

PSLS 2020 Conference Session Descriptions

(as of September 11, 2019)

Monday January 13, 2019 | 8:30 am – 12:00 pm

101 Modernizing the National Datums and the State Plane Coordinate System in 2022 (Part 1)

Dan Gillins PhD, PLS, Jeff Jalbrzikowski PS, GISP

The National Geodetic Survey is modernizing the National Spatial Reference System, and new reference frames and a geopotential (vertical) datum are scheduled to be released in 2022. This modernization effort will lead to changes in the execution and georeferencing of future control surveys involving GNSS and leveling. In addition, a new State Plane Coordinate System is being designed. Web-based tools, including OPUS-Projects, have also been recently developed to enable surveyors to publish their static GNSS control surveys. Additional work is currently underway to further develop OPUS-Projects so that surveyors can submit Real-Time Kinematic GNSS vectors as well as leveling observations. OPUS-Projects will be a major tool for managing, processing, adjusting, and publishing control surveys.

301 Bridging the gap, stepping into the future

Amy Hopkins PLS

Bringing the generations together to work more productively for you, your company and for the future of the Surveying profession. We'll discuss how to get the Silent Generation, Baby Boomers, Gen X-ers, Millennials and now Gen Z to work together. We can all learn so much from each other, and the surveying profession will be better for it.

Listen, Learn, Lead

This presentation will include a panel discussion made up of members of various generations and also a panel of survey college students to discuss the future of surveying.

601 Boundary Commission

David Widmer PLS, John Smoker PLS

1. Why? 2. Who appoints? 3. Composition of a Boundary Commission? 4. Duty of Boundary Commissions? 5. Sources of instructions? 6. Necessity of Public Hearings? 7. Professional Standards of Practice.

Source Records & Authority of Records: 1. Legislative Acts. 1a. Statute Reference Books
2. Original Surveys 2a. PA Archives, County Boundary Survey Maps, Township Connected Warrant Maps, Individual Warrant Surveys 3. County Courthouse 3a. Deeds 4. Maps 4a. GIS, LIS, General Use Maps

Boundary Retracement Considerations: 1. Slope distances 1a. Survey Laws at the time of Survey
1b. Modeling the terrain 2. Angle Accuracies 2a. Compass vs. Total Stations vs. GPS 3. Geodetic Survey Considerations vs. Conventional Survey Methods 4. Basis of Datum and Reasons Why?

Correlating Information, Record and Field: 1. Are the Survey Rules of Constructions applicable?

Requirements of Final Map and Report: 1. Authority for Source of Required Information 1a. Specific items to be shown on plan.

Case Review: Retracement of the common boundary lines between the Counties of Lawrence and Butler.

701 FEMA Elevation Certificates and Zone A BFE Determinations (PART 1)

Thomas Smith PE, PLS

It is intended that the participants will attend part 1 and part 2 of the workshops.

The goal of this seminar is to instruct the attendees to complete the FEMA Elevation Certificate. The instructions will include how to find the latest FEMA forms and the tools needed to complete the Certificate for detailed study streams (AE Zones) and for approximate Flood Zone (A) streams. The presentation will discuss the field data needed to complete the forms, including the use of Google Earth and datum conversion using VERTCON software. A detailed example of an Elevation Certificate survey will be discussed.

Monday January 13, 2019 | 8:30 am – 10:00 am

201 PA ONE Call

Jim Larkin

Designers, Project owners, Excavators, and Facility Owners all have specific responsibilities under the PA Underground Utility Line Protection Law. As the Law was signed new, by Governor Tom Wolf, on October 30, 2017; The PA Public Utility Commission (PUC) now enforces the Law. There are new responsibilities in addition to those carried forward for all the stake holders performing excavation in PA. An explanation from a Designer and Project owners prospective on the requirements for excavation work in Pennsylvania.

401 Project Management

Brian Yorkiewicz PLS

501 Legislative Update

Ted Mowatt, CAE, Wanner Associates

801 Introduction to GNSS

Dimitrios Bolkas PhD, PEng

Surveyors with little to no experience or knowledge in satellite positioning and who wish to understand how Global Navigation Satellite Systems (GNSSs) works are encouraged to attend this workshop. Some of the concepts that will be discussed include, how satellites can be used to obtain positioning information, the different coordinate systems involved in GNSS, what are the GPS error sources, why certain field procedures must be followed to obtain coordinates with desired quality, and things to watch when determining if a GNSS survey is the appropriate method for the application.

