



Breezy Point Conference Center
March 17-19, 2020

23rd Annual
SURVEY
TECHNICAL
WORKSHOP

Sponsored by the
Office of Land Management

Welcome to the 23rd Annual Survey Technical Workshop

March 17 – 19, 2020



**Sponsored by: The Office of Land Management
Minnesota Department of Transportation**

Director, Office of Land Management..... Joseph D. Pignato
Assistant Director, Survey & Mapping Peter Jenkins
Workshop/Training Coordinator..... Cheryl Hunstock

Workshop Planning Committee:

Nathan Anderson MnDOT (St. Paul)
Casey Crisp..... MnDOT (Metro)
Jeremy Erickson..... MnDOT (Detroit Lakes)
Jeremy Flatau MnDOT (Detroit Lakes)
Lance Frost Stonebrooke Engineering, Inc.
Joe Hamlin MnDOT (Metro)
Lisa Hanni Goodhue County
Melissa Holperin..... MnDOT (St. Paul)
Cheryl Hunstock..... MnDOT (St. Paul)
Peter Jenkins MnDOT (St. Paul)
Steve Jobe Wright County
Bud Jorgenson MnDOT (St. Paul)
Kyle Klasen WSB & Associates, Inc.
Richard Morey MnDOT (Retired)
James Schneider..... MnDOT (Metro)
Kevin Sutherland..... MnDOT (Duluth)

FROM THE WORKSHOP COMMITTEE

The Minnesota Department of Transportation welcomes you to the 2020 Survey Technical Workshop. This event marks the 23rd consecutive year that the Office of Land Management has sponsored this workshop and we are happy, and committed, to offering this training year after year. We want to acknowledge the contributions of our public and private sector partners who continue to help us make this workshop a success.

This workshop allows all interested parties the opportunity to review current practices, examine prospective trends, consider technical improvements and build relationships within the surveying community.

The workshop committee is comprised of county, private sector and MnDOT employees and has worked hard to compile session topics that are hopefully pertinent and interesting to those involved in survey operations throughout the State of Minnesota. The committee diligently reviewed last year's evaluation forms and made every attempt to improve the workshop based on the comments and suggestions made by the attendees. That being said, please remember to fill out the evaluation form in the packet of information you received when you registered. It is closely reviewed and helpful when planning future workshops. We encourage you to fill it out as you complete each session, that way it won't be such a daunting task to complete at the end of the workshop. Please feel free to contact anyone on the workshop committee with comments or suggestions regarding the workshop. The names of the committee members are on the first page of this booklet.

The workshop sessions have been arranged in both plenary and concurrent formats. Please take a few minutes to review the schedule, session descriptions, speaker biographies and vendor summaries in this booklet as they will assist you in determining what sessions you may like to attend to maximize your learning experience.

If during the workshop you want to take some time to speak more privately with a vendor in the display area in the Lakeside Dining Room, please do so. While we encourage attendance at all the sessions we realize this may be the best time for you to ask questions of the vendors.

For those of you submitting for Professional Development Hours with the *Board of Architecture, Engineering, Land Surveying, Landscaping Architecture, Geoscience and Interior Design*, please select those sessions that will meet your personal training needs and satisfy your defined licensing standard requirements. Workshop participants are responsible for submitting for Professional Development Hours with the Board.

We would like to thank the presenters for generously sharing their time and knowledge and for providing us all the opportunity to learn and ultimately improve the services we provide. Last, but not least, special thanks go to you, the participant. This workshop would not exist without your continued support and enthusiasm. We encourage your participation in each of the sessions. The evening will provide you with a more casual environment to consider and discuss the day's materials and sessions.

FOR YOUR INFORMATION:

In the packet you received at registration you will find:

- **Workshop Program** – This booklet contains the schedule, session descriptions and presenter and vendor biographies.
- **Quick Reference Guide** – This is for your convenience in finding sessions of interest.
- **Evaluation Form** – This form **MUST** be turned in at the end of the workshop. These evaluations are essential as we consider pertinent topics for future workshops. They also give us vital information about how certain topics were received and about the workshop presentations in general.
- **Name Tag** – Please wear the name tag you will find in the packet you received throughout the workshop. Not only do we want to know who you are, but your name tag will identify your company and/or place of employment. Please place your name tag in the box on the registration table at the end of the workshop.
- **Tuesday, March 17 Lunch Ticket** – If you have purchased Breezy Point Lodging Package or the Meeting/Meal Package, you will find the March 17 lunch ticket affixed in your workshop packet. This was done in an effort to avoid confusion at the first lunch of the workshop. The remainder of your meal tickets can be picked up at Breezy Point registration desk in the main lobby upon check-in. If you have purchased the meeting/meal package only, your tickets can also be picked up at Breezy Point registration desk.

