Bearing this in mind, even with the occasional disagreement, we continue to follow a similar vision of the future and work for the common goal of progress. With this being my last opportunity to convey my thoughts, I want to express my gratitude at being given the privilege of serving this society as your president.



HAYES INSTRUMENT CO.

(Your Equipment Specialist)
502 S. Cannon Blvd. • Shelbyville, TN 37160
1-800-251-1280





LEASE
PURCHASE



DATA
COLLECTORS



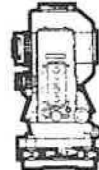
GLOBAL POSITIONING SYSTEMS



USED
EQUIPMENT



SURVEYING
SOFTWARE



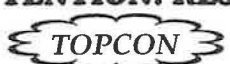
TOTAL
STATIONS



PLOTTERS

HAYES SURVEYING SYSTEMS

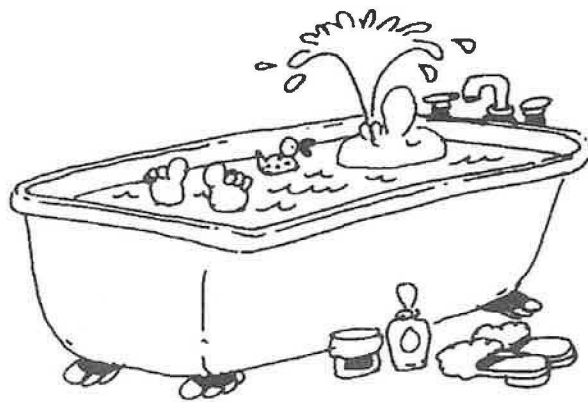
We configure surveying systems to your particular needs, including financing.
Our "cancel anytime" lease guarantees satisfaction and affordability.
★ **ATTENTION: RLSs and LSITs Call To Be Put On Our Mailing List** ★



1-800-251-1280



Getting into GPS doesn't mean you have to take a bath!



The G. Lengemann Company and Trimble have teamed up to offer you a wide array of options which enable you to take advantage of GPS technology today.

- You can sign up for our Consultant Package. We'll send our trained GPS Technical Support Rep with the latest GPS equipment to your job site. He'll work with your people to train them while you're completing the job.
- If you're already familiar with the use of GPS equipment, we can rent just the equipment you need.
- When you're ready, we can help you to analyze and even arrange financing for the purchase of the Trimble System that's right for you.

*Remember when you said that someday you were going to look into GPS? Well that someday is now!
Call us today.*

G. LENGEMANN CO.
(800) 632-3923

2314 N. Fifth Street
P.O. Box 496
Niles, MI 49120
(616) 684-2116
(616) 684-1588 Fax



7528 Pendleton Pike
Indianapolis, IN 46226
(317) 542-7673
(317) 542-7784 Fax

ISPLS BOARD OF DIRECTORS MEETING HIGHLIGHTS

by Dianne Bennett, Executive Director

August 2, 1997

The ISPLS Board of Directors held a meeting on Saturday, August 2, at ISPLS headquarters at 10:01 a.m. President Cloyd called the meeting to order. Guest present was Mark Gardner. The minutes and treasurer's report were reviewed and approved.

Staff Activity Report - A written report was submitted and reviewed. The report is stated under individual topics listed below.

Change in Agenda - Ross Holloway, Indiana Board of Registration member, stated that the Indiana State Board of Registration would like for a list of those individuals found in violation of state standards be published in the Hoosier Surveyor. After discussion, a motion was made and passed to ask the Board of Registration to prepare a letter listing those in violation of state standards on state letterhead and submitting said letter to ISPLS to be inserted in the Hoosier Surveyor and mailing said letter by ISPLS to all non-ISPLS members that are registered in Indiana.

The meeting was then returned to the agenda.

Chapters - The Northwest Chapter is having a workshop on Boundary Law by Ron Hansell on August 15, at Valparaiso University Union Center.

The Initial Point Chapter will host the ISPLS Picnic September 13, at Brown County State Park.

The Central Indiana Chapter - G. Lengemann is sponsoring a golf outing at the Links Golf Club October 3. Information will be mailed out sometime in September. The next chapter meeting will be September 18.

No reports were received from Hoosier Hills, Wabash Valley, St. Joseph, Northeast, Southwest, Tecumseh.

Convention Coordination - ACSM 2000 Conference - After checking, no adequate convention space was available in Indianapolis at that time. ISPLS will not be trying to host the ACSM 2000 Conference.

Education - The profit on the ISPLS workshop "How Does GPS Help a Surveyor?" was \$349.59. A report was received from the Hoosier Hills Chapter on the workshop on "Boundary Law" presented August 1996. The Hoosier Hill's profit was \$1276.62 and ISPLS's share was \$319.15. The Northwest Chapter will hold a workshop on "Boundary Law - 1997 Update." The ISPLS workshop at Pokagon State Park will be on "Deed Analysis and Boundary Resolution in the Public Lands."

Ethics - The letter prepared by Dave Blankenknecht for a complaint will be transferred to ISPLS letterhead and signed by Dave Blankenknecht.

Government Affairs - Information obtained by Randy Miller in regards to the Grant County Drainage Case was submitted to the board for review and comment. A motion was made and passed to send this information on to Ron Hansell for further review.

Membership - A motion was made and passed to accept the new applicants: Life - Dorman Miller; Associate - John D. Dickerson; Student - Craig S. Nance; Junior - Andrew J. Birkle, Dale T. Kruse, Thomas A. Randall, Jr. (New SIT), Mike E.

Sheppard, (New SIT), Bryan T. Schaefer (Reinstate); Member - Mark W. Teepe, Dale L. Kesler (Reinstate), Student to Junior - James Freeman, Daniel Blann, Mark Ober, Jeff Franciski; Student to Associate - Scott Lutz.

GIS/LIS - The HARN training session was held on Purdue campus by NGS July 30 & 31. The HARN survey will begin August 4 and will begin in Northwest Indiana and go east and zig zag throughout the state. NGS will be here for five (5) weeks.

Old Business - The Initial Point Chapter is going to send out 300 more flyers to the surveyors in the area for the ISPLS picnic.

New Business - A letter from Roger Woodfill suggesting some sort of recognition of Charter Members at the Lafayette Convention was discussed.

September 13, 1997

The ISPLS Board of Directors held a meeting on Saturday, September 13, at the Brown County Inn in Nashville, Indiana. President Cloyd called the meeting to order. The minutes and treasurer's report were reviewed and approved.

Staff Activity Report - A written report was submitted and reviewed. The report is stated under individual topics listed below.

Change in Agenda - Kathy McCarter, Polis Research Center of IUPUI addressed the Board on GIS and gave an overview of a project IUPUI is working on to develop a state wide GIS Base Map.

Business Management - Capin & Crouse have completed ISPLS's 1996/1997 financial report.

Chapters - The Northwest Chapter held a meeting Sept. 11, and had discussion on proposed changes to 865. Next meeting is in Oct.

Central Indiana Chapter has a meeting Sept. 18. They may sponsor a workshop in the spring.

Education - The profit on the Northwest/ISPLS workshop on "Boundary Law" was \$945.41 for ISPLS, \$236.35 for Northwest Chapter. The ISPLS workshop on Sept. 26 at Pokagon State Park is on "Deed Analysis & Boundary Resolution in the Public Lands."

The Professional Development Program letter and application was sent out Friday, September 12th to ISPLS members.

Government Affairs - The legislation passed, that defeated the drainage judgment in the Grant County Case. It was reviewed by Ron Hansell.

Membership - A motion was made and passed to accept the new applicants: Member - Duane Brown, Paul Breeze, Thomas Oesterling; Junior - Grant Niemeyer, Steven Amos, Associate - Russell Tice (Member to Associate); Student - Michael Semon, Jennifer Minnick, Jay Jones, Kevin Krulik, Ryan Carrel, Kyle Betz, Paul Klodzen, Nathaniel Pfeiffer, Darren Norrington, Aaron Braun, David Zientek, Andrew Kidder, Dennis Mazur, Christopher Siebern, David Vandenberg, Andrew Hagedorn, Robert Adams, Gregory Quebe, Randell Peterson, Kristen McVey, Dustin Ballard, Mike Davis, Rick McAvane.

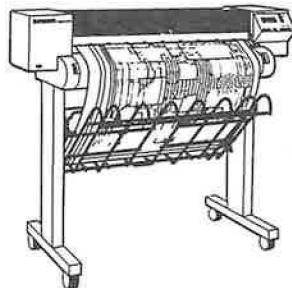
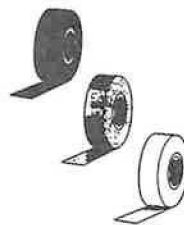
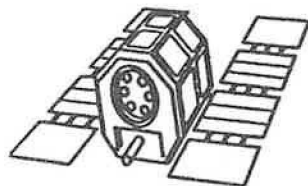
Nominations - Nominations for President Elect are Daniel Woo and Les Weber.

...continued Page 17



SALES • SERVICE • REPAIR

Your Complete Source For Surveying Equipment & Supplies



- Dual Axis Total Stations
Starting at \$6,300.00
- Dual & Single Frequency
Global Positioning Systems
- Software
- Data Collectors
- Tripod Data Systems
- Digital Bar Code Reading Levels
- Transits, Levels, EDM's
- Radios
- Magnetic Locators
- Field Supplies
- Plotters & Supplies

- Rental & Leasing Plans
- Complete Service & Repair
- Re-Cell Batteries

- Featuring:

Leica

SOKKIA

Radius

MOTOROLA

hp HEWLETT
PACKARD

SCHONSTEDT INSTRUMENT COMPANY



6330 E. 75th Street, Suite 114 • Indianapolis, IN 46250
317-849-7090 • 1-800-533-2280 • FAX: 317-849-7297

PURDUE GPS CLASS ON TV

by B.H.W. van Gelder, W. Lafayette, IN

In case of enough outside attendants the course CE511 GPS surveying will be taught on TV, so Indiana people do not need to drive up to West Lafayette to attend a Purdue University class. Purdue University lets the course go on TV if there are more than 20 off-campus students. The class was taught for the last time on TV in the Fall of 1996. Unfortunately, the survey engineers were outnumbered by mechanical and electrical engineers from General Motors who participated in this course from Michigan and as far away as Arizona! For the Purdue graduates: the course is a modernized version of the well-known CE500 Geodetic Control Surveying class. Since my arrival at Purdue University in 1992, the course has become known as "The GPS Course" campus-wide. Not only undergraduate and graduate students from our (single and dual-degree) programs participate, but also students from the agricultural engineering, forestry and natural resources, etc.

For the contents of the course, see below, or you can contact me (765-494-2165). For questions about the registration, fees, etc., call Purdue University's Continuing Engineering Education (CEE) at 765-494-7015. Please note that the deadline is December 4, 1997; with a late fee of \$75, one may register until January 9, 1998.

Hopefully, land surveyors/survey engineers of Indiana will outnumber the students from other engineering fields!

CE597D THE GLOBAL POSITIONING SYSTEM

TTh 3:00-4:15 p.m.