Monday January 13, 2019 | 10:30 am – 12:00 pm

202 Maps in the Penn State University Library

Heather Ross

The Donald W. Hamer Center for Maps and Geospatial Information at Penn State University collects and manages print and digital maps and other geospatial information resources in support of Penn State research and teaching, and for use by residents of Commonwealth of Pennsylvania. It is home to the largest print map collection in

Pennsylvania and is considered a top 15 collection in the country by volume. In this workshop, participants will learn how to search for print and digital maps in our collection in addition to finding maps from other institutions. Of particular interest is the digital collection of Pennsylvania Sanborn fire insurance maps from the mid 1880s through mid 1900s for many Pennsylvania communities. Penn State manages the largest collection of Sanborn maps outside of the Library of Congress and has digitized the entire collection and made those out of copyright freely available online.

402 Road Safety

Douglas Allwein, PLS

Following the proper safety procedures while working on active roadways is often overlooked in our industry. Whether caused by a lack of time, budget restraints, laziness or ignorance, many surveyors will proceed with their work without the necessary controls in place to comply with federal and state regulations. This webinar is a review of the regulations set forth in the Manual on Uniform Traffic Control Devices (MUTCD), as adopted by the Pennsylvania Department of Transportation.

The workshop will also review traffic statistics and study cases of incidents on the roadways. This will remind us of the seriousness of roadway hazards. We often become desensitized to the traffic conditions, which makes working on the roadways even more dangerous. Creating a safe work environment should be everyone's top priority.

502 Trimble Business Center, Field to Finish

Kenneth Fronheiser PLS

This workshop will take a look at how the Field-to-Finish workflow can save time, money, and enhance your delivery to your clients. We will look at both field and office workflows. From building a code list, exercising best field practices and importing and generating linework are just a few topics that will be covered.

802 Metrification of Surveying

Scott Reeser PLS

The United States of America is one of only three countries in the industrialized world that has not fully embraced the metric system of units. As we approach the implementation of a new datum for surveying (NSRS 2022) the US Survey foot is slated to go by the way of the rod and

perch, will it be replaced by the meter? In this session, we will discuss switching surveying in the US to metric and what ramifications it could have on the work of surveyors.

Monday January 13, 2019 | 1:30 pm – 5:00 pm

102 Modernizing the National Datums and the State Plane Coordinate System in 2022 (Part 2)

Dan Gillins PhD, PLS, Jeff Jalbrzikowski PS, GISP, Brian Naberezny PLS, GISP

The National Geodetic Survey is modernizing the National Spatial Reference System, and new reference frames and a geopotential (vertical) datum are scheduled to be released in 2022. This modernization effort will lead to changes in the execution and georeferencing of future control surveys involving GNSS and leveling. In addition, a new State Plane Coordinate System is being designed. Web-based tools, including OPUS-Projects, have also been recently developed to enable surveyors to publish their static GNSS control surveys. Additional work is currently underway to further develop OPUS-Projects so that surveyors can submit Real-Time Kinematic GNSS vectors as well as leveling observations. OPUS-Projects will be a major tool for managing, processing, adjusting, and publishing control surveys.

203 Basic Geodesy

Charles Ghilani

This workshop is a basic workshop with few equations but providing attendees with a description and understanding of basic geodetic concepts involved in horizontal and vertical surveying. It will cover the history of geodesy, how the motions of the Earth are handled in reference frame systems/datums, discuss the relationships between geodetic, satellite, and Earth-centered, Earth-fixed (ECEF)/geocentric coordinates, how the gravity field affects height determinations including the difference between geodetic and orthometric (elevations) heights, and what the NGS plans for 2022. The presentation will be interspersed with 3D animations and videos to help attendees understand the basic underlying concepts and the difference between plane and geodetic surveying.