***THANK YOU
FOR SUPPORTING
MnDOT'S 2020 SURVEY
TECHNICAL WORKSHOP***



2020 SURVEY TECHNICAL WORKSHOP SCHEDULE

TUESDAY, MARCH 17, 2020

WHITEBIRCH I & II			
9:00 AM	<i>WORKSHOP REGISTRATION</i>		
10:00 AM	WELCOME AND OPENING REMARKS Pete Jenkins, Assistant Director Office Of Land Management		
10:15 AM	LEWIS AND CLARK MAPPING Don Borcharding		
11:15 AM	THE GEOGRAPHICAL CENTER OF THE UNITED STATES AND NORTH AMERICA Jerry Penry		
12:15 PM	LUNCH IN MINNESOTA I & II		
	WHITEBIRCH I	WHITEBIRCH II	LAKESIDE RM.
1:15 PM	LASER SCANNING TECHNOLOGY IN FORENSICS Dustin Harr Hennepin County Crime Lab	STRINGLESS MILLING AND PAVING Dan Schellhammer Tom Abell Repeated 3/17 at 3:30pm	BASIC GEODESY AS IT RELATES TO SURVEYING Geoff Bitner
2:15 PM	CONSTRUCTION STAKING: BEST PRACTICES WHEN USING GNSS AND ROBOTIC TECHNOLOGY Steve Richter	2022 DATUM UPDATE David Zenk	TopoDOT DEMONSTRATION OF AUTOMATIC FEATURE EXTRACTION FROM POINT CLOUD Ted Knaak
3:15 PM	BREAK IN MINNESOTA I & II		
3:30 PM	STRINGLESS MILLING AND PAVING Dan Schellhammer Tom Abell Repeat	NEW COORDINATING SYSTEMS FOR 2022 & DEPRECIATION OF US SURVEY FOOT Geoff Bitner	FUTURE ADVANCES IN TOTAL STATION TECHNOLOGY Tim Kerr
4:30 PM	ADJOURN		
5:30 PM	DINNER IN MINNESOTA I & II		

VENDOR DEMONSTRATIONS

2020 SURVEY TECHNICAL WORKSHOP SCHEDULE

WEDNESDAY, MARCH 18, 2020

6:45 AM BREAKFAST IN MARINA DINING ROOM			
	WHITEBIRCH I	WHITEBIRCH II	LAKESIDE RM.
8:00 AM	CASE STUDY – AERIAL AND TRADITIONAL SURVEY WORKFLOWS TESTED Jay Haskamp	SURVEY STAKING: UPDATE OF 35W/CROSTOWN AND I-94 PROJECT Mike Sjodin <i>Repeated 3/18 at 2:15pm</i>	THE EVOLUTION OF THE SURVEY MONUMENT Jerry Penry
9:00 AM	SURVEYING SAFETY Doug Thies <i>Repeated 3/19 at 11:25</i>	HIGH ACCURACY DRONE SURVEYING Ladd Nelson Jeff Walsh <i>Repeated 3/19 at 8:00am</i>	AN HOUR ABOUT HOURS: THE LSIT EXPERIENCE Melissa Holperin Mark Lundquist Jordan Olson
10:00 AM BREAK IN MINNESOTA I & II			
10:25 AM	STRINGLESS (AMG) PAVING Jason Meihost <i>Repeat 3/19 at 1:15pm</i>	RESPONSIBILITIES FOR BOUNDARY EVIDENCE PERPETUATION ON CONSTRUCTION PROJECTS Sam Gibson	SURVEY MATH REFRESHER Sean Clark Dan Kvaal
11:25 AM	SURVEY HISTORY OF THE STATE LINE BETWEEN WI AND MN ALONG THE ST. LOUIS RIVER BOUNDARY, PT 1 Anthony Lueck	POINT CLOUDS CASE STUDY Colin Lee Adam Smith <i>Repeated on 3/18 at 3:30pm</i>	SURVEYING SAFETY Doug Thies REPEAT
12:15 PM LUNCH IN MINNESOTA I & II			
1:15 PM	SURVEY HISTORY OF THE STATE LINE BETWEEN WI AND MN ALONG THE ST. LOUIS RIVER BOUNDARY, PT 2 Anthony Lueck	MONITORING SOLUTIONS WITH TRIMBLE AND SENCIEVE Dustin Harr Wes Schneider Jesse Huff	STRINGLESS (AMG) PAVING Jason Meihost REPEAT
2:15 PM	PLSS SHORT CUT METHOD Pat Veraguth	ZIEGLER CONSTRUCTION TECHNOLOGY SYSTEM UPDATES AND EMERGING TRENDS Tom Abell Jim Linn	SURVEY STAKING: UPDATE OF 35W/CROSTOWN AND I-94 PROJECT Mike Sjodin REPEAT
3:15 PM BREAK IN MINNESOTA I & II			
3:30 PM	TRIMBLE DATA PREPARATION Dylan Jones	SHOW YOUR VALUE Scott Marlin	POINT CLOUDS CASE STUDY Colin Lee Adam Smith REPEAT
4:30 PM ADJOURN			
5:30 PM DINNER IN MINNESOTA I & II			

 VENDOR DEMONSTRATIONS



2020 SURVEY TECHNICAL WORKSHOP SCHEDULE

THURSDAY, MARCH 19, 2020

6:45 AM		BREAKFAST IN MARINA DINING ROOM		
	WHITEBIRCH I	WHITEBIRCH II	LAKESIDE RM.	
8:00 AM	HIGH ACCURACY DRONE SURVEYING Ladd Nelson Jeff Walsh	NGS UPDATE David Zenk	RIGHT OF WAY PLAT MODERNIZATION Geoff Bitner	
	REPEAT			
9:00 AM	HOW SURVEY WORK AND ARCHEOLOGY INTERSECT ALONG MN RIGHT OF WAYS Andrew Kurth	ETHICS PANEL DISCUSSION Mike Fangman David Meyers Rick Morey Dennis Pederson	INTERPRETING TOPOGRAPHIC AND ROADSIDE FEATURES FOR OPTIMAL SNOW FENCE PLACEMENT Dan Gullickson Trent Robbins	
10:00 AM		BREAK IN MINNESOTA I & II		
WHITEBIRCH I & II				
10:15 AM	WOODY PLANTS ON MINNESOTA'S NOXIOUS WEED LIST: 2020 CHANGES AND ADDITIONS David Hanson			
11:15 AM	3D VISUALIZATION TECHNOLOGY: ARE YOU ALL IN OR A NAYSAYER? Jeff Christiansen			
12:15 PM		ADJOURN		