Professor Boudewijn H.W. van Gelder

Phone: 765-494-2165 Fax 765-496-1105

E-mail: vngelder@ecn.purdue.edu

Course Objective: Provide the student with a conceptual understanding of positioning (for surveying, navigation, etc.), using measurements from the 25 earth-orbiting satellites belonging to the Global Positioning System.

Course Description: Coordinate frames in geodesy, surveying, navigation, etc.: transformation between frames; basic aspects of geometric geodesy and physical geodesy; orbital motion; geometric and dynamic modeling; satellite geodetic observation equations; GPS observables; physical limitations; network design and analysis techniques; least squares estimation; mapping.

Prerequisites: Calculus, linear algebra, physics.

Homework: Weekly assignments.

Exams: Two two-hour exams and one three-hour final exam.

Project: One term paper on an arbitrary GPS application of interest to the student. If desired, the student can complete a job-related project in place of the term paper.

Computer Requirements: None required; however access to a personal computer with Quick Basic, FORTRAN, C, or a math spreadsheet program (e.g., MATLAB, Student Version 4 or later) will greatly facilitate homework assignments.

Textbooks: Required --A. Leick, *GPS Satellite Surveying*, 2nd ed., John Wiley & Sons, 1995. Recommended - B.Hofmann-Wellenhof, H. Lichtenegger, and J. Collins, *GPS, Theory and Practice*, 3rd ed., Springer-Verlag, 1994. *GPS World (Monthly Magazine)*. *The MATLAB, (Version 4 or later) User's Guide*.

SURVEYING ENGINEERING NOW GEOMATICS ENGINEERING

The Purdue School of Civil Engineering will change the title of Surveying Engineering area to Geomatics Engineering. The change will be effective beginning with the fall semester 1997.

The International Standards Organization definition of Geomatics is: "Geomatics is a field of activities which, using a systematic approach, integrates all the means used to acquire and manage spatial data required as part of scientific, administrative, legal and technical operations involved in the process of the production and management of spatial information. These activities include, but are not limited to, cartography, control surveying, digital mapping, geodesy, geographic information systems, hydrography, land information management, land surveying, mining surveying, photogrammetry, and remote sensing".

Geomatics has gained wide acceptance as a new term that better conveys the changing and expanding content of traditional surveying and mapping activities. Geomatics encompasses the new technologies and tools that must be used to solve a greater breath of problems in the spatial information arena. Since the Purdue undergraduate and graduate programs include most of the topics listed in the definition, it is appropriate to change the area name to Geomatics Engineering. A name change for the undergraduate degree program, Land Surveying Engineering, is not planned at this time.

NEW SURVEYING COURSES OFFERED AT PURDUE UNIVERSITY CALUMET

The Construction Technology (CNT) Department at Purdue University Calumet has added numerous land surveying courses to its curriculum, effective Fall Semester of 1997. The department now offers nine (9) land surveying courses, which total 28 credit hours.

For many years, the department has offered courses in Elementary Surveying (CET 104), Route Surveying (CET 208), Land Surveying and Subdivision (CET 209), and Construction Surveying (CET 306). These are required courses in the department's current degree programs. Five new courses are now available, and are being offered as electives. These include Surveying Computations (CET 210), Land Survey Systems (CET 303), Legal Descriptions (CET 304), Astronomic and Geodetic Surveying (CET 322), and Surveying Law (CET 402). The CNT department ran numerous experimental courses over the past 6 years which evolved into these new offerings. The department hopes to eventually offer formal degrees in Surveying Technology.

Full-time and part-time surveying faculty include Anthony M. Gregory, Associate Professor of Civil Engineering Technology; Kenneth D. Gembala of Plumb Tuckett and Associates in Merrillville, Indiana, and Richard L. Hudson of PTGR, a Division of The Bonar Group in Valparaiso, Indiana. For further information, contact the CNT department at (219) 989-2332.

UNITED STATES DEPARTMENT OF THE INTERIOR

A HISTORY OF THE BUREAU OF LAND MANAGEMENT EASTERN STATES AND THE GENERAL LAND OFFICE RECORDS

The history of public lands in the eastern United States can be traced through the Bureau of Land Management's (BLM) Eastern States land records, dating back to the beginning of westward expansion. Since then, Federal land records have been amassing; and most of them--field notes, survey plats, patent records, tract books and case files are used daily at BLM's eastern field operations headquarters in Springfield, Virginia.

The Eastern States maintains the records of more than 9 million land transactions, involving over one billion acres of land. Each year, the office--often called the "biggest land title office in the world"--furnishes over 10,000 copies of specific records to private citizens, surveyors, title attorneys, abstract companies, industry representatives, Federal, State, and local governments, and historical researchers.

To explain how the BLM acquired these records, it's necessary to go back to the end of the Revolutionary War. The U.S. acquired the public domain lands lying west of the Ohio River from the States that laid claim to them. Also, the U.S. Government found itself faced with a huge debt. That's when the Continental Congress passed the Land Ordinance Act of May 20, 1785, authorizing the Treasury Department to survey and sell public domain land as a source of revenue. The public domain is all the land originally acquired by the United States for purposes of National expansion. (The original public domain States were: Ohio, Indiana, Illinois, Michigan, Florida, Wisconsin, Alabama, Mississippi, Louisiana, Minnesota, Iowa, Missouri, and Arkansas.)

The Act also established the policy of "survey before settlement"--a policy that continues to this day. After heated debates in Congress about the best methods of survey to be used, the rectangular system was adopted so lands could be identified with certainty by a legal description. The survey of the public lands was the first step in the public land disposal system, and the surveyor's field notes became the first written public land records.

Public Domain States

Today, the BLM Eastern States maintains a complete set of field notes and township plats covering 13 public domain States within its 31-State area of jurisdiction. The field notes are filed by State in 1,745 bound volumes, and more than 30,000 plats are filed by State, Principal Meridian, township, and range.

In 1787, after the first surveys were completed in Ohio, the first public domain lands were sold from a one-room office of the Board of Treasury in the Federal Building located in lower New York City. That office moved to Philadelphia in 1790.

As events rushed our young Republic toward the War of 1812, settlers continued to pour into the frontier in search of land with little thought about how the international complications would affect their future. Ohio lands, ceded by the Indians in the Treaty of Greenville, were soon filled with settlers. Fingers of settlement probed north from the Ohio River along river valleys in the Territories of Indiana and, later, Illinois.

Settlement proceeded at an equal pace south of the Ohio.

Between 1800 and 1812, Congress created 18 land districts and the Treasury Department sold more than 4 million acres of public land for settlement.

When the public lands were sold, "patents" were issued. Patents are deeds transferring land ownership from a sovereign (the U.S. Government) to a buyer. Patents are the best form of warranty deed, and are the first record in a chain of title to a piece of the public domain. Therefore, they are extremely important in establishing private ownership of land. Before March 2, 1833, all original patents were actually signed by the President of the United States; after that, designated officials signed in his behalf. BLM's Eastern States records include the earliest patent signed by a President. It is dated March 4, 1792, signed by President George Washington and countersigned by Secretary of State Thomas Jefferson.

Sale of the Public Lands

Today, BLM's Eastern States houses 9,386 bound volumes, containing more than 5 million patent documents. Some patents issued before 1908 are filed by State and name of the land office where the certificate originated. Others are filed according to the act of Congress under which they were issued, despite geographical location. Since 1908, all patents have been assigned consecutive numbers and filed numerically.

The Continental Congress had set its land disposal policies when it adopted the Land Ordinance of 1785. The deficiencies of that policy, including the requirement that all public lands be paid for in cash, brought wide spread demands for a reform of public land laws. Congress responded. On May 10, 1800, President John Adams signed a new public land law meeting most of the demands of the settlers.

The new Act provided for credit sales of public land, reduced the minimum size of individual tracts that could be sold to 320 acres, and set a \$2 per acre minimum price for public lands. It retained the provision that all public lands be sold at public auction.

Under the credit system, a person buying a tract of land had to pay one-twentieth of the agreed price at the time of the sale and one-fourth 40 days later. A second quarter was due at the end of the second year and the rest during the third and fourth years. The Government charged 6 percent interest on the unpaid balance, but offered a 8 percent discount for payments made before the due date. Land not fully paid for after the fifth year was forfeited and resold at auction.

With that solid accomplishment, Adams soon relinquished his office to the newly elected Thomas Jefferson. Jefferson appointed Albert Gallatin to be his Secretary of the Treasury. Gallatin was to be responsible for the administration of the public land for the next 12 years. (Through the first term of James Madison.)

Gallatin was a resident of western Pennsylvania and understood the problems of the frontier. He believed that public lands should be sold in small tracts to the individual settler. He had a keen interest in the public domain.

During his tenure, the sale of public land spurred by credit

sales, was greatly expanded. The credit system, a blessing to the settler, was a bane to the accountants. Gallatin insisted on absolute accuracy and instructed his receivers that they must accept any payment offered by a settler on his account, no matter how small.

The calculations involved in figuring interest and discounts on a payment of a few dollars complicated the work for all.

Many things combined to increase the work load. In 1803, President Jefferson negotiated the Louisiana Purchase, adding more than 500 million acres of public lands west of the Mississippi. From 1800 to 1812, Congress created 14 new land districts besides those established in 1800. For each new district a land office had to be set up and two new officials appointed to run the district.

Many were the causes for delay in getting ready for a land sale. One was the requirement that all public land be surveyed before it was sold. The survey might be delayed because of Indian trouble, the absence of a supervisor, or by the mania of some surveyors for pin-point accuracy. Surveyors never had enough clerical help. The new administration practiced frugality as a matter of principle, but the practice was frequently carried to the point of parsimony.

With an ever-increasing work load, the Treasury Department office moved from Philadelphia to the new Federal city of Washington in 1800. There, six clerks kept land records and issued patents from a two-story wooden building on 15th Street, near Pennsylvania Avenue.

The tract book system of recording land transactions was established about that time. The tract books began simply as listing of all the transactions involving surveyed public lands--by State or territory, meridian, township, range, section, and subdivisions. The number of entries increased rapidly as land offices from throughout the country forwarded certificates to the headquarters office, where official patents were issued. Today, the original tract books are used as the basic index for public land title research in the eastern States.

The General Land Office

Today, there are 1,582 original General Land Office tract books at Eastern States, showing how, when, and to whom title to public domain lands passed from the United States--in the States of Alabama, Arkansas, Florida, Illinois, Indiana, Iowa, Louisiana, Michigan, Minnesota, Missouri, Mississippi, Ohio, and Wisconsin. An additional 2,325 tract books covering the western public domain states are also filed at the office on microfilm. For day-to-day management, the western BLM offices use the Master Title Plat system instead of tract books.

As the number of sales increased, Gallatin found himself more and more embroiled in the details of public land administration. As a result, other duties were neglected. As the Nation headed toward war with England, it was obvious that his time was needed for more important matters. At last, Congress heeded his plea for relief.

On April 25, 1812, by an act of Congress, the General Land Office was created within the Treasury Department. It was the first Bureau to be created within a department.

In creating the General Land Office, Congress combined the functions that had previously been scattered among three Federal agencies--Treasury, War, and State. The Secretary of the Treasury had directed the survey and sale of public lands. Treasury also

maintained records and accounts. The Secretary of War administered military bounties and bounty lands. Patents were issued by the Secretary of State.