302 Photogrammetric Principles applied to UAS

Frank Derby PhD

Photogrammetry has been a part of the surveying technology for many years. It is the art and science of making maps from aerial photographs. Traditional photogrammetry typically involves analog photographs taken from manned aerial vehicles. The technology is becoming even more popular with the use of Unmanned Aerial Vehicles (UAVs) and digital photographs for mapping purposes. Whereas photogrammetric principles are common in both approaches, there are differences in the various stages, especially in flight planning, photo control points, and image storage and processing. In this workshop, the basic principles of photogrammetry including flight planning, photo scale, relief displacement, conversion of analog photos to digital imagery, interior and exterior orientations, image rectification versus geo-referencing, and creation of ortho-photographs. Where necessary, differences between the two approaches will be discussed.

403 Preparing Surveyor's Reports

D. Robert Davidson

This program will discuss the importance of preparing a Surveyor's Report, what information should be included and how to format it. Emphasis will be placed on the reports role as evidence in court and how a surveyor can use it as the basis for testimony.

503 Employment Discrimination

Presenter to be announced

602 Surveyor as an Expert

Bruce Blair, PLS

702 FEMA Computations to establish Base Flood Elevation (BFE) for a Zone A System (Part 2)

Thomas Smith PE, PLS

This workshop is a continuation of Part 1 and assumes the user has knowledge of FEMA Elevation Certificates and experience in completing the information required.

A FEMA Zone A stream is one where no detailed study has been completed by FEMA; therefore, no Base Flood Elevations (The so-called 100-year flood elevation). This workshop will cover the use of FEMA maps with field surveyed cross-sections to determine the BFE using approximate methods. The use of the USGS StreamStats model will be covered to determine peak flows for an actual watershed. Detailed methods will also be covered to determine flood flows and BFE elevations with cross-section data. The FEMA eLOMA (electronic letter of map amendment) will be discussed, which allows the removal of structures or property mapped within the flood plain. Presentation of several case studies to illustrate various types of projects.

803 Riparian Boundary

Michael Brinkash Sr., PLS

In order to Determine the Location of Water Boundaries the Surveyor Should Understand the Following:

1. Definitions Associated with Water Boundaries
2. Classification of Waterways (Navigable or Non-Navigable)
3. Commerce Clause vs. Title Test (Navigability)
4. Where is the Boundary Line Along Navigable Waters?
5. Deed Calls and Phrases Along Waterways
6. Evidence to Determine Water Marks (High & Low)
7. Where is the Boundary Line Along Non-Navigable Waters?
8. Canals
9. Riparian Rights

10. River Story
11. Different Water Rights
12. Survey Problem – You be the Judge
13. Frequently Asked Questions

Tuesday January 14, 2019 | 8:30 am – 12:00 pm

103 Ethics for the Geomatics Professional

Scott Reeser PLS

This session will discuss ethical considerations surveyors but also applies to engineers. Attendees will review published definitions of Professional Ethics, as well as cultivate a group definition. The Code of Ethics included within the Engineer, Surveyors and Geologist Registration Law will be reviewed, as well as ethical codes from other surveying and engineering professional organizations. Discussion on the development of surveyor ethics will be discussed. This session is geared toward group participation, the presenter will encourage participation by all attendees in a manner that encourages thought and exchange of ideas.

204 Unmanned Aerial Systems – Mapping Best Practices

Mack McCarty

404 Taking you from the 'Field to the Finish Line' with Carlson Software (Part 1)

Michael Hyman, Douglas Aaberg, PLS

Utilizing Carlson SurvCE/SurvPC and Carlson Survey students will gain a better understanding about the core 'Field-to-Finish' process. We will take a systematic approach for someone who is just getting started and help users who have started the process go to the next level. How it can be adapted for both the office and the field vs. how intimidating it can be even if you've never done it before. This will be a 'hands on' class with interactive Field-2-Finish learning. From there we will create surfaces for contour map creation. We will also look how you can collect GIS attribute data within your field-to-finish field activities and what deliverables are needed. Additionally, we will discuss how your field-to-finish collection/office processing data can assist any firm with the movement of 3D Points, 2D and 3D Line-work and 3D Surface stakeout and output. Additional items that will be reviewed: Survey Points/Drawing and locating of Survey Points/Using Coordinate Files Effectively within your Survey/Real Time-Cloud Survey Data-from 'field-to-office' and 'office-to-field'/Surface Model and Contour Map Creation/Point Rotation and Translations/Google and other image sources for your survey with Carlson Survey and Carlson SurvCE/SurvPC

504 Effective Time Management

Bill Beardslee PE, PLS, PP

In today's aggressive society, every surveyor's time is under constant stress. Clients, projects, family and business management demand, in essence, more time than actually exists. This

seminar will help surveyors begin to control their many tasks and make some order out of the daily chaos.