 VENDOR DEMONSTRATIONS



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[Session Descriptions and Speaker Biographies](#)

WELCOME AND OPENING REMARKS

Joseph D. Pignato, P.E. – Director, MnDOT Office of Land Management

Joe Pignato is the Director of the Minnesota Department of Transportation's (MnDOT) Office of Land Management. In this position, he provides overall leadership to the Office of Land Management regarding technical engineering, land surveying, real estate guidance and administrative direction so that staff are trained and resources effectively utilized in support of MnDOT's mission. Joe has been with MnDOT since 1997 where he has worked in the areas of Consultant Services, Legislation, State Utility Engineer, Right of Way and Special Projects. Prior to working at MnDOT, Joe worked for a local Minnesota consulting firm for 10 years as a structural design engineer. He graduated from North Dakota State University with a degree in Civil Engineering.

Peter Jenkins, PLS, CFedS – Assistant Director, MnDOT Office of Land Management

Peter Jenkins is an Assistant Office Director and oversees the Surveying and Mapping Section in the Office of Land Management at the Minnesota Department of Transportation. He holds a Bachelor of Science Degree from Ferris State University and a Master of Science Degree from the University of Minnesota. After 13 years in the private sector Pete went to work for MnDOT in District 7, Mankato, serving as the District Surveyor and then as the Land Management Engineer. In 2004 he took the position of Photogrammetric Engineer in St. Paul and was promoted to his current position in 2016. He holds licenses in Minnesota and Wisconsin and is a Certified Federal Surveyor. He was also the MSPS Surveyor of the Year in 2014.

OPENING SESSIONS:

LEWIS AND CLARK MAPPING

Presented by **Don Borcharding**

Captain Clark will give you his brief resume, the start of the trip and explain how he surveyed and prepared his field notes, sketches and final mapping of the journey up the Missouri, down the Columbia River and Yellowstone River on their return trip.

Don Borcharding

Don Borcharding is a retired Professional Engineer and Surveyor previously licensed in Minnesota, Iowa and Wisconsin. He is a graduate of Iowa State University, retired President of Yaggy Colby Associates, Past President of the Minnesota Society of Professional Surveyors, Past Member of the Minnesota State Professional Licensure Board, and past adjunct professor at St. Cloud State University. He has received Professional Awards as both Minnesota Surveyor and Engineer of the Year.

THE GEOGRAPHICAL CENTER OF THE UNITED STATES AND NORTH AMERICA

Presented by **Jerry Penry**

When maps of the United States and North America became increasingly accurate, it was only natural for curious minds to wonder where the geographical centers should be located. Kansas became the early and logical location for the geographical center of the United States based upon visual appearance. Refinements in mapping and the methods used by competing government agencies were not always in agreement as to the exact location. The addition of Alaska and Hawaii as states complicated the situation when these land masses had to be considered and a shift was made to South Dakota. The geographical center of North America began in Minnesota, was changed to South Dakota and then to North Dakota. What initially began as curiosity, later evolved into potential commerce and tourism interests making the designations extremely important to many.

Jerry Penry – Lancaster County Engineering, NE,

Jerry has 35 years of experience in land surveying. He obtained a degree in surveying from Southeast Community College at Milford, Nebraska, in 1985. For the first 12 years of his career, he was employed by several private engineering firms in Lincoln. Jerry began working for Lancaster County Engineering in 1997 and currently manages the survey department where he balances time in both the office and field. The majority of his work is related to legal boundary surveying and section corner remonumentation. He has recovered hundreds of original government corner stones. Jerry has had over 50 professional articles published which are directly related to land surveying. He has also published seven books related to surveying, railroads and WWII history. He is a frequent speaker in a multi-state area and is head of both the Historical Committee and the Ethic and Standards Committee for the Professional Surveyors Association of Nebraska. Jerry lives in Lincoln and is a licensed land surveyor in Nebraska and South Dakota.

The workshop sessions that follow are listed in this program in alphabetical order for quick reference

2022 DATUM UPDATE

Presented by **David Zenk**

During this session there will be an overview of the reasons for new datums and implications for State Plane Coordinates and for coordinate conversions.

David Zenk – National Geodetic Survey

David Zenk is a Geodesist with the National Geodetic Survey, serving as Regional Geodetic Advisor for the Northern Plains Region (MN, ND, SD, IA, NE). He holds Bachelor of Science Degrees in Civil Engineering and Mechanical Engineering from the University of Minnesota and a Master's Degree in Land Surveying from Oregon State University. Dave has served as adjunct faculty at the University of Minnesota Geography Department and at Saint Cloud State University Geography Department. He is a past Chair of the Minnesota GIS/LIS Consortium and is currently serving as Editor of the MSPS "Minnesota Surveyor" magazine. Dave is licensed as a Registered Land Surveyor and Professional Engineer in the State of Minnesota.

3D VISUALIZATION TECHNOLOGY: ARE YOU ALL IN OR A NAYSAYER?