Two years after its creation, the General Land Office was destroyed by British troops invading Washington. It took 2 years to rebuild a similar structure at the same site. Fire again destroyed the 2-story wooden building in 1833, but all records were rescued and carried to the safety of nearby private houses. For 6 years, the General Land Office occupied a row of 5 private houses on the south side of Pennsylvania Avenue, between 14th and 15th Streets.

During the same period, 179 land offices were eventually established within the 13 eastern public domain States, all generating more and more record files.

In 1839, the headquarters moved into the new Treasury building at 15th and Pennsylvania Avenues, where there was enough space for the increasing volume of files--and it was fireproof.

The General Land Office was transferred to the newly created Interior Department in 1849, and, after three more moves, the records were moved to the present-day Interior building in 1937. In 1946, after a major reorganization, the General Land Office became a part of the new Bureau of Land Management within the Interior Department.

After 1950, reorganization--and more moves for the public land records--became commonplace. In 1954, the Bureau abolished regional offices in favor of State offices; and old Region VI became the Eastern States Office. Eastern States Office later merged with the Washington Office of Field Services and became a Division of Field Services within the BLM headquarters. In 1964, another Bureau reorganization changed the Division back to the Eastern States Office which, in the process, inherited the remaining General land Office non-decentralized lands activities formerly retained in the BLM Director's Office.

In still another reorganization in 1967, the Eastern States Land Office, by then at Silver Spring, Maryland, was created. Finally, in 1973 Eastern States Land Office again became the Eastern States Office. In 1979, the office moved to Virginia and in 1992, it moved to its present location in Springfield, Virginia. There all the records are protected in fireproof, temperature and humidity controlled vaults. The Eastern States' functions have grown--from those limited to a land office to those of a more widely-based multiple-use resource management office.

Due to the age and wear from frequent use, the records are slowly and continuously losing their readability. Today, the land records consist of 9,386 volumes of patents and other conveyances of title in land, 1,582 volumes of the GLO Tract Books, 30,000 Cadastral Plats, and 1,750 volumes of accompanying field notes.

Preserving America's Heritage

In 1953, the new BLM began its first review of the land records. This review saw that the original land records were wearing out and a replacement records system was developed for the western States that created the Master Title Records system that were a composite of the original tract books. The study determined that all original patents would be microfilmed. (Since the Eastern States was not part of this records improvement project, the original

...Continued Page 10

patent books are still being used.) A second study was conducted by Stone and Webster (Stone and Webster 1986) on the feasibility of automating the GLO records. This study recommended that immediate action be taken to preserve and to convert patent records to a microfilm medium for future use. Each document would need to be indexed and a database developed and stored in a computer for future searches. The estimated cost of this effort would be about \$20 million.

With technology changing so rapidly, Eastern States (ES) initiated a second study of the GLO records with West Coast Information Systems, Inc. (WESCO 1989), emphasizing the need to look at optical scanning and disk storage. The estimated overall project cost for the scanning and indexing of records for the GLO states for this medium was \$6 million. Based upon the results of this study, Eastern States entered an Interagency Agreement with the Department of Energy (DOE), Office of Scientific and Technical Information. This allowed access to an existing DOE contractor, Science Applications International Corporation (SAIC), to develop the project's requirements definition and design recommendations, and complete a prototype scanning and indexing system. Actual GLO records for the state of Arkansas, 323 volumes of patents (or about 163,000 documents), were used for the prototype.

In September 1989, Eastern States awarded a Small Business Administration Contract to Dynamic Concepts, Inc. (DCI), to complete the record conversion project. The production equipment has 2 document scanning stations, 12 indexing stations, and 3 quality assurance stations to meet daily production schedules of about 2,400 documents per day. The quality control/quality assurance plan for this scanning and indexing work is designed to achieve 99 percent accuracy for the image of each document scanned and 99.5 percent accuracy for the elements of that document that are indexed.

DCI has completed the conversion of Arkansas, Louisiana, Florida, Alabama, Mississippi, Michigan, Wisconsin, Ohio, and Minnesota patent records. Current plans call for GLO records conversion of Missouri, Indiana, Illinois, and Iowa, during the next five years. After conversion of the GLO records for these states, automation will continue with the serialized patents, miscellaneous military warrants, railroad grants, swamp grants, survey plats, and field notes.

System Requirements

The primary concerns of Eastern States in terms of its in-house records maintenance and control is twofold: to protect the original archival record from the normal wear and tear while, simultaneously, securing access to the patent and tract book volumes kept at Eastern States. Currently, access to these records is made directly by the customers and by Bureau employees in their research.

Various attempts have been made to retire these original records to prevent their further deterioration. The attempts have always centered on two mutually supporting themes: (1) the need for a patent image that is clear enough to be used instead of the original document to confirm title or for historical or genealogical evidence; and (2) a usable indexing system that can direct the researcher to a specific image, either from a knowledge of the land

description or the name of the patentee. Because of the large number of land patents and other conveyances in the East and the need to access patent volumes in different ways, automation was considered the answer.

Data Collection Plan

System Description

The GLO Automated Records System is providing the capability to scan, index, store, update, and retrieve images and attribute data for the images of historic GLO documents. The Eastern States provides the individual paper document pages to be scanned and stored on optical disk. Patents, plats, and field notes are then indexed. The GLO Automated Records Project includes a Quality Assurance (QA) Plan in which daily samples of GLO document images are inspected for clarity, detail, and resolution and patent and field note attribute data are checked against the visual images.

Customers can retrieve these images from optical disk and access the associated attribute data through a variety of query choices, such as retrieval by land description or patentee name. Both on-site and remote dial-in access are available. Users of the system can generate reports in hard copy form or view the indexed attribute data. At the least, all users of the GLO Automated Records System can receive document image output in hard copy form. On-site users also can display GLO document images alone or simultaneously with attribute data. On-screen document image viewing is not currently available to remote users. Besides the capabilities provided to customers, BLM staff can query the database directly and BLM quality assurance specialists can update both images and attribute information as needed. The system will support the collection of statistics to monitor retrieval usage and to support accounting functions.

Data Collection Procedure

Step 1. Optical Scanning of the GLO Records--The Eastern States has contracted for the optical scanning of the GLO patent volumes in page number order, sequentially.

Step 2. Assign Reference Numbers to Scanned Data--Each image is assigned an image name (number) corresponding to its location on the optical disc. The assigned accession numbers link the scanned images with the indexed attribute data, enabling customers to access a copy of the original document through an active operational database (GLO Automated Retrieval System).

Step 3. Data Entry Into Attribute Database--After scanning the GLO documents, 35 fields of information are abstracted from the patent documents, creating an attribute database. The data standards for the GLO attribute database meet the data formats found in the Status Coding Handbook used by the Bureau for data collection.

Step 4. Review and Verification--Data is edited and reviewed according to the BLM review procedures in the quality control/quality assurance plan. This plan is designed to achieve 99 percent accuracy for the image of each document scanned and 99.5 percent accuracy for the elements of that document that are indexed.

Document Attribute Database Description

Patents are retrievable by legal land description, patent authority, patentee name, land office, certificate number, and county.

A query by legal land description uses only standard cadastral

units--meridian, township, range, section, and aliquot part. The GLO Automated Records System will be able to identify and retrieve all patents that overlap the land described in a land description query.

Other patent attributes being entered into the attribute database include authority for transfer of title; name and date for transfer of title; signature and date signed; acreage; GLO volume and page number; a flag for metes and bounds surveys; number of pages in document; a flag for non-original markings; a flag to indicate whether the subsurface rights have been reserved; the survey date for metes and bounds; a flag indicating the presence of fractional parts; and a flag indicating reservations imposed on the grant.

All types of patents for the GLO States will be included in the GLO Automated Records Project. The system also will include all types of plats and field notes held by Eastern States (including those from outside the public domain States).

Records also will include other field note attributes as specified by ES. These may include date, surveyor name, field note volume number, volume page number, field note set page number, and type of survey.

External System Interface Requirements

Besides supporting the importation of plat attribute data from the Geographic Coordinate Data Base (GCDB), the GLO Automated Records System will support output of data attribute information onto tape or other format suitable for loading on the Geographic Information System (GIS) Prime computer at Eastern States. The GLO Automated Records System will process GLO data through: 1) on-site retrieval stations that are part of the GLO Automated Retrieval System and 2) dial-in access to the GLO Automated Retrieval System. Although no other form of external system interface is required, the design of the GLO Automated Records Project has not precluded the later addition of interfaces.

Update Requirements

The GLO Automated Records System is supported by a BLM quality assurance specialist to edit existing data for patents, plats, and field notes. Update input from the GLO Automated Records Project consists of replacement images or modifications to the attribute database.

The GLO Automated Records Project also includes support for appropriate access control for authorized personnel performing system maintenance and development functions. All access to the system for update is protected by access codes or equivalent security mechanisms.

Retrieval Requirements

User Interface Requirements

BLM users have the additional option of direct access to the attribute database for retrieval. All user interfaces for retrieval will be designed to promote ease of use by customers.

The GLO Automated Records Project supports remote dial-in access for retrieval as well as supporting log-in and authentication procedures.

Functional Requirements

The GLO Automated Records Project supports retrieval of records by a patentee name that can tolerate some variations in the

spelling of a name. The System is required to support Boolean operations on retrieved record subsets.

Due to the critical nature of the land description data, the system will contain checks on the content of the land description field. Such checks will include a land overlap check and a comparison of acreage to aliquot parts.

Retrieval Generated Output Requirements

The following output will be supported by the GLO Automated Records Project:

- An 11"x17", 8 1/2" x 11", or 19"x 25" paper copy of any GLO document image in the system.
- A printout, on paper, of the attribute information for any GLO document in the system.
- A report, on paper, showing the results of a query of the attribute database. This report will include identification information for all patents in the system that matched the query criteria.
- A report, on paper or on the screen of a retrieval workstation, that shows GLO Automated Records Project update or usage statistics. This report also will support the accounting function.
- A report, on paper, of billing information.
- A report via facsimile of image and attribute information. This is to be a direct link without the necessity of hard copy.

The GLO Automated Records Project also will support image and attribute output in all the following forms: microfilm, 5 1/4" CD ROM, 5 1/4" floppy disk, and magnetic tape.

Accounting Requirements

The GLO Automated Records Project provides an accounting database to document system access and use, identify system users, and create billing information. Billing information consists of necessary collected statistics and a recommended charge for each session. The GLO Automated Records Project includes a cost recovery system that is based on established BLM cost recovery guidelines.

Conclusion

The GLO Automated Records Project promises true service to the people of the United States. Land title searches are being reduced from several hours, or sometimes days, of paging through many fragile documents to a few simple key strokes on a computer--from the researcher's locality. Remote dial-in service is now available.

In the Fall of 1993, individual State CD-ROM disks for the data bases began to be produced for the automated records. The disks are sold through the U.S. Government Printing Office. CD disk users can search on over 20 attribute fields and substantially reduce research time.

The GLO Automated Records Project became available to the public at the Eastern States Public Service Room in February 1993. Additional Information about the GLO Automated Records Project can be obtained by writing to Eastern States at:

Bureau of Land Management, Public Service Section
7450 Boston Boulevard, Springfield, Virginia 22153
703-440-1600

Reprinted from The Mississippi Surveyor, July 1997.