603 Civil 3D

John Cooke

Autodesk Civil 3D® is a very powerful - and popular - solution applicable in many Civil Engineering and Survey firms. Despite its power, Civil 3D's core survey functionality has not kept pace with developments by other vendors, including Leica, Trimble, Carlson and others. This class, drawn on real-world experience in a medium-size survey and engineering firm, focuses on two major areas: First, the class identifies core functionality within Civil 3D essential and common to survey and engineering applications, and looks at configuring that environment to work optimally. Secondly, the class identifies and focuses on better survey solutions in other products, including Leica and Carlson, and looks at integration of these more modern solutions as replacements for the dated aspects of Civil 3D. The implementation strategy is to pull the best pieces from different, and sometimes competing, software products to develop the most efficient solution possible.

703 Stormwater Management Methods Using HydroCAD (Part 1)

Tom Seybert PE, PLS

This workshop will present methods in stormwater management design for quantity control. The 2-day workshop will highlight the use of HydroCAD* in the analysis and design methods. Participants are required to bring a Microsoft Windows-based laptop computer to the workshop and download a free 15-day trial version of HydroCAD* on the first day of the workshop. Prior to attending the workshop, participants will also be required to purchase a copy of the HydroCAD-10 Owner's Manual from HydroCAD Software Solutions, LCC, and bring it to the workshop. Participants should bring a hand calculator to complete some of the minor calculations. Paper copies of the notes will be helpful during workshop exercises, yet if participants work in groups of two, one group member can display the notes on their laptop (paperless) while the other can run the HydroCAD* model. In this case there would be no need for printed notes.

804 CST Exam Prep Level 1

Brent Birth PLS

Tuesday January 14, 2019 | 1:30 pm – 5:00 pm

104 Survey Practice – Tech and Business Aspects (Some things I wish someone had told me years ago)

Donald Kamp, PLS

Today's Surveyors face many challenges in their practice today. From technology and professional liabilities, to effectively cultivating tomorrow's surveyors, the numerous day to day responsibilities can be overwhelming. This workshop will provide insights with examples of things for you to consider in improving what you do, and how you do it. This will be

accomplished through a number practical tips and examples, coupled with the benefit of discussion from real world experiences of attendees. We will all gain insights on ways to provide for growth and development of ourselves, our employees and our firm.

205 Legal Issues on Privacy and UAV/UAS/GIS

Mack McCarty

304 Writing Legal Descriptions

Scott Reeser PLS

This session is intended for both surveyors (in varied roles and responsibilities as well as those outside the profession that are involved with the preparation of legal descriptions. The content of the session is focused on legal descriptions for real property and/or easements. The workshop will review parts of a legal description and how to assemble the information in each part. Different types of descriptions will also be discussed. Common mistakes and tips in preparing descriptions will be reviewed during the session. Time is allocated to the attendees having an opportunity to draft simple descriptions.

405 Taking you from the 'Field to the Finish Line' with Carlson Software (Part 2)

Michael Hyman, Douglas Aaberg, PLS

Utilizing Carlson SurvCE/SurvPC and Carlson Survey students will gain a better understanding about the core 'Field-to-Finish' process. We will take a systematic approach for someone who is just getting started and help users who have started the process go to the next level. How it can be adapted for both the office and the field vs. how intimidating it can be even if you've never done it before. This will be a 'hands on' class with interactive Field-2-Finish learning. From there we will create surfaces for contour map creation. We will also look how you can collect GIS attribute data within your field-to-finish field activates and what deliverables are needed. Additionally, we will discuss how your fieldto-finish collection/office processing data can assist any firm with the movement of 3D Points, 2D and 3D Line-work and 3D Surface stakeout and output. Additional items that will be reviewed: Survey Points/Drawing and locating of Survey Points/Using Coordinate Files Effectively within your Survey/Real Time-Cloud Survey Data-from 'field-to-office' and 'officeto-field'/Surface Model and Contour Map Creation/Point Rotation and Translations/Google and other image sources for your survey with Carlson Survey and Carlson SurvCE/SurvPC