Presented by **Jeff Christiansen**

Visualization technology has hit some rather interesting milestones in the past year. Through creativity and computational horsepower, 3D visualizations are unlike anything we have seen before. Yesterday's cutting-edge technology is tomorrow's yawn, but what about today and how can the technology be leveraged. 3D mesh derived from drone-acquired photography? A discussion on how photographically acquired asset models will revolutionize the survey industry, while bringing along the kicking and screaming naysayers. Being out in front of the cutting-edge wave has its advantages, but can also bring a bit of peril, as well. Methodical review of best practices, when sometimes they don't even exist, can lead to wasted development time. Be prepared for ROI's being impacted but embrace the change otherwise you'll be dead last. Visualized flights through entire corridors on a predetermined flight path are just as informational, but now include more design and environmental details within the model that weren't previously included due to hardware and software limitations. Finally, through several real time examples, many aspects of alternative designs (geometrical design differences, pavements types, to survey data limitations) and aesthetics (texture, color and context sensitive designs), can all be shown within the same real time experience.

Jeff Christiansen, Principal – WSB & Associates, Inc.

Jeff is the visualization manager with more than 24 years of experience, having completed many disparate types of visualization projects, including over 400 miles of roadway corridors with design elements that include five-level interchanges, bridge aesthetics and complex roundabouts. He is an experienced project manager in the development and final production of frame-by-frame, real time and AR/VR visualizations for municipal, state and federal projects. His ability to understand complex engineering schematics from transportation, architectural, land planning and manufacturing affords him a unique perspective to engage and educate stakeholders through his 3D visualizations.

AN HOUR ABOUT HOURS: THE LSIT EXPERIENCE

Presented by **Melissa Holperin, Mark Lundquist and Jordan Olson**

Are you thinking about becoming a licensed surveyor in the future and are wondering what you are getting yourself into? Or maybe you already are an LSIT (Land Surveyor in Training) and just want to know how the experience is going for others. If this sounds like you, come hang out with us for an hour while we have a conversation about the licensing journey. This will be an open and honest discussion which means no topic or question is off limits, so you know it's going to be interesting.

Melissa Holperin – Minnesota Department of Transportation

Melissa Holperin graduated from Ferris State University in Big Rapids, Michigan with a Bachelor of Science Degree in Surveying Engineering in 2013. She then worked in the private sector for 3 years, before joining MnDOT in 2017 through its graduate program. Since completing the program in 2019, she has been working as a LSIT (Land Surveyor in Training) in the Platting Department of the Metro District Right of Way office in Roseville. Melissa is currently the President of the Capitol Area Land Surveyors Association (CALSA) and a member of the Minnesota Society of Professional Surveyors (MSPS) and its Young Professionals Committee.

Mark Lundquist – Minnesota Department of Transportation

Mark graduated from the University of Minnesota in 2004 with a Bachelor of Science Degree in Civil Engineering and has taken land surveying classes at St. Cloud State University. He is currently an LSIT and working towards becoming a registered land surveyor. He worked for Westwood Professional Services from 2004 to 2008 as an instrument person and then a crew chief. In 2009, he was hired at MnDOT as a Transportation Generalist Senior on a survey crew at Oakdale Surveys. In 2013 Mark transferred to Metro Right of Way as a Transportation Specialist and worked there as a drafting technician until 2016. Currently he is an Engineering Specialist writing legal descriptions for MnDOT at Central Office in St. Paul.

Jordan Olson – Minnesota Department of Transportation

Jordan Olson works in the MnDOT Metro District Surveys office. He has surveying experience in the private sector, the Public Works Department for the city and county of Denver, CO and has been with MnDOT since 2017. He completed two years of rotations with the MnDOT Graduate Engineer and Land Surveyor program. Jordan graduated from St. Cloud State University with a Bachelor of Science Degree in Land Surveying and Mapping Science. He has recently become licensed as a Land Surveyor in Minnesota.

BASIC GEODESY AS IT RELATES TO SURVEYING

Presented by **Geoff Bitner**

This session will be a new approach to an old topic by reverse engineering from a GPS derived coordinate to the fundamental components of geodesy needed to compute a position. This high level overview will introduce the elements of geodesy and relate them to everyday practice.

Geoff Bitner – Minnesota Department of Transportation

Mr. Bitner is a licensed Land Surveyor with the Minnesota Department of Transportation's Office of Land Management. He joined MnDOT in 1998 as a Survey Technician and has been with the Office of Land Management since 2007. In the last thirteen years he has held positions in Right of Way Mapping, Geodetics and Platting. Geoff holds a Bachelor of Science Degree from Salisbury University and a Master of Science Degree from the University of Minnesota.

CASE STUDY – AERIAL AND TRADITIONAL SURVEY WORKFLOWS TESTED

Presented by **Jay Haskamp**

In this session we will go through the results of different measurement technologies used for surveying, including traditional methods, Static scanning, Mobile scanning and Aerial Lidar. With the advent of some of these new methods of capturing Topographic Survey Data, especially Aerial Photogrammetry and Lidar, we wanted to test the Pros and Cons of each. We will discuss the methods used today as well as discuss some of the accuracies we found when employing these different methods of surveying.

Jay Haskamp – Frontier Precision, Inc.

Jay Haskamp is a Trimble Certified Trainer and the Geospatial Technical Team Manager for Frontier Precision, Inc. He has been involved with Surveying and Engineering since 2002 and has served just about every role both in the field and the office. Jay joined Frontier

Precision in 2008 and currently leads their team of Certified Trainers, Support Staff and Services Personnel. He is a Certified UAS Remote Pilot, and has had the opportunity to work with, and train Geospatial Professionals throughout the Upper Midwest, the Rocky Mountain and Southeastern regions, Alaska and Mexico.

CONSTRUCTION STAKING – BEST PRACTICES WHEN USING GNSS AND ROBOTIC TECHNOLOGY

Presented by **Steve Richter**

When it comes to construction staking we often get a lot of questions around what staking tool to use and when. When using Trimble Access, there are some helpful tools to make this decision easier and more streamlined. This includes proper survey style setup, integrated survey and road staking tips and tricks. We will also focus on best practices when it comes to what tool to use and when on a staking project.