MARION COUNTY SURVEYOR'S OFFICE PARTICIPATES IN INDIANA HARN 1997

by David Pruett, P.L.S., Indianapolis, IN

The staff of the Marion County Surveyor's Office recently completed participation in the Indiana "HARN" project in central Indiana.

The Indiana HARN is one of the most complete geodetic reference control networks in North America due to the vertical requirements that compliment the horizontal specifications.

The Marion County Surveyor's Office sponsored four HARN stations, three within Marion County, and one on Indianapolis Airport Authority property at Mt. Comfort Airport in northwestern Hancock County.



Ed Glass sets up the 2-meter fixed height rod at Mt. Comfort station.

The HARN locations were selected based on criteria of: public accessibility, an area free from satellite obstructions, proximity to USC & GS/NGS benchmarks and with a wide dispersion in the area they serve.

On May 6, 1997, the office hosted a meeting with HARN participants to learn the requirements for levelling to the HARN stations. It was learned that all level runs had to be pre-approved by NGS, then submitted in Blue Book format for NGS adjustment and approval. The Blue Book levelling was completed using the office's Leica NA 3000 digital level and two calibrated and certified 3 meter INVAR rods. The longest level circuit course was nearly 25 miles (40 km) going from Mooresville to Stout Field in southwestern Marion County.

The office took advantage of the long level runs to establish additional benchmarks to densify vertical control in the areas.

On July 30 and 31, the surveyor's office personnel attended meetings at Purdue University with NGS Project Director, Cliff Middleton, who gave detailed instructions on how NGS wanted HARN participants to conduct their G.P.S. observations, and to calibrate the meteorological instruments (psychrometer, thermom-

eter & barometer) to the NGS standards.

The central Indiana HARN participation started Monday, August 11, 1997, with a 5 1/2 hour observation taken on the first two HARN sites. On Tuesday, all four HARN sites were visited concurrently. This was made possible when Ron Melton of P.I. Cripe, Inc., loaned us a Trimble 4000 SSE receiver.



David Pruett, P.L.S., Marion County Surveyor's Office, Supervisor checks the Trimble 4000 SSE G.P.S. receiver.

Wednesday's observation of two sites completed the participation in this phase of the HARN project. All GPS observation sessions started at 6:45 a.m. and ran until 12:40 p.m. each day.

During each session, NGS, INDOT and private contractors collected observation data concurrently on other HARN sites throughout central Indiana. During each observation, weather data of barometric pressure, temperature range, wind speed, cloud



Tim Greene, Assistant Party Chief, fills out a H.A.R.N. data sheet.



Jack Irwin, P.L.S. Marion County Surveyor and Robert Wilcoxon, Party Chief, measure antenna height at station Mills.

cover, and visibility were recorded at the beginning, middle, and end of the session. The barometric pressure, dry bulb, and wet bulb temperature from a psychrometer were then input into NGS's RELHUM software to calculate the relative percent humidity. Recorded also during each observation were the equipment types, serial numbers, satellites observed and a station rubbing. Antenna height is of critical importance when a HARN observation is taken.

To make this task easier, Mark Gibson of Hickerson Instruments provided a two-meter fixed height tripod for us to use in the project.

New descriptions and directions to get to the HARN points were also written in a format approved by NGS and reviewed by relief personnel throughout each session.



Tim Kiste, P.L.S., Party Chief reviews the H.A.R.N. data sheet.

At the end of each observation the receivers were returned to the office and downloaded using Trimble GPSURVEY software. The raw data files collected in the receivers had to be converted into RINEX format, a universal format that data from all different receiver types can be converted to, so that NGS can combine all the data collected statewide. This was done using the DAT2RIN program supplied with the Trimble software. After the conversion, both the raw data and RINEX files were put on diskette and organized with the observation data logs and sent to the HARN contractor, Rick Rayback of Schneider Engineering, for submittal to NGS. This completed one more stage of the HARN program.

The final stage is to use GPS to "tie in" with the remaining recovered triangulation stations from the prior USC & GS surveys. At the completion of this stage, the past will join the present to perpetuate and build future geodetic control for the 21st century Hoosier surveyor.



John Whiteside, Assistant Party Chief is dressed for Wednesday's rainy weather.



N.G.S. stations and section corners are guarded by sign posts whenever possible.

Bonar Group selects UPS for Express Shipping!



UPS Service Provider, Eric Everett; Diane Peters and Rich Hudson of Bonar Group

*"We at Bonar Group look at Eric, our UPS driver, as part of our team. His contribution is an important part of our everyday business. It is so easy to take this for granted."
- Bonar Group.*

UPS is PROUD to PARTNER with
INDIANA SOCIETY OF PROFESSIONAL LAND SURVEYORS
and would like to thank *ALL* of the members who support our Association Program.

Call for details on the discounts available to members.
1-800-325-7000.



TRIBUTE SURPRISES VETERAN SURVEYOR

by Tim Evans, Staff Writer, Indianapolis Star & News,, Indianapolis, IN

COUNTY PROCLAIMS STANLEY SHARTLE DAY TO HONOR MAN'S SERVICE DURING 61-YEAR CAREER.

DANVILLE, IND. - Stan Shartle is the dean of land surveyors in Indiana.

His career dates to 1936 - when he started surveying the countryside around Danville with a homemade transit and a 100 - foot piece of string - and continues today as a partner in the Danville engineering firm of Parsons, Cunningham and Shartle.

But even with 61 years of experience under his belt, Shartle was apprehensive when County Commissioners summoned him to their meeting Monday to discuss a project he is doing for the county.

Ever the meticulous professional, the 74-year old Shartle was armed with a 3-inch-thick stack of documents to support his work as he took a seat in front of the board.

What he didn't know was that he wouldn't need the documents or any explanations. Commissioners had called him to the Government Center for a surprise reception in honor of their proclamation of Monday as Stanley Shartle Day.

"Gee whiz", was about all the soft-spoken Shartle could utter. "How I wish I had worn a tie."

The official proclamation noted Shartle "has settled more property disputes than any judge or lawyer...on the strength of his knowledge, integrity, his work and his dedication to Hendricks County." It was accompanied by a plaque and letters of commendation from Sen. Richard Lugar, R-Ind., and Rep. Ed Pease, R-Ind.

During his career, Shartle worked as county surveyor and deputy surveyor and county engineer. He also worked for the Indiana Toll Road Commission and Indiana State Highway Commission.

Shartle said he didn't believe he deserved such an honor - just yet.

"Maybe in another 25 years, when I'm 100," he joked.

Professionals who work in his field tend to disagree.

"A surveyor's surveyor" is how those in the know describe him. Other terms like "hero", "mentor" and "consummate professional" flowed freely from the lips of people whose lives and careers have been touched by Shartle.

"I understand you are the only person who knows where every (cornerstone) marker in the county is," attorney Ben Comer told Shartle during the reception Monday. "And not only where they are, but who put them there and if it was raining that day."

It may sound farfetched, but Shartle always did - and still does - take his work to such extremes. Precision, detail, accuracy and fairness are his hallmarks.

"He's been a great influence on me," said Walt Reeder, the county's director of planning and a licensed surveyor and engineer. "He's the best land surveyor I have ever seen."

Reeder said whenever he follows the work of another surveyor, he double-checks that work - except when he is following Shartle.

"I don't bother," he said. "He is just so meticulous. I've always thought that if I could be half as good a surveyor as Stan, I would be doing great."

Reeder said Shartle's keen memory, meticulous style and more than 60 years of practical experience combine to make him an invaluable resource.

As an example of Shartle's wealth of knowledge, Reeder said the surveyor was consumed with studying the work of his predecessors and talked about them like personal friends. He knew what tools they used, when they got new ones and their individual peculiarities.

Such minutiae may not mean much to the average citizen, but to Shartle it meant that a previous survey could have been skewed by inches or feet - something that wasn't acceptable to him.

"I always wanted all of my jobs to hold up in court," he said, adding none of his survey work was ever overturned.

Shartle said his interest in surveying was spurred by several old maps he found as a child in a trash can in a Danville alley. He learned they were made by Henry B. Steeg of Indianapolis, who Shartle contacted and began a friendship with. He said Steeg was a mentor to him and encouraged his interest in surveying.

Later, former County Surveyor Fletcher Franklin took the young Shartle under his wing - telling him stories, giving him books and eventually selling him his first real equipment.

"I just loved it so much that when my schoolmates were off playing ball, I was out in the woods practicing my art and science," he said.

Time has done little to dull his love of the trade.

"I've been doing it longer than anyone in the state," said Shartle, who turns 75 on Saturday. "As long as they will have me and my health holds out, I don't want to give it up."



Pictured left to right, J.D. Clampitt, President Hendricks County Commissioner, Stanley Shartle, PLS, Judge Jeffery Boles, Circuit Court Hendricks County.

THE SURVEYOR AND THE INTERNET

by Chris Cothrun, Service Technician, Ingenuity, Inc.

This issue we are going to depart from the usual discussion of instruments and instead, discuss some of the useful resources available to the surveyor via the Internet. Even if you are not using the Internet at this time, peruse this article, as you may discover some new area of interest.

I'm going to skip a technical discussion of the Internet itself. There are many books and magazine articles dedicated to all aspects of the Internet that give the subject a much broader coverage than I ever could. In this article, I will assume you have a basic understanding of the common Internet terms such as World Wide Web, Newsgroups, and e-mail. If these terms aren't familiar to you, the local library or bookstore will have many books that explain these. I hope the information presented here will motivate you to take a closer look at what is available to those associated with the surveying profession. All the resources presented in this article are available to almost anyone who has Internet access or who subscribes to any of the on-line services.

SURVEY INFORMATION

What would be useful to a surveyor in a computer network?

Surveyors have their own newsgroups, titled **sci.engr.surveying**. This is a discussion group where you can post a question or a comment that is made available to anyone who wants to access this newsgroup. They can then post a reply or post additional information related to your posting. Anyone can participate and contribute to the subject at hand.

For example, one "thread", or set of messages that follow a common subject, was started by a surveyor in England who wished to replace his unreliable summer help with a robotic total station. He related his demo experiences with various manufacturers' equipment. Other individuals contributed their opinions on the usefulness of the robotic or "one man" total station. Other discussion topics have included the use/misuse of least squares adjustment techniques, land ownership laws in various states and countries, and other topics of professional concern to surveyors.

There is also a *mailing list* for surveyors. The only difference between the mailing list and the *newsgroup* is the fact that the messages posted to the mailing list appear in your electronic mailbox instead of your news reading program. Of course, the set of messages is different but the topic is generally the same. To subscribe, send (e-) mail to <majordomo@smultron.com> with *subscribe surveying* as the subject of your message. You should receive a confirmation message in your mail box within minutes.

There are hundreds of worthwhile Web pages that relate to the surveying profession. Instead of listing them all, here are three that provide links to many more quality pages. From these you can find government pages such as the National Geodetic Survey homepage, state association pages, and individual surveyors' home pages.

The first, <<http://homepage.interaccess.com/~maynard/>> is run by Maynard H. Riley, PLS. He has some good information about the surveying profession along with an excellent selection of links to more Web sites.

In addition to the surveying mailing list, Professor D. Whalstrom maintains a web site at <<http://smultron.com/>> that, along with some of his interest, has several survey-related links.