505 Effective Business Writing

Bill Beardslee PE, PLS, PP

In today's world of email and texting, writing skills are still mandatory to communicate properly to clients, staff, and agencies. Proper writing skills help protect the surveyor and the client from future costly issues.

604 Civil 3D: Terrain Modeling, Contouring & Analysis

John Cooke

This class examines the creation of Digital Terrain Models, or Surfaces, in Autodesk Civil 3D®, with an emphasis on producing highly-accurate models as efficiently as possible from survey

data. Since the Civil 3D Surface is also the basis for contouring and analysis within the program, better surfaces yield better contouring and analysis as results.

The class reviews the data types for terrain modeling - point, breakline and contour data - and how their use is facilitated with survey data transferred into the drawing from field work. The class will examine how breakline data can be captured and included in the Civil 3D TIN. The course will examine various strategies for filtering point data for inclusion in the Civil 3D Surface, including Point Groups, Description Keys and other tools. Major topics also include the assessment of surface accuracy and surface editing, techniques for improving the quality of contouring, surface presentation and annotation styles, and the use of surfaces in analysis functions, such as slope and drainage assessment.

704 Stormwater Management Methods Using HydroCAD (Part 2)

Tom Seybert PE, PLS

This workshop will present methods in stormwater management design for quantity control. The 2-day workshop will highlight the use of HydroCAD* in the analysis and design methods. Participants are required to bring a Microsoft Windows-based laptop computer to the workshop and download a free 15-day trial version of HydroCAD* on the first day of the workshop. Prior to attending the workshop, participants will also be required to purchase a copy of the HydroCAD-10 Owner's Manual from HydroCAD Software Solutions, LCC, and bring it to the workshop. Participants should bring a hand calculator to complete some of the minor calculations. Paper copies of the notes will be helpful during workshop exercises, yet if participants work in groups of two, one group member can display the notes on their laptop (paperless) while the other can run the HydroCAD* model. In this case there would be no need for printed notes.

805 The Topographic Survey

Amy Hopkins PLS

The Surveyor will walk away with confidence in their ability to read and interpret contours. Field crew will develop a true understanding of how to collect data for a topographic survey from both the field and office aspects. What shots are needed, what are breaklines and how to shoot them. This session will give the party chief with little or no drafting experience a view from the draftsman's perspective and subsequently, office personnel will learn to interpret field data more efficiently to better direct field crews. What role does stormwater management features play in your survey? What contour interval should you use? What's an index contour? Learn how to read contours in order to check that your drafting software generated the surface correctly. "Garbage in, garbage out." Is that aerial or drone mapping supplied by a sub-consultant correct? Be confident in your ability to read and interpret contours and topography. This is not a drafting class and does not focus on any particular drafting software.

This session is geared toward Surveyors of any experience level, field personnel and office draftsman who want a better understanding of the field and office work that goes in to a topographic survey as well as survey managers who must review these types of surveys and products. This is not a drafting class.

Wednesday January 15, 2019 | 8:15 am – 11:45 am

105 Subdivision and Sale of Clean and Green/Property Boundary Surveys and Subdivision of Farmland Preservation Easements

D. Robert Davidson

Surveyors need to understand Clean & Green; ACT 319 and the implications of actions that result in a violation of the the Act. Failure to understand the regulations governing the transfer of property enrolled in Clean and Green, could result in the property owner owing significant roll-back penalties. This program will present information on the sale and subdivision of property enrolled in Clean and Green and how to avoid unexpected penalty costs. Consequences of an unintended violation could be significant and may be considered malpractice.