Steve Richter – Frontier Precision, Inc.

Mr. Richter is the Vice President of Sales for Frontier Precision, Inc. A charter member of the Trimble MGIS Hall of Fame and Trimble Certified Trainer, Mr. Richter started his career in the surveying profession back in 1989, working with CAD products and services while he attended college. Getting into GPS technology in 1991, he has spent the last 28 years specializing in that discipline. With the past 16 years focusing on training and support, Steve has been able to provide certified training to Engineering, Surveying and MGIS professionals throughout the Upper Midwest as well as provide technology driven lectures on GPS and Surveying. He currently resides in Minnesota working out of the Maple Grove office for Frontier Precision.

ETHICS PANEL DISCUSSION

Presented by **Mike Fangman, David Meyers, Rick Morey and Dennis Pederson**

During this presentation, Mike Fangman, David Meyers, Rick Morey and Dennis Pederson will present a Surveyor's Ethics Panel where they will discuss real life cases of ethical dilemmas and give real world examples on how to handle them. Please bring your questions to this interactive session.

Mike Fangman – Rice County Surveyor

Mike gained exposure to the land surveying profession while working seasonally for his parents business during his formative years. He received a Bachelor Degree in Studio Art from Winona State University in 2001 and later decided to attend St. Cloud State University and pursue a career in land surveying. Mike received his license to practice land surveying in Minnesota in 2010. He is currently employed full-time as the Rice County Surveyor in Faribault Minnesota. His duties include the perpetuation of the Public Land Survey, advising multiple departments and contributing to the county's enterprise GIS. Over the past 12 months, Mike has had the opportunity to develop his skills within ArcMap and the parcel fabric. He enjoys helping county staff and members of the public on a daily basis.

David Meyers – Rinke Noonan Attorneys at Law

David Meyers is a shareholder with Rinke Noonan Attorneys at Law. He focuses his practice in real estate matters and is a certified Real Property Law Specialist. David is the Examiner of Titles for six counties and the Deputy Examiner for several others. In 2019 David was elected as a Fellow to the American College of Real Estate Lawyers.

Richard Morey – CST Coordinator for Minnesota

Richard Morey retired after 36 years with MnDOT where he started as a Highway Technician on a construction survey crew. While at MnDOT Rick served as a Survey Crew Chief, District Surveyor and Assistant Director in charge of the Office of Land Management Surveying and Mapping Section. Rick is a member of MSPS, MACS and CALSA, being selected as the 2009 Surveyor of the Year. He holds a Masters of Geographic Information Science from the University of Minnesota where he has served as an adjunct professor. Rick is currently the state CST Coordinator for Minnesota.

Dennis Pederson – Bogart Pederson & Associates, Inc.

Dennis D. Pederson, L.S. served as a principal of Bogart Pederson & Associates, Inc. (BPA) in Becker, Minnesota from 1997 until 2015. BPA serves a variety of land surveying, civil engineering and mapping clients in both the public and private sectors. Now, as a Senior Land Surveyor for BPA, he focuses on legal matters, title surveys and finding elusive files.

A graduate of the University of Minnesota, Morris in 1969 with a B.A. in Biology, Dennis intended to teach high school Biology. However, he was drafted and graduated from the U.S. Army Engineer School in Topographic Surveying in the spring of 1971. Prior to 1997, he worked for John Oliver & Associates in Elk River for 24 years and received his Land Surveyor's license in 1983. He has served as part time Mille Lacs County surveyor from 2003 to 2007 and is an affiliate member of the Minnesota Association of County Surveyors. A current member of MSPS Chapter 5 and NSPS, Dennis has also served as Secretary of the Board of Directors and chair of the Education Committee.

Dennis partnered with Attorney David Meyers as co-instructors for the Boundary Law class at St. Cloud State University from 2008 until 2012, continuing as the sole instructor until 2020. He sits on the Industry Advisory Committee of St. Cloud State University and also served on the LSCE Advisory Committee of St. Cloud Technical and Community College until 2020. Dennis' specialties are complex retracement surveys, section corner restoration and the Boundary Commission.

FUTURE ADVANCES IN TOTAL STATION TECHNOLOGY

Presented by **Tim Kerr**

This presentation looks at technological trends in the Geospatial industry and their impact on Total Station technology. These advances are the key to simplifying the complexity of the survey operation, enhanced productivity through automation and the ability to optimize the usage of data through greater connectivity. Current examples of these capabilities provide insight as to what may be just around the corner.

Tim Kerr, Senior Support Engineer – Geomatics, Leica Geosystems Inc.

Tim Kerr has been directly involved in the surveying and mapping industry since 1970. He was awarded a Bachelor of Science Degree in Surveying from Ferris State University in 1981 and a Master of Science Degree in Geodesy from Purdue University in 1984. Tim's career with Leica Geosystems Inc. (Wild Heerbrugg Instruments at the time) began in February of 1985. During his time with the company he has served in many roles which partially include support, training, sales, and product development. He took leave from the company from 1993 until 2001 and served as one of the principals of a company providing training and project management services for users of modern surveying technologies.

HIGH-ACCURACY DRONE SURVEYING

Presented by **Ladd Nelson and Jeff Walsh**

During this session, Jeff Walsh will share his background and experiences with the commercial use of drones in Surveying and Engineering applications. He will show examples of recent projects completed using drones and cover best practices for getting the highest accuracy possible with drone photogrammetry, which is 0.06 ft. vertical at 2-sigma (or 95% error estimate). Then Ladd Nelson will present on how Carlson Software can be utilized with very accurate drone-derived point clouds.