Finally, as the name implies, <<http://www.landsurveyor.com>> has an extensive Web site dedicated to the surveying profession. Here you can add your name to their professional directory, take a look at Professional Survey Magazine on-line, or follow their links to even more survey-related pages.

GPS INFORMATION

The **sci.geo.satellite-nav** newsgroup generates a number of GPS-related messages every day. Most of these messages concern recreational-grade C/A code-only receivers, but there is the occasional posting that is of interest to the surveyor.

There are also two GPS/Geodesy e-mail discussion groups that specifically cover the use of GIS for precision measurements. The Canadian Space Geodesy Forum (CANSPACE) is an international list that not only brings you questions and answers about GPS, but has daily postings of the GPS satellite constellation status and reports on solar flare activity. You can subscribe to the CANSPACE list by sending the message SUB CANSPACE *your name* to <listserv@unb.ca>. You can find archives **CANSAPCE.html**. You can also subscribe to the GPS tech mailing list by sending a message to <gpstechrequest@cotopaxi.standord.edu>.

The World Wide Web contains an ever increasing, number of sites dedicated to GPS information. I can only present some of the area sites I know of here. Most of these have links to other sites containing GPS information.

<<http://www.utexas.edu/depts/graff/contents.html>> contains introductory interactive lessons on several aspects of geography. Several of their lessons are of interest to surveyors, with topics such as a Geodetic Datum Overview, a Coordinate Systems Overview and a Map Projection Overview. Of particular interest to the GPS surveyor or anyone interested in fundamentals of GPS is their GPS Overview at <<http://www.utexas.edu/depts/grg/gcra/notes/gps/gps.html>>. This page presents the viewer with text and figures illustrating GPS satellite signals and how those signals are used to produce a position. The overview also illustrates GPS error sources, duration of precision principles, and differential measurements techniques.

For information straight from the source, the US Coast Guard Navigation Center maintains the Navigation Information Service at <<http://www.navcen.uscg.mil>>. The Department of Defense Notice Advisories to Navstar Users, GPS constellation status, and precise ephemerides are all available here for viewing or downloading.

If you want to know what the Russians are up to with the GLONASS system, you can visit their page at <<http://mx.iki.rssi.ru/SFCSIC/SFCSIC-main.html>>.

The University NAVSTAR Consortium posts their own reports on the use and testing of various GPS receivers. Their page can be found at <<http://www.unavco.ucar.edu/>>.

The US National Geodetic Survey maintains pages at <<http://www.ngs.noaa.gov/index.html>>.

For more complete coverage of the GPS resources available, see Richard Langley's excellent article in November 1995 issue of *GPS World*.

OTHER INFORMATION

What else would be of interest to the surveyor on the Internet? I found several items that some of you might find useful.

The surveyor seems to be on a convergent path with GIS technology. The <**comp.infosystems.gis**> newsgroup brings together professionals from all aspects of the emerging GIS technology. Here you will find topics from technical questions for specific GIS platforms to discussions on the applications of this technology.

Most surveyors use CAD programs, with the predominant being AutoCAD. Two AutoCAD-based newsgroups- <**alt.cad.autocad**> and <**comp.cad.autocad**> - generate a number of AutoCAD-related messages everyday.

You can browse numerous AutoCAD pages from the links at <<http://www.wit.edu/ATC/ACADLINK.html>>, including the AutoDesk homepage at <<http://www.autodesk.com/>>.

The Hewlett Packard 48 series calculators have become one of the more popular survey data collection platforms along with being a convenient programmable field calculator. There are several newsgroups dedicated to the HP 48, with a broad cross section of users contributing to the discussion. Most of the message traffic is in the <**comp.sys.hp48**>, but my news server also showed the newsgroups <**comp.sources.hp48**> and <**comp.sys.hp48.d**>. Of course, the many 48 users have put up a number of Web pages. I'll only list <<http://www.hb9eh.ch/~gym/schueler/richard/HP48GX.HTM>>, but you can follow the links from the page to others.

CONCLUSIONS

One of the Internet's most compelling features is the chance for everyone to contribute and interact. If you have access and are willing, you can contribute your experience/expertise to the discussions and even to the World Wide Web. However, this necessitates a note of caution - information posted in newsgroups, mailing lists or on the WWW can be incorrect. These are usually corrected by more knowledgeable persons, but you should always check any source of information.

Finally, take a look at our Web page at <<http://ourworld.compuserve.com/homepages/cothrun/>>.

...excerpts from the *Nevada Traverse*, Vol. 23, No. 2, 1996

ISPLS MINUTES

...continued from Page 5

Board of Registration - The Board of Registration will send a letter to all registered surveyors listing those surveyors that have been found in violation of state standards

The Governor assigned E.R. Gray, III to the board as its seventh member. The Governor also assigned Mike Feldbusch to the Hoosier Heartland Study Committee.

New Business - A letter from New Jersey SPLS on surveying video was forwarded to the Public Relations Committee.

A letter was received from Michigan Museum on Surveying requesting ISPLS become a member. A motion was made and passed to become a member.

E.R. GRAY, III APPOINTED TO BOARD OF REGISTRATION

Greg Hill, left, Deputy Director, Indiana Professional Licensing Agency, administers the oath of office to E.R. Gray, III, right, Columbus, who was appointed July 1997 by Indiana Governor Frank O'Bannon as the new land surveyor member of the Land Registration Board. A change in the L.S. registration board statute, passed by the 1997 state legislature (and signed by the governor to take effect July 1, 1997), added one more land surveyor board member, increasing the size of the board from 6 to 7. Two other members of the current board, Pat Cunningham, Battle Ground, and Tom Boofter, New Albany, were reappointed for four-year terms to July, 2001.



E.R. Gray III, was born in Bedford, IN and attended Ivy Technical College (Terre Haute) where he obtained an associate degree in architectural technology. He began his surveying career with Dunlap Engineering Co. (Columbus) in 1972, and since 1984, has been Bartholomew County Surveyor. His county became the first in Indiana to complete their corner perpetuation program. His surveying and mapping firm, E.R. Gray and Associates, PC was started in 1989. A past president of ISPLS (1995), he currently serves as NSPS Governor from Indiana.

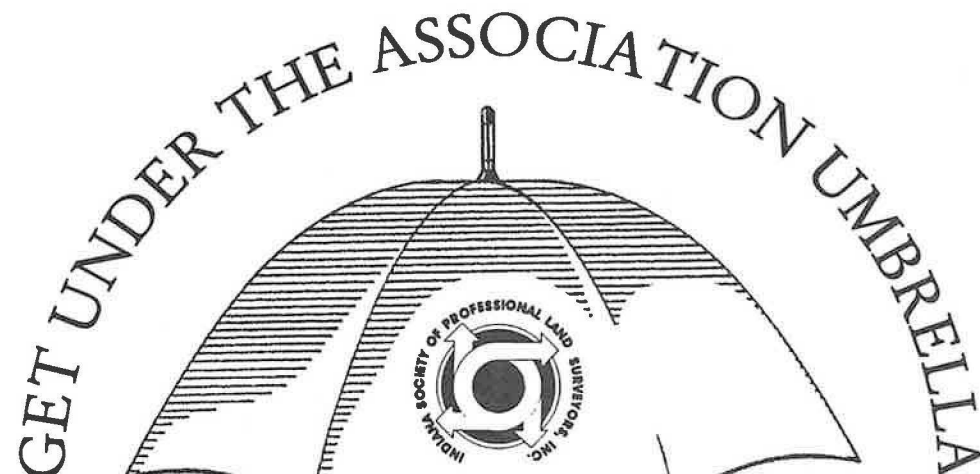
**SPECIAL OFFER
NOW AVAILABLE THROUGH THE
INDIANA SOCIETY OF PROFESSIONAL
LAND SURVEYORS**

**A SPECIAL ASSOCIATION AUTO AND
HOMEOWNERS INSURANCE PROGRAM
THAT MAY SAVE YOU MONEY**

**UNDERWRITTEN BY
CITIZENS INSURANCE COMPANY AND
ADMINISTERED BY
AGENCY ASSOCIATES, INC.
4545 NORTHWESTERN DRIVE, SUITE D
ZIONSVILLE, IN 46077**

**JACKIE MCGINNIS
ACCOUNT ADMINISTRATOR
317-228-2777 OR 1-800-759-2777**

Let ISPLS help you SAVE on your company's long distance phone bill!



It's true! As an ISPLS member, you are automatically entitled to take advantage of discounts on your company's long distance expenditures.

Offered through UWI, the ISPLS program offers you access to discounted rates on the major long distance network of your choice — rates that are unavailable directly from the carriers.

The savings you could experience in this program could pay for a large part of your membership dues. Call or fax UWI today for the details you need to start saving!



Choose the Reliable Quality of a major network—including AT&T and MCI.



Enjoy significantly Lower Rates—up to 48% savings!



Receive unprecedented Personalized Service.

FAX 1-800-611-5698

To get the money-saving details about the ISPLS Discounted Long Distance Program, FAX Program Administrator UWI at 1-800-611-5698. Or call 1-800-342-9287.



UWI
ASSOCIATION PROGRAMS
Program Administrator
1-800-342-9287

Name _____

Company Name _____

Fax Number _____

Phone Number _____

ISPLS ANNUAL PICNIC 1997

by Tom Boofter

The ISPLS Annual Picnic was held September 13 at Brown County State Park. The weather was near-perfect and the picnic site was ideal. Fifty-four surveyors and survey-related personnel were on hand to relish the outdoor cooking of Kirk McCauley and family and to cheer on the contestants.



Kirk McCauley and Family, Vic (Father) & Lolitta (Mother) fixing our delicious lunch.

Lots of bragging rights were earned. The chain-throw competition was won by Harold Hart. (Some wondered how such skill could be retained by a modern surveyor like him). The pacing contest was won by Jeff Souder (ISPLS State President, Perry Cloyd, placed a dismal 11th place). The team competition for compass-and-chain traverse was won by the team from the Initial Point Chapter (small wonder! Some say they still survey like that down there). The contest for setting up the stiff leg tripod transit was won by Vic McCauley. A very respectable 4th place finish by 91 year -old Nelson Prall, distinguished surveyor from Bedford embarrassed most of us inept contestants.

The tree identification contest, monitored of course by Frank Ballintyn, was won by Andy Grangier, (he thought he could eat the leaves, but he only received a trophy, a twig with a pen inside).

We also had a horseshoe singles and doubles event, a new instrument set-up event and of course the surveyor child challenge and the scavenger hunt. The latter were both won by Megan Jones.

It is always interesting to our readers to know who wins such

C.I.C. GOLF OUTING

The first C.I.C. Golf Outing was held October 3, 1997. Fifty-two players enjoyed a beautiful sunny fall afternoon. Congratulations go out to the winning team from Colonial Surveying and the second place team from USI Consultants. The real winner is the scholarship fund which received \$550.00. The Central Indiana Chapter (C.I.C.) would like to thank all who participated as well as the following hole sponsors.

Agency Associates, Inc.
G. Lengemann Co.
Nikon Instrument Corp.
R.Q.A.W. Corporation
Schneider Engineering
Stoeppelwerth & Assoc.
United Parcel Service
USI Consultants
Weihe Engineers, Inc.