The Pennsylvania Agricultural Conservation Easement Purchase Program enables state and county governments to purchase conservation easements from farmers. The program relies upon criteria to determine if a boundary survey is required of the property subject to the easement. It also provides specific survey and plat requirements of properties that are required to be surveyed. Their are also very specific subdivision requirements. This program will discuss these survey requirements.

206 Subsurface Utility Engineering

Greg Finkle PE

Subsurface Utility Engineering (SUE) is rapidly being deployed on more and more construction projects and in some cases is now required by law for certain DOT jurisdictions. However, the who, what, when, where and why are still unknown by many stakeholders. This workshop is to help participants understand what SUE is, how it works, when it would be beneficial and how beneficial it can be from both a qualitative and quantitative approach.

305 Terrestrial Laser Scanning for Forensic Applications

Frank Derby PhD

Terrestrial laser scanning has become an effective process for acquiring data in many applications including surveying and mapping, engineering, historical preservation, archaeological investigations and forensics.

In forensic applications, data from the terrestrial laser scanner are used to present facts, visuals representations, and data to the court. This is more so in traffic accidents where the road must be cleared quickly to allow vehicular movement. The data can also be used to preserve evidence, especially in homicide, traffic, and other criminal matters where cases linger in the courts for long periods resulting in fading memories of witnesses. This workshop will address various factors to consider during terrestrial laser scanning operations for forensic purposes.

406 Survey Adjustments... Tips Tricks and Pitfalls with Carlson Software (Part 1)

Michael Hyman, Douglas Aaberg PLS

In this class we will highlight real world examples and recommendations of 'Tips-Tricks and Pitfalls' within the program for better quality mapmaking practices for the Land Surveying industry. The class will also review the updated and enhanced Carlson SurvNET Least Sq adjustment module within Carlson Survey featuring customer supplied project examples. We will also review lot definitions via Carlson's improved LotNet functionality with and without roadway definitions. GIS topics will also be reviewed and applied to the Land Surveying tools within Carlson. The topics discussed and shown within this class are derived from years of experience of using, training and supporting land surveying projects. This is a lecture type session with anticipation of robust Q&A, as time allows.

506 Surveying in 2025

Bill Beardslee PE, PLS, PP

From ancient times, through today's times to the future, surveying has been a key factor in the development of society. As surveyors absorb new technologies and procedures, they marvel at how rapidly things now change. But what will surveyors be doing in 2025 and beyond?

What will licensure look like? What will equipment look like? Will survey crews be real robots? How will the surveyor be interacting with and serving clients. This is a crystal ball look into everyone's imagination.

605 Training Surveyors with Virtual Reality

Dimitrios Bolkas PhD, Peng, Jeff Chiampi

Surveying engineering requires data collection with different techniques and instruments. Each project presents unique challenges, in terms of how to collect data in an efficient and timely manner, but also ensure that data accuracy satisfies project requirements. However, student training is often limited only on an area around the campus where each surveying program is situated. This reduces students' comprehension on how to use techniques and instruments in real applications; thus, making them unprepared for the job market. In addition, outdoor activities are weather dependent and canceling such activities due to inclement weather is common, which disrupts the educational process. This reduces the time students spend with surveying instruments; limiting their experience and skills with surveying practices and techniques. To address these unique challenges, we have developed surveying engineering laboratories in immersive virtual reality.

This workshop will present the creation and implementation of surveying engineering laboratories in virtual reality. We will discuss data collection using unmanned aerial systems and terrestrial laser scanners in order to create the virtual environment. We will present how laboratories are developed in virtual reality, including creation of relevant exercises, user control and interaction with surveying instruments and virtual environment. Finally, we will discuss the pedagogical contribution of virtual reality technology in surveying education.

705 Stormwater Management Methods Using HydroCAD (Part 3)

Tom Seybert PE, PLS

This workshop will present methods in stormwater management design for quantity control. The 2-day workshop will highlight the use of HydroCAD* in the analysis and design methods. Participants are required to bring a Microsoft Windows-based laptop computer to the workshop and download a free 15-day trial version of HydroCAD* on the first day of the workshop. Prior to attending the workshop, participants will also be required to purchase a copy of the HydroCAD-10 Owner's Manual from HydroCAD Software Solutions, LCC, and bring it to the workshop. Participants should bring a hand calculator to complete some of the minor calculations. Paper copies of the notes will be helpful during workshop exercises, yet if participants work in groups of two, one group member can display the notes on their laptop (paperless) while the other can run the HydroCAD* model. In this case there would be no need for printed notes.