Ladd Nelson - Ladd Nelson – Carlson Software, Inc.

Mr. Nelson joined Carlson Software in 2007 and is the Director of Midwest Sales for Carlson Software. He has been serving the Land Surveying and Civil Engineering markets since 1991 and has technical experience covering product development and design, sales, technical support along with product implementation and training. Mr. Nelson's interest in computers and his Civil Engineering Degree from the University of Wisconsin-Platteville gave him the opportunity to pursue a career in software development for land surveyors and civil engineers. For over twenty five years, Ladd has been providing his clients with technical support and on-site training. His background also includes land survey experience and he is working to build a strong dealer/client base in the upper Midwest portion of the United States. Ladd is based near Dubuque, IA, and can be reached directly by phone at 563-583-8552 or by email at lnelson@carlsonsw.com.

Ladd has previously been an Officer and Board member for the IntelliCAD Technology Consortium (www.intellicad.org) and currently serves on the Board of Directors of the Open Design Alliance (www.opendesign.com), a non-profit organization comprised of member companies who are committed to open industry-standard formats for the exchange of CAD data and to the maintenance of valuable data stored by design systems.

Jeffrey J. Walsh – Whirrx

Before co-founding Whirrx LLC in 2018 and serving as its CTO, Jeff has spent the previous 20 years working on many diverse GIS and Remote Sensing projects. Currently, Jeff has flown hundreds of drone surveys in 9 different states across the U.S. Regarding sUAS technology, Jeff is primarily focused on building turn-key surveying systems and providing processing services capable of attaining design-grade vertical accuracy. Jeff has a Professional Master's Degree in GIS & Remote Sensing from the University of Minnesota, is an ASPRS Certified Photogrammetrist, a GISP and a Private Pilot.

HOW SURVEY WORK AND ARCHEOLOGY INTERSECT ALONG MN RIGHT OF WAYS

Presented by **Andrew Kurth**

MnDOT's Cultural Resources Unit (CRU) balances the state's transportation needs with historic preservation. This presentation provides an overview of why MnDOT maintains a staff of professional archaeologists and historians and how they work to help MnDOT achieve its mission. This session will provide an overview of relevant state and federal laws, what types of historic properties might be present within MnDOT's right of way and describe how surveyors and survey technicians can assist CRU in identifying and maintaining some of Minnesota's most threatened cultural resources.

Andrew Kurth – Minnesota Department of Transportation, Office of Environmental Stewardship

Andrew Kurth is an Archaeologist with the Minnesota Department of Transportation's Office of Environmental Stewardship, Cultural Resources Unit. He has been with MnDOT since 2017. Andrew has experience working at the state and federal level in both the private and public sector in the fields of cultural resources, land management and GIS. He holds a M.S. in Cultural Resources Management from State Cloud State University and a B.A. in Anthropology from the University of Minnesota Duluth.

INTERPRETING TOPOGRAPHIC AND ROADSIDE FEATURES FOR OPTIMAL SNOW FENCE PLACEMENT

Presented by **Dan Gullickson and Trent Robbins**

This session will illustrate the important role survey data plays with determining proper snow fence alignment, height, and porosity for achieving drift free roads. MnDOT's Blowing Snow Control Shared Service presenters Dan Gullickson-Supervisor, and Trent Robbins, the South Region Blowing Snow Control Designer, will share examples of projects they have worked on and the role surveyors play in helping design drift free roads.

Dan Gullickson – Minnesota Dept. of Transportation, Office of Environmental Stewardship

Dan Gullickson is a University of Minnesota Forestry Program graduate with over 30 years of experience working with public and private landowners installing windbreaks, shelterbelts and snow fences to better manage blowing and drifting snow. He chaired Minnesota's Interagency Living Snow Fence Task Force that received the US Department of Transportation Design Merit Award for the publication, Catching the Snow with Living Snow Fences. Dan has served on 7 research projects with the University of Minnesota to better understand Minnesota's winter climate, benefit costs and the social science surrounding blowing snow. Dan is the Blowing Snow Control Shared Services Supervisor with the Minnesota Department of Transportation.

Trent Robbins – Minnesota Dept. of Transportation, Office of Environmental Stewardship

Trent Robbins is a South Dakota State University History Program graduate with about 20 years of Land Management experience. He has worked in both the private and public sector as a Survey Crew Chief. Since coming to work for the Minnesota Department of Transportation in 2010, Trent has held positions in the Right-Of-Way, Surveys and Design functional groups. Currently, he is the Blowing Snow Control Designer for Southern Minnesota.

LASER SCANNING TECHNOLOGY IN FORENSIC

Presented by **Dustin Harr and the Hennepin County Crime Lab**

Join us in the session as we give an overview of the latest Trimble Scanning technologies and how they are being used in a Forensic Environment. Trimble and Hennepin County Crime lab will give examples of its uses and benefits.

Dustin Harr – Frontier Precision, Inc.

Mr. Harr has been with the Frontier Precision team for over 18 years. He resides in the Maple Grove location and covers the southern part of Minnesota and the Minneapolis area

for Geospatial survey solutions. He enjoys immersing himself in the technology world to keep up to date on the latest information and trends that he can share with others.

MONITORING SOLUTIONS WITH TRIMBLE AND SENCIEVE

Presented by **Dustin Harr** (*Biographical Reference: Laser Scanning Technology in Forensics*), **Jesse Huss and Weston Schneider**

In this session we will go over different solutions for automated monitoring being used on projects. We will discuss the difference between campaign and real-time monitoring as well as go into some of the different ways to use Trimble Access, Trimble 4D Control and Sencieve monitoring sensors. We will also show reports and some more advanced functionality for those critical projects. Trimble Monitoring specialists will be on site to answer questions and give examples.