We look forward to next years event. If you are interested in being part of next years event please contact Joel Frost @ The G. Lengemann Co. 317-542-7673.

A special thanks from the ISPLS and the C.I.C. Chapter goes to Joel Frost and all of the staff at G. Lengemann for their coordination and support of the golf outing to benefit the scholarship fund.

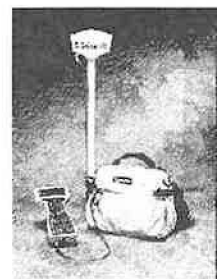
contests, but it is also noteworthy to know who did not place well in such competition. For instance, former ISPLS President and current director, E.R. Gray won nothing. Of course he had just completed his first day as a Registration Board member. Governor O'Bannon appointed Gray to the board to be the seventh member after our new legislation took effect. Professor Van Gelder of Purdue and overseer of the state's HARN program, also won nothing, some said he couldn't win the pacing contest because he paces in meters (eleven steps = ten meters, he says). He came in fifth place. Our President-Elect, Rick Miller also won nothing, but he placed high in the plate refill line according to Chef McCauley.

Many thanks to our sponsors, the door prizes were excellent, and thanks to this year's hosts, the Initial Point Chapter (they sure know how to arrange fine weather). Finally, thanks to Purdue's football squad for knocking off Notre Dame that day, it did a lot of surveyors good to have a little long awaited revenge on the Irish.



ELLERBUSCH
INSTRUMENT COMPANY

PATHFINDER PRO XR



- GPS / GIS data capture
- Built-in DGPS Beacon receiver and antenna
- FREE DGPS signal gives submeter accuracy
- No need for a base station
- Louisville USCG DGPS Beacon scheduled to activate July 1st.
- Windows based Pathfinder Office software

- One button batch processor
- Ergonomic hip pack design
- NMEA and RTCM output standard

4600 LAND SURVEYOR



- Totally self-contained unit
- Entry level GPS system
- Lowest power consumption - just 1 watt
- One button operation
- Single frequency
- Runs on "C" cell batteries

- Mounts directly to tripod or rangepole
- Fully sealed and buoyant
- Compatible with all 4000 series receivers
- RTCM input capable to receive DGPS signal

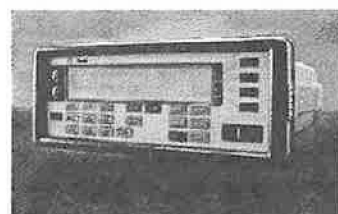
SITE SURVEYOR 4400



- Fourth Generation Technology
- Specifically designed for Real Time Kinematic
- Dual Frequency
- Lightweight
- Everest multipath rejection
- OTF standard

- Lightning fast initializations
- Compatible with 4000SSE and SSI receivers
- Post processing capable with optional GPSurvey software and external data collectors

4000 SSI GEODETIC SURVEYOR



- Dual frequency
- Millimeter accuracy
- Static, Fast-static, Kinematic surveys
- Super Trak technology
- Everest Multipath rejection technology
- Geodetic Control

- 30 mile baselines in one setup
- Fully functional, integrated control panel
- Built-in memory

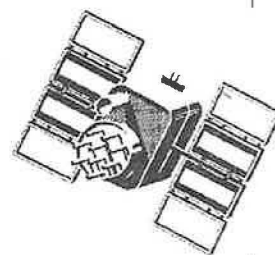
ELLERBUSCH INSTRUMENT COMPANY

Ellerbusch Instrument Company was founded in 1955. We have been servicing Kentucky, Indiana and Ohio from our present location for over 30 years! Ellerbusch has been an Authorized Trimble GPS Dealer since 1985! We are eager to provide you with the products and services you need - now and well into the 21st century. A big part of that future is GPS!

- Authorized Trimble GPS Dealer
- Free Consultation and Estimate
- Free On-Site Demo
- GPS Rentals
- Lease Plans
- Free On-Site Training (with purchase)
- Free Phone Support
- Licensed Surveyor on Staff
- Dealer for DGPS Correction Signals - AccQPoint, DCI, and OmniStar



Call **John Pruden**
GPS Sales & Tech Support Specialist



ELLERBUSCH INSTRUMENT COMPANY

4509 VINE STREET CINCINNATI, OH 45217
(513) 641-1800 FAX (513) 641-4360 (800) 582-2644
email: einstrumnt@aol.com

LOOK OUT!

by Ron Koons, RoSaKo Enterprises
Safety Consultants, Middletown, Indiana

I started this month's article before leaving for Pennsylvania and doing some work for the Navy. On the way home, we were involved in an accident and my topic has quickly changed. We have addressed motor vehicle safety in the past, but it's about time to take another perspective. OSHA has no specific guidelines for motor vehicle safety even though motor vehicle accidents remain as the #1 killer in today's workplace. An OSHA attempt is now being made to deal with motor vehicle safety, but I have grave misgivings about what may come out of this effort. We already have books full of regulations covering the subject and accidents still occur by the thousands on a daily basis. Let's look at what happened to Sandee and I to see how a similar event may create problems for your business.

The #1 most important item in motor vehicles safety has to be the use of seat belts. We were struck from behind while at a dead stop by a vehicle going from 20 to 30 mph. Think that speed won't cause any problems? Three days later we are both still very sore and we were wearing seat belts! Had we not been wearing the seat belts there is no doubt we would have been checking out the hospitality of a Pennsylvania hospital. What about your employees...do you have a company regulation requiring the use of seat belts? (Please do not send out more employees in one vehicle than you have seats/seatbelts. In an accident, someone setting on a plastic bucket or lawn chair is much more likely to get seriously injured.)

What about securing materials in and on your company vehicles? We had an entire Blazer full of materials that were needed for our work. That included a full word processing system! Not one single item was broken or hurt in any way. Everything had been packed, wrapped, and secured to prevent the items from flying around. I have inspected many survey crew vehicles and find all kinds of items in the back that are not secured. Also don't forget the inside of your cab if using a truck or separate load/passenger area.

What about lost time? We were on an interstate in Pennsylvania in the midst of an 8 mile traffic jam. I feel fortunate that from the time the accident occurred we only were held up a little more than an hour. As accidents get more severe, this time can reach hours or even months if more severe injuries are incurred.

The real lost time for our accident has been in the settlement of the claim. There is no doubt the other driver was at fault, but I still have to go through all of the "insurance hoops" to make certain our claim is properly handled. (By the way, if you are ever in an accident in Pennsylvania, you might be surprised to find out the police do not fill out a report if the accident has no injuries or if neither vehicle has to be towed.) The accident occurred on Sunday, so the first thing Monday morning I called my insurance agent. I gave them brief details (about 15 minutes) and agreed to go to their office when we returned. It took about an hour to make a statement and give them full details when the visit was made. Then came contacting the other driver's insurance company. Both my agent and myself left several calls with the adjuster handling the case and yet received no return call. After finally contacting a supervisor,

the adjuster asked me to wait on hold. That entire episode was another hour. We have to wait four days for an adjuster to look at the vehicle and that will probably take another 2 hours. In the meantime I obtained an estimate which took another 90 minutes.

Assuming the adjuster agrees with my estimate, there won't be any more lost time with the insurance company, but if not, the lost time could add up quickly. When the body shop is ready, we will have to get the rental vehicle and deliver our vehicle which will probably take another two to three hours. When the work is completed the same process will occur in reverse, with additional time for inspecting the vehicle.

I have made a lot of assumptions in giving times, which could very readily be a lot longer. In your situation with an employee involved, these times would most likely be a lot higher. Add to that all of the water cooler discussions and a simple accident adds up to a lot of lost time and money.

It just makes sense to address motor vehicle safety. Don't forget to address speeding. Make certain your drivers know that on time appointments are important, but not at the expense of safety.

I hope this insight into our accident helps everyone understand that even minor accidents can have a dramatic impact on the bottom line. Add any injuries to the equation and the time adds up even more. If it is your driver's fault...let's not even discuss that!

COMPLETED CAREERS

DAVID C. HOLLOWAY (29)

David C. Holloway, 29, Greenwood, passed away September 15 following a long battle with Hodgkin's disease. He was an employee of Schneider Engineering Corporation for the past 3½ years and worked as a Survey Technician in the Avon office. David earned an Associate Degree in Architectural Technology and a B.S. in Construction Technology from Purdue University at Indianapolis. His career aspiration was to become a Registered Land Surveyor. To fulfill this goal David was continuing his studies while undergoing cancer treatments and had recently taken the ACSM Survey Technician's Examination. David was a highly motivated and energetic young man who's integrity, courage and spirit was an inspiration to all who knew him. David is survived by his wife Nancy, his parents, brother and a very close extended family. His friends and the surveying profession have lost a bright star and he will be sorely missed.

DONALD A. MITCHANER (58)

Donald A. Mitchaner, 58, Indianapolis, died September 22. Don was employed the past 2 years as a Surveyor's Assistant at Schneider Engineering Corporation. He had previously worked for Gerdt Furniture and Conrail, and was an Army veteran. In addition to being a skilled wood worker, Don loved the outdoors and was looking forward to the Fall hunting season. Don is survived by sons Jeffrey and Anthony Mitchaner, daughter Lisa Hooper, mother Betty Jean Fiege, sister Marge White, brothers Rick and Dave Fiege, and five grandchildren.

ISPLS 46TH ANNUAL CONVENTION

JANUARY 14-16, 1998 - UNIVERSITY INN & CONFERENCE CENTER, W. LAFAYETTE, INDIANA

The registration fee of \$185 for the convention includes all meetings, handouts, refreshment breaks, two luncheons, and the banquet. The registration of \$100 for the spouses includes a like number of meals, and all events on the spouses program. The student registration fee of \$25 includes meetings and luncheons only. One day registration fees include meetings, handouts and luncheons for the day registered for. Please return the attached registration form with your payment by 12/31/97 to assure reserved space.

Registrations received after 12/31/97 will include a \$30 late fee, be accepted based on available space, and will not be guaranteed handouts or meals. Refund requests received by 1/5/98 will be made in full, after 1/5/98, a 50% deduction will be made. After 1/13/98, no refunds will be made.

LODGING

University Inn & Conference Center
3001 Northwestern Avenue
West Lafayette, IN 47906
(800) 777-9808

Convention rates of \$71.00 (double) have been arranged. Please indicate you are attending the 1998 ISPLS Convention when making reservations.

NOTE: All sessions will be held at University Inn & Conference Center which is not on Purdue University campus but is a privately-owned complex about 2 miles north of campus on US 52.

WEDNESDAY, JANUARY 14		
5:30 - 7:30	Cocktail Party in Exhibit Hall (includes raffle drawing)	
7:00	Board of Directors Meeting	
THURSDAY, JANUARY 15		
8:00	Registration Exhibit Hall Opens	
8:30 - 10:00	-Litigation & the Surveyor (Day 1) Walter G. Robillard -Subsurface Utility Design Jeff Lew -Debt Collection Jeffrey J. Newell	10:15 - 11:45 -Litigation & the Surveyor continued Walter G. Robillard -Wellhead Protection John A. Mundell 12:00 - 1:30 Lunch with Leroy Keyes PU Asst. Athletic Director 1:30 - 3:00 -Litigation & the Surveyor continued Walter G. Robillard -Land Title Surveys Timothy R. Warner 3:30 - 5:00 ISPLS Annual Business Meeting 6:30 - ? Banquet & Awards Presentation Cash Bar

ISPLS 46TH ANNUAL CONVENTION

JANUARY 14-16, 1998 - UNIVERSITY INN & CONFERENCE CENTER, W. LAFAYETTE, INDIANA

PROGRAM SELECTION

Please indicate those sessions which you would be interested in attending. Your selections are not considered final. Your selections will be used by the program committee to help determine the schedule, room arrangements, and number of handouts for each session. Your cooperation is greatly appreciated.