806 CST Exam Level 1

Brent Birth PLS

Wednesday January 15, 2019 | 12:45 pm – 4:15 am

106 Dendrology & Forestry Ecology

Brent Birth PLS

207 Why Am I Getting Sued? How Can I Avoid Another Suit? What Happens Next?

Mark Amirault, Laura Malloy, Vince Costello

This course will examine real situations where a surveyor found themselves in situations where there was potential negligence, loss productivity, loss income, etc. During the session the attendees will learn about what caused the problem, how the problem was resolved, and how the problem could have been avoided. We will discuss insurance policies that will aid in the recovery, as well as lessons learned from these situations.

306 Laser Scanning – Which Problem Solving Solution is Right for You?

Kenneth Fronheiser PLS

This workshop is for professionals looking to enter the field of terrestrial laser scanning. We will discuss the different types of terrestrial laser scanners on the markets, field and office workflows, and what types of deliverables can be created from a terrestrial laser scanner.

407 Survey Adjustments... Tips Tricks and Pitfalls with Carlson Software (Part 2)

Michael Hyman, Douglas Aaberg PLS

In this class we will highlight real world examples and recommendations of 'Tips-Tricks and Pitfalls' within the program for better quality mapmaking practices for the Land Surveying industry. The class will also review the updated and enhanced Carlson SurvNET Least Sq adjustment module within Carlson Survey featuring customer supplied project examples. We will also review lot definitions via Carlson's improved

LotNet functionality with and without roadway definitions. GIS topics will also be reviewed and applied to the Land Surveying tools within Carlson. The topics discussed and shown within this class are derived from years of experience of using, training and supporting land surveying projects. This is a lecture type session with anticipation of robust Q&A, as time allows.

507 Forensic Surveying

Bruce Blair PLS

606 Computations in SPCS

Charles Ghilani PhD

This workshop will cover the underlying theory of map projections. It will demonstrate how to take field observations of direction and distance and reduce them to a mapping/grid surface. It will also demonstrate how to layout a ground distance that is determined from SPCS/grid coordinates. The workshop will show how a single project factor can be used to perform these computations in the field automatically in your data collector as well as how to determine when one project factor is sufficient to achieve SPCS coordinates from field observations and layout ground observations such as a surface horizontal distance from grid coordinate computations. Finally it will demonstrate how to compute SPCS coordinates when your control lies in more than one SPCS zone.

706 Stormwater Management Methods Using HydroCAD (Part 4)

Tom Seybert PE, PLS

This workshop will present methods in stormwater management design for quantity control. The 2-day workshop will highlight the use of HydroCAD* in the analysis and design methods. Participants are required to bring a Microsoft Windows-based laptop computer to the workshop and download a free 15-day trial version of HydroCAD* on the first day of the workshop. Prior to attending the workshop, participants will also be required to purchase a copy of the HydroCAD-10 Owner's Manual from HydroCAD Software Solutions, LCC, and bring it to the workshop. Participants should bring a hand calculator to complete some of the minor calculations. Paper copies of the notes will be helpful during workshop exercises, yet if participants work in groups of two, one group member can display the notes on their laptop (paperless) while the other can run the HydroCAD* model. In this case there would be no need for printed notes.

807 Digitally Capturing Ancient Italy

Matthew Bainbridge, Rick Celender RLA, CET, CPESC, CPSWQ, Mark Dietrick, Rob Sinclair

This interdisciplinary team of surveyors, engineers, designers, architects, scanning technicians, drone pilots, educators, and software experts will share their recent experiences working to digitally preserve historical sites in a small Italian town using technologies such as terrestrial LiDAR scanners, unmanned aerial systems, ground-penetrating radar, kinematic LiDAR, Matterport, 360° camera technology, and GNSS systems. Relevant software programs and workflows will also be discussed in regard to processing this data and tying it into survey control. The team will also cover online cloud platforms and migrating the data for use in augmented reality (AR) and virtual reality (VR).