Jesse Huff – Trimble Inc.

Jesse Huff has a background in Land Surveying with over 25 years of hands-on experience. Having worked in a large variety of capacities on projects ranging from boundary determination to complex highway projects and multi-billion dollar oil and gas projects, Jesse is intimately familiar with all aspects of project execution. He is former Associate Member of the National Society of Professional Surveyors (NSPS), a current member of the Australian Surveying and Spatial Sciences Institute (SSSI) and maintains active participation in various industry associations. Jesse served as Vice President for a multinational consulting firm based out of Western Australia prior to officially joining Trimble Inc. in 2017. His current role is managing the Monitoring program for Trimble worldwide.

Weston Schneider – Frontier Precision, Inc.

Weston Schneider is the Northern Minnesota Geospatial Consultant for Frontier Precision out of the St Cloud office. He has been with Frontier Precision since 1994 and covering the Geospatial industry since 2001. Weston has provided field training for the GPS, Robotics and Imagery products.

NEW COORDINATING SYSTEMS FOR 2022 & DEPRECIATION OF US SURVEY FOOT

Presented by **Geoff Bitner** (*Biographical Reference: Basic Geodesy as it Relates to Surveying*)

Learn about the Minnesota Department of Transportation's efforts to modernize the State Plane and County Coordinate Systems in preparation for the new reference frame to be released in 2022. This presentation will provide a brief history about coordinate systems in the state and discuss MnDOT's efforts to prepare our coordinate systems for the future.

NGS UPDATE

Presented by **David Zenk** (*Biography Reference: 2022 Datum Update*)

During this session you will hear about progress on GEOID18 and NGS coordinate conversion tools - NCAT, VERTCON, VDATUM. and NGS DSWorld datasheet tool.

PLSS SHORT CUT METHOD

Presented by **Pat Veraguth**

The PUBLIC LAND SURVEY SYSTEM (PLSS) was surveyed by GLO Surveyors that were paid by the mile. Some of the original Surveyors took short cuts. We will look at one particular shortcut method that has been well documented and what to look for when looking for these short cuts.

Patrick D. Veraguth – Douglas County

Pat has been in the Surveying industry for 26 years, 20 years for Winona County and six years currently with Douglas County. Pat is very passionate about Remonumentation. He has dug and established hundreds, if not thousands, of corners in his survey career. As chair of the MACS PLSS committee, he is working on finding an avenue to remonument all the Section corners in the state at the correct location.

POINT CLOUDS CASE STUDY

Presented by **Colin Lee and Adam Smith**

TH 67 in Upper Sioux Agency State Park is currently closed due to road and slope failure. MnDOT's Photogrammetric Unit flew and mapped the area in spring 2019 using their drone and hired a consultant to collect airborne LiDAR of the area in fall 2019. Hear about this interesting project and how these technologies were used.

Colin Lee – Minnesota Department of Transportation

Colin Lee is a Certified Photogrammetrist and remote sensing Project Manager at the Minnesota Department of Transportation. He received his undergraduate degree in geography from the University of Minnesota, Twin Cities. In his 13 years with MnDOT he has worked with various types of remotely sensed data. Colin is a FAA Certified Remote Pilot.

Adam Smith – Minnesota Department of Transportation

Adam Smith is a supervisor in the Minnesota Department of Transportation's Photogrammetric Unit. He has been working in the field of surveying and mapping for over 20 years. Areas of expertise include project management, creating geospatial products from imagery and point clouds, sUAS operations, and research and development. Adam received a Bachelor of Science Degree in Conservation with a minor in GIS from the University of Wisconsin at River Falls and a Master of Science Degree in Infrastructure Systems Engineering from the University of Minnesota. He holds certifications as an ASPRS Certified Photogrammetrist, GISP and FAA Certified Remote Pilot.

RESPONSIBILITIES FOR BOUNDARY EVIDENCE PERPETUATION ON CONSTRUCTION PROJECTS

Presented by **Sam Gibson**

The obligation to preserve PLSS monuments and other direct evidence of boundary location on highway projects is clearly charged in State Statute and Policies to the road authority. However, the application of these requirements is subjected to diverse interpretation by various entities. Further confusion is often introduced through the devolution of responsibilities presented by the use of a variety consultants, contractors and subcontractors on many projects.

This presentation will review the statute and policy requirements for preservation of boundary evidence. The presenter will use examples from his own experience to illustrate concepts and situations that may require special attention.

Sam Gibson – County Surveyor, Washington County, MN

Sam Gibson PLS, received his initial instruction in surveying at the Inter-Service Engineering School at Fort Leonard Wood, Missouri. He received an Associate's Degree in Construction Technology from the Community College of the Air Force and his Bachelor's Degree from University of Northern Iowa.

He has held a variety of surveying positions in Iowa and Minnesota in both the private and public sectors. He was licensed as a Land Surveyor in the State of Minnesota in 2006, He spent 12 years as Chief Surveyor for the City of Saint Paul leading the St Paul Public Works, Survey and GIS Division from 2016 to 2019. Sam is an adjunct instructor in Land Surveying for Dakota County Technical College and was appointed as Washington County Surveyor in October 2019.

RIGHT OF WAY PLAT MODERNIZATION

Presented by **Geoff Bitner** (*Biographical Reference: Basic Geodesy as it Relates to Surveying*)

MnDOT is in the process of modernizing the appearance of the right of way plat. Learn about the changes being made and how to interpret or use the document. Additional time will be given to demonstrate how you can access various MnDOT records from online sources as well as their significance in determining the highway boundary.