Thursday, January 15

- ___ Litigation & the Surveyor
- ___ Subsurface Utility Design
- ___ Debt Collection
- ___ Wellhead Protection
- ___ Land Title Surveys

Friday, January 16

- ___ Litigation & the Surveyor
- ___ GIS & Perpetuation
- ___ ACSM Technician
- ___ University Programs
- ___ HARN
- ___ Equipment Calibration
- ___ Field Notes

SPOUSE PROGRAM

- THURSDAY, JANUARY 15
- 8:30 Continental Breakfast in the Hospitality Room
- 9:30 Mary Kay Demonstration
- 11:30 Lunch @ the Loeb House Bed & Breakfast
- 1:00 Shopping @ Tippecanoe Mall
- 4:00 Return to University Inn
- 6:00 Banquet & Awards Presentation
- FRIDAY, JANUARY 16
- 8:30 Continental Breakfast in the Hospitality Room
- 9:00 Creative Memories Presentation & Workshop
(Participants bring personal photos to create a page)
- 12:00 Lunch @ Seattle Beanery
- 1:15 Shopping @ Purdue West Shopping Center
- 3:00 Return to University Inn
- 3:30 Accessorizing the Plain Black Dress

REGISTRATION FORM

Mail to: ISPLS
55Monument Circle, Suite 1222
Indianapolis, IN 46204

Name: _____
Firm Name: _____
Address: _____
City, State: _____
Zip Code: _____ Phone: _____
Spouse's Name: _____

	Fee	Number Attending	Total
Member	\$185	()	_____
Non-Member	\$275	()	_____
Spouse	\$100	()	_____
Student (full time)	\$ 25	()	_____
1 day (Member)	\$145	()	_____
1 day (Non-Member)	\$200	()	_____
Late Fee (After 12/31/97)	\$ 30	()	_____
Firm Member deduct 20%			_____
TOTAL AMOUNT ENCLOSED			_____

Method of Payment
___ Check (Make Checks payable to ISPLS)
___ Visa ___ Mastercard
Account Number: _____
Expiration Date: _____
Printed Name: _____
Signature: _____

Test-Drive the World's Fastest Total Station

...Using Your Own Data Collector!

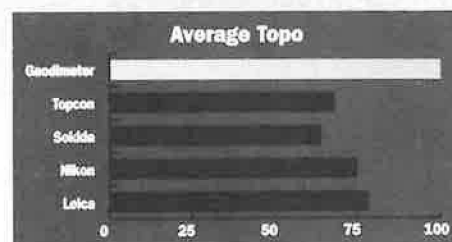
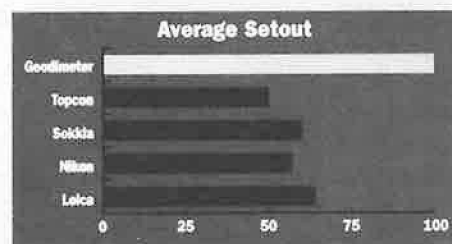


Simply Plug Your Data Collector...

Your favorite data collector — including any TDS or SDR33 unit — hooks right up to the Geodimeter® System 600. These data collectors feature software which can drive the servo-motors, providing the fastest way to stake out.

There's No Learning Curve.

This is your chance to test-drive the fastest total station on the market without having to learn a new data collection system. The servo-driven Geodimeter System 600, the most complete surveying system available today, now interfaces with all popular data collectors.



The above charts represent competitors' productivity as compared to the Geodimeter servo-driven total stations. These results were arrived at in the field by independent surveying crews.

...Into our Servo-Driven Geodimeter System 600.

The Geodimeter System 600 is setting new speed records all over the world. With servo-drive and AUTOLOCK™ capabilities, the system eliminates time consuming aiming, focusing, and fine adjustment — kicking your productivity into high gear.



Try Them Together for Two-Weeks.

Rent the Geodimeter System 600 for a special discounted rental price of just \$250 for 2 weeks. It's a low-cost way to experience the high productivity of servo-drive!

You Won't Want to Go Back.

Once you rev up your productivity with the Geodimeter System 600, you may not want to give it up. Should you decide to buy the system, we'll apply 100% of the rental cost to your purchase! To begin your test-drive, call Geotronics today.



Geotronics of North America, Inc.
911 Hawthorn Drive • Itasca, IL 60143
Telephone: (630) 285-1400
Fax: (630) 285-1410
E-mail: info@geodimeter.com

PERSONAL FINANCES: PLANNING FOR THE FUTURE

RETIREMENT PLANNING

Although tax season forces all of us to focus once a year on current income tax planning and review, retirement planning often gets put on the back burner. Even if you feel you are planning ahead and have retirement accounts, these accounts can get snared by large taxes if the withdrawal of money from them is not properly planned. Distributions from these accounts are not only subject to income taxes, but if an account has "too much" money, distributions from it may also be subject to an additional 15% excise tax, otherwise known as the "excess distribution" tax.

The excise tax applies when annual aggregate retirement distributions exceed a certain inflation-adjusted threshold. Furthermore, if you die leaving a large balance in your retirement account, these funds may be subject to income tax when distributed to your heirs, and could be subject to an additional 15% estate excise tax. These hefty tax bills can be avoided by planning now how you will consume your retirement and other savings accounts. Choosing the right beneficiary and distribution method, as well as the timing of these decisions, is essential.

RECENT TAX LAW CHANGES

Planning and review is particularly important in order to take advantage of changes in the tax law, especially if the changes are in effect for only a short time. Take, for example, a new law that became effective January 1, 1997. For the next three years, there is a temporary suspension of the 15% excise tax on excess distributions; individuals can withdraw unlimited amounts from qualified retirement plans (including IRAs) without incurring this excise tax. Generally, the persons who are likely to benefit from this temporary suspension are those who are retired or near retirement, and have a relatively large balance in their retirement accounts (e.g., \$1 million or more). Some examples of individuals who may benefit are:

- * Persons who are currently receiving annual payouts that exceed \$155,000 (for 1996), and expect to continue that level of withdrawal in the near future. These taxpayers have been subject to the excise tax and will be once again when the tax is reinstated on January 1, 2000.

- * Persons who originally planned on delaying withdrawals until they were 70 1/2, but their withdrawal amount will probably exceed the inflation-adjusted amount (\$155,000 for 1996) and be subject to the excise tax in 2000 or thereafter when the temporary suspension ends. By taking distributions over the next three years, these persons could reduce the balance in their retirement accounts, thus reducing the distribution amounts to a level below the excise tax threshold amount.

- * Persons whose estates will be subject to the 15% estate excise tax. The tax suspension did not affect the separate 15% estate excise tax that applies to large retirement account balances remaining at the time of the taxpayer's death. However, withdrawals taken over the next three years might reduce the balances in retirement accounts, so that the balances remaining at death are below the threshold amount at which the estate excise tax applies.

These are only some of the situations that may be affected by the temporary suspension. Other individuals, such as those leaving retirement account assets to charity, or those who may be eligible for lump-sum distributions, may also benefit. Each taxpayer is different and most likely does not fit perfectly into any of the above situations. The only way to find out if you may really be able to benefit from the suspension is to find out the financial impact of accelerating versus deferring distributions.

ESTATE PLANNING

Estate plans also need regular review. Even if you feel you have done a comprehensive estate plan, it should be reviewed regularly to ensure that it still serves all your needs. Below is a checklist of items that should be looked at regularly:

- * Are you comfortable with the executors and trustees of your will?
- * Do you have the right type and amount of life insurance?
- * Are you taking advantage of the estate tax marital deduction?
- * Have you considered a personal residence trust?
- * Have you considered a living trust to help avoid probate?
- * Have you made gifts to family and friends annually to take advantage of the yearly \$10,000 exclusion (\$20,000 for joint gifts)?
- * If you have made gifts, are these gifts of cash or assets that are likely to appreciate in the future.

401(K) DEPOSITS

The Department of Labor has just tightened the rules governing how quickly employers must deposit retirement plan contributions made by their employees. These new rules will affect 401(k) plans and other types of employee benefit plans where employees make contributions.

Under prior rules, employers were required to transfer employee contributions to the plan as soon as reasonably possible, with a 90-day maximum. The Labor Department felt that some employers were using the employee contributions as a 90-day interest-free loan to their companies instead of sending the contributions in to be invested as soon as possible.

Under the new rules, employers must invest employee contributions no later than 15 business days after the end of the month in which they were contributed or withheld from paychecks. The 15-day requirement is the maximum time allowed; the regulations still require that employee contributions be transferred for investment as soon as reasonably possible.

The new rules took effect February 3, 1997.

Reprinted with permission from Capin Crouse LLP, Tax & Business Issues Vol. 197-1. (Tax & Business Issues is not intended to present complete discussion of each subject or provide specific accounting, tax or legal advice. If you have questions or desire specific advice in respect to these matters, please contact Capin Crouse or other professional counsel.)

CLASSIFIED

REGISTERED LAND SURVEYOR CREW CHIEF AUTOCAD OPERATOR

Medium sized Northwest Indiana land surveying firm is looking for a Registered Land Surveyor, a Crew Chief and an Autocad Operator. Excellent starting salary and employee benefit package.
Call: (219) 769-5012

INSTRUMENT OPERATOR

MSE Corporation, one of the leading surveying companies in the state has an immediate need for an Instrument Operator. The successful candidate will have a high school diploma with a strong understanding of mathematics including use of trigonometry and geometry. Experience in the use of EDM and theodolites is desired.
Benefits include: immediate participation in our Flexplan (health, dental, life and 401(k) Plan), free parking, in-house cafeteria, workout center, smoke-free environment and much more.

Qualified candidates should send resumes along with salary history to:

MSE Corporation (LOGO)
Mailstop: 10
941 N. Meridian Street
Indianapolis, IN 46204
EOE M/F/D/V/

CALENDAR

December 6, 1997

ISPLS Board of Directors Meeting, Indianapolis

December 11, 1997

Northwest Chapter Meeting

January 14,15, 16, 1998

ISPLS 46TH Annual Conference, University Inn & Conference Center, W. Lafayette, IN

February 3-6, 1998

Michigan Society of Professional Surveyors Annual Meeting, Detroit, MI, Contact: Roland Self, 517-484-2413.

February 4-7, 1998

Kentucky Association of Professional Surveyors Annual Conference, Lexington, KY, Contact: Betty Gray, 600-866-3029

February 5-7, 1998

Professional Land Surveyors of Ohio Annual Conference, Cleveland, Contact: George Hofmann, 216-234-5544

February 18-21, 1998

Illinois Professional Land Surveyors Association Annual Conference, Clock Tower Resort & Conference Center, Rockford, IL.

February 25-28, 1998

ACSM Annual Convention and Exhibition. Contact: ACSM, 301-493-0200.

NEW ISPLS MEMBERS

as of August 2, 1997

Dorman Miller - Life
Gary Ahlberg - Associate
John Dickerson - Student
Craig Nance - Student
Andrew Birkle - Junior
Dale Kruse - Junior
Thomas Randall, Jr. - Junior (SIT)
Mike Sheppard - Junior (SIT)
Bryan Schaefer - Junior (Reinstate)
Mark Teepe - Member
Dale Kesler - Member (Reinstate)
James Freeman - Student to Junior
Daniel Blann - Student to Junior
Mark Ober - Student to Junior
Ronald Miller - Associate to Junior
Kevin Vonderheide - Student to Junior
Scott Lutz - Student to Associate
Jeff Franciski - Student to Junior

as of September 13, 1997

Duane Brown - Member (Reinstate)
Paul Breeze - Member (Reinstate)
Thomas Oesterling - Member (Reinstate)
Grant Niemeyer - Junior (Reinstate)
Steven Amos - Junior (Reinstate)
Russell Ticen - Member to Associate
Michael Semon - Student
Jennifer Minnick - Student
Jay Jones - Student
Kevin Krulik - Student
Ryan Carrel - Student
Kyle Betz - Student
Paul Klodzen - Student
Nathaniel Pfeiffer - Student
Darren Norrington - Student
Aaron Braun - Student
David Zientek - Student
Andrew Kidder - Student
Dennis Mazur - Student
Christopher Siebern - Student
David Vandenberg - Student
Andrew Hagedorn - Student
Robert Adams - Student
Gregory Quebe - Student
Randell Peterson - Student
Kristen McVey - Student
Dustin Ballard - Student
Mike Davis - Student (Reinstate)
Rick McAvene - Student

SUSTAINING MEMBERS

THANKS FOR YOUR CONTINUED SUPPORT

ELLERBUSCH INSTRUMENT CO.
4509 Vine Street
Cincinnati, OH 45217
(800) 582-2644

GEOTRONICS OF NORTH
AMERICA, INC.
911 Hawthorn Drive
Itasca, IL 60143
(630) 285-1400

G. LENGEMANN COMPANY
4086 Pendleton Way
Indianapolis, Indiana 46226
(317) 542-7673

HARRISON MARKER AND
INSTRUMENT COMPANY
P.O. Box 66
Anoka, Minnesota 55303
(612) 421-1445

HAYES INSTRUMENT CO.
502 S. Cannon Blvd.
Shelbyville, Tennessee 37160
(800) 251-1280

SEILER INSTRUMENT &
MANUFACTURING COMPANY
6330 E. 75th Street
Indianapolis, Indiana 46250
(317) 849-7090

ZAENKERT SURVEYING
ESSENTIALS, INC.
1841 California Road
Okeana, OH 45053
(513) 738-2917

Indiana Professional Licensing Agency
Indiana Government Center South
302 W. Washington Street, Room E034
Indianapolis, Indiana 46204
(317) 232-2980

FIRM MEMBERS



AMERICAN
CONSULTING
ENGINEERS, Inc.

MAX P. NEWKIRK, L.S.

• CIVIL ENGINEERING • ARCHITECTURE
• TRANSPORTATION • PLANNING
• ENVIRONMENTAL • SURVEYING
• TRAFFIC • STRUCTURAL

4165 MILLERSVILLE ROAD
INDIANAPOLIS, IN 46205-2998
317-547-5580 FAX 317-543-0270

TELEPHONE 317/482-5141 : 317/873-2515 FAX 317/483-0559

ANDERSON & ASSOCIATES

222 EAST MAIN STREET
P.O. BOX 508
LEBANON, IN 46052

JERRY L. CARTER
REGISTERED LAND SURVEYOR

• BOUNDARY SURVEYS • DRAINAGE PLANS
• MORTGAGE SURVEYS • SUBDIVISION DESIGN
• TOPOGRAPHY MAPS • CONSTRUCTION STAKING

ASA

LAND SURVEYING

DAVID HELTON, L.S.

JOHN PHILLIPS, L.S.
PH. 317-653-2714
FAX 317-653-1227

7 S. SPRING ST.
GREENCASTLE, IN 46135

Hubert L. Longest, Jr., P.E.
President



Beam, Longest and Neff, Inc.
CONSULTING ENGINEERS

8126 Castleton Rd.
Indianapolis, IN 46250

1-317-849-5832
FAX 1-317-841-4280

BONAR
GROUP

DARRELL G. POST
PROFESSIONAL LAND SURVEYOR

616 SOUTH HARRISON STREET
FORT WAYNE, INDIANA 46802
(219) 424-0318 Fax (219) 424-0410

PTGR
A MEMBER OF BONAR GROUP

RICHARD L. HUDSON
PROFESSIONAL LAND SURVEYOR

158 S. NAPOLEON STREET, SUITE 100
VALPARAISO, INDIANA 46383-5582
(219) 462-1158 Fax (219) 462-0329

ENGINEERS ARCHITECTS PLANNERS SURVEYORS
FORT WAYNE • INDIANAPOLIS • VALPARAISO



DONOVAN ENGINEERING

2020 INWOOD DRIVE
EXECUTIVE PARK
FORT WAYNE, IN 46815

GREG ROBERTS P.L.S.
JOHN R. DONOVAN P.E. & P.L.S.
FRANCIS X. MUELLER P.L.S.

OFFICE 424-7418

FIRM MEMBERS

FINK ROBERTS & PETRIE, INC. FRP ANDREW H. GERDOM Project Manager 3307 West 96th Street Indianapolis, Indiana 46268 317-872-8400 Tele 317-876-2408 Fax Engineers • Architects • Surveyors Geologists • Environmental Managers	Morley and Associates, Inc. CONSULTING ENGINEERS AND SURVEYORS/ARCHITECTS Danny K. Leek, R.L.S. Senior Project Surveyor • Associate • Vice President 605 S.E. MARTIN LUTHER KING, JR. BLVD. EVANSVILLE, INDIANA 47713-1797 OFF: (812) 464-9585 FAX: (812) 464-2514 RES: (812) 853-9620
HOLLOWAY AND ASSOCIATES, P.C. LAND SURVEYING AND ENGINEERING ROSS O. HOLLOWAY, P.L.S., P.E. P.O. Box 234 Mooresville, IN 46158 Phone: 317-831-7918 Fax: 317-831-8255	NSE Corporation Engineering Digital Mapping Surveying Landscape Architecture 941 North Meridian Street Indianapolis, IN 46204-1061 317-634-1000 317-634-3576 FAX 317-443-8738 Mobile Jeffrey A. Meyerrose, L.S. Vice President, Development/Surveying
MAJOR Land Surveying, Inc. MAJOR ENGINEERING • LAND SURVEYING • LAND PLANNING 435 East Main Street P.O. Box 7006 Greenwood, Indiana 46142 Off: 317-888-4496 FAX: 317-887-4447	Alex D. Oak, PE, RLS President PAUL I. CRIPE, INC. 7172 Graham Road Indianapolis, Indiana 46250 317-842-6777 FAX# 317-841-4798 Architects • Engineers • Landscape Architects Land Planners • Land Surveyors • Environmental Consultants
M MARBACH & BRADY B LAND SURVEYING, INC. Christian F. Marbach, P.L.S. President (219) 266-1010 Fax (219) 262-3040 3220 Southview Drive • Elkhart, Indiana 46514	RQAW CONSULTING ENGINEERS & ARCHITECTS DANIEL G. KOVERT, PE, LS RQAW Corporation 4755 Kingsway Drive, Suite 400 Indianapolis, IN 46205-1547 FAX (317) 255-8354 (317) 255-6060 Voice Mail 334

FIRM MEMBERS

SCHNEIDER ENGINEERING CORPORATION Civil Engineers • Land Surveyors • Land Planners John V. Schneider, P.E., L.S. President 3020 N. Post Road P.O. Box 26068 Indianapolis, Indiana 46226-0068 Tel: (317) 898-8282 Fax: (317) 899-8010	United Surveying, Inc. LAND SURVEYORS AND ENGINEERS Daniel R. Woo, L.S. President Res. (317) 894-8172 United Surveying, Inc. 5332 N. Temple Avenue Indianapolis, Indiana 46220 Phone: (317) 253-4996 FAX: (317) 253-5385
SITE LINE, INC. Land Surveying and Civil Engineering John H. Silnes L.S. 461 West Main, P.O. Box 602 Greenwood, IN 46142 Telephone 882-9301 Boundary Surveys • Subdivision Design • Plot Plans • Construction Surveys	VESTER & ASSOCIATES, INC. SURVEYING & SUBDIVISION DESIGN PATRICK N. CUNNINGHAM, R.L.S. PRESIDENT 309 COLUMBIA ST. SUITE 101 LAFAYETTE, INDIANA 47901 TELEPHONE (317) 742-6479
JOHN H. STEPHENS, R.L.S., Inc. 134 S. Wabash St. Wabash, IN 46992 Bus. 563-4467 Home 563-6080	
STOEPPELWERTH & Associates, Inc. R.M. Stoeppelwerth, PE, PLS President (317) 849-5935 CONSULTING ENGINEERS • LAND SURVEYORS 9940 Allisonville Rd. P.O. Box 509007 Indianapolis, IN 46250 1-800-728-6917 FAX: (317) 849-5942	Effective Solutions ▶▶▶ WOOLPERT 7140 Waldemar Drive Indianapolis, Indiana 46268-4192 ▶▶▶ 317.299.7500 FAX: 317.291.5805

THE HOOSIER SURVEYOR

Indiana Society of Professional Land Surveyors, Inc.
55 Monument Circle, Suite 1222
Indianapolis, Indiana 46204

Bulk Rate
U. S. Postage
PAID
Indianapolis, IN
Permit No. 4056

1*1*****5-DIGIT 46204

I.S.P.L.S.

DIANNE BENNETT

55 Monument Cir Ste 1222

Indianapolis IN 46204-5903



IT'S MONUMENTAL! ... IT'S CAST IRON!

Through the centuries stones, trees, posts, and aluminum have been used to mark land boundaries. Most of these points are lost. Centuries old Cast Iron is still intact. Only the passing of centuries will show the lasting durability of Harrison's Cast Iron Survey Monuments.

FEATURES:

FERROMAGNETIC—Monuments respond emphatically to metal detection instruments.

BREAK-OFF POINTS—The bottom portion will maintain an accurate position if the top is broken off..

ECONOMY—Over time the features of Harrison's Survey Markers make them the most economical investment available today. The Primary choice for perpetuation of original government corners.

EXTENDIBLE SERIES:

- The primary choice for perpetuation of original government corners.
- Standard legends, private legends and brass plates are available.
- No replacement needed—Just remove the top with the Easy-off Wrench and add spacers and/or legend top for flush fit.
- Spacers and legend tops are available in 1", 2", 5" and 10" lengths.
- Flared base and straight models are available in a wide variety of lengths.

HARRISON
MARKER CO.
Established in 1961

For additional information call or write:
Box 66 / Anoka, MN 55303 ■ (612) 421-1445

EXTENDIBLE
SERIES