SHOW YOUR VALUE

Presented by **Scott Marlin**

Demonstrating our value as land surveying professionals to our organizations is one of the most important things we must do for personal and professional growth. This session will walk through a report to the Morrison County Board that describes how adding integrated land surveying services has made major changes in a few short months. Adding value to your organization through leadership in every technical and professional role is key. Come explore ways to define your value!

Scott Marlin – Community Land Solutions, Inc. and Morrison County Surveyor.

Scott Marlin is the owner of Community Land Solutions, Inc. in Sauk Rapids, MN. He has 20 years of experience working in local government. Scott's experiences include time with county and municipal government, regional development commissions and conservation agencies. In addition to providing commercial and residential land surveying services, Scott is currently serving as the Morrison County Surveyor.

STRINGLESS MILLING AND PAVING

Presented by **Tom Abell and Dan Schellhammer**

Mastering the science of Stringless Milling and Paving is the next step in the process to fully automated machine control on projects. This session will provide an update on current AMG technology, highlights from the use of 3D milling technology on a MnDOT project on I-90 during the 2019 construction season and lessons learned from a contractor implementing the technology for the first time.

Tom Abell – General Manager, Ziegler CAT / SITECH Northland

For the last eight years, Tom has have been involved in construction technology at Ziegler and SITECH Northland. After working in software and hardware specialist roles, he is now the General Manager of SITECH Northland.

Dan Schellhammer – Midstate Reclamation & Trucking

Dan Schellhammer is the President of Midstate Reclamation and Trucking. He is a graduate of the University of Minnesota with a Degree in Civil Engineering and is a Professional Engineer registered in the state of Minnesota. Dan is a Cold Planning Committee Member for the Asphalt Recycling and Reclaiming Association and is a member of MnDOT's Sustainable Transportation Advisory Council.

STRINGLESS (AMG) PAVING

Presented by **Jason Meihost**

During this session there will be an overview of stringless paving. We will delve into the process and how to actually get started. You will learn what is needed from construction surveys.

Jason Meihost – Croell Inc.

Jason has been paving with Croell, formerly CFI, since 2003. During that time he operated a paver for 3 years and paved roughly 150 miles, most of it strangles. Croell began with stringless paving in 2011 by purchasing one complete setup. Over 400 miles of stringless paving was done at that time. Now, we have enough to run four machines simultaneously and haven't used stringline since 2016. In 2017 Jason became Croell's Paving Technology Manager.

SURVEY HISTORY OF THE STATE LINE BETWEEN WI AND MN ALONG THE ST. LOUIS RIVER BOUNDARY, PT. 1

Presented by **Anthony Lueck**

This session is Part 1 of a 2 Part presentation. During Part 1 the following will be addressed: a) the 1852 State Line survey along the St. Louis River between the State of WI and Territory of MN. Progression of the General Land Office Surveys between MN & WI along the St. Louis River, b) the U.S. Lake Survey 1861 Meade Map of the St. Louis River and Corps of Engineers 1895 era Harbor Triangulation survey connection with the St. Louis River boundary and c) the 1916 U.S. Supreme Court accepts a complaint between MN and WI to determine a State Line Boundary along the St. Louis River. We will look at the 1917 testimony in City of Duluth, MN. and Superior, WI.

Anthony Lueck – North Country Land Surveying

Anthony Lueck is a Licensed Land Surveyor in Minnesota and Wisconsin. His surveying experience includes ten years as an Engineering Technician with the U.S. Forest Service Engineering Department in Ely, Minnesota. Eleven years as a Survey Technician with the St. Louis County Surveyor's Office in Duluth, Minnesota. For eight years, Anthony was a Land Surveyor with Krech, Ojard & Associates Consulting Engineers and ten years self-employed as a Land Surveyor at North Country Land Surveyor, Inc. located in Duluth, Minnesota.

SURVEY HISTORY OF THE STATE LINE BETWEEN WI AND MN ALONG THE ST. LOUIS RIVER BOUNDARY, PT. 2

Presented by **Anthony Lueck** (*Biographical Reference: Survey History of the State Line Between WI and MN Along the St. Louis River Boundary, Pt. 1*)

During Part 2 of this presentation, the following will be addressed: a) the October Term, 1919 of U.S. Supreme Court hearings of the State Line boundary. March, 1920 U.S. Supreme Court decree for a State Line boundary along the St. Louis River between Minnesota and Wisconsin, b) the appointed 1921 U.S. Boundary Survey Commission report on the State Line between MN and WI based on the U.S. Supreme Court decree. Procedures of the field survey to follow the Court directives, c) the 2017 field Retracement Survey of the 1921 Boundary Survey between MN and WI: the location and condition of 1921 State Line reference monuments. What monuments are in place today? d) a review of the State Line Legal Description and Boundary Commission Map Exhibit No. 2 along the St. Louis River. Discussion of the State Line survey. Is there still a boundary issue along the St. Louis River?

SURVEY MATH REFESHER

Presented by **Sean Clark and Dan Kvaal**

This session will cover various surveying and engineering related math topics, including but limited to, vertical and horizontal curves, PLSS considerations and other relevant calculations. This session is meant to be a math refresher for technicians.

Sean Clark, PE, St. Cloud Technical & Community College

Sean Clark is a Registered Professional Engineer in Minnesota with 20 years of consulting engineering experience designing infrastructure construction plans, writing specifications, project management, construction observation, and surveying. Sean is in his sixth year as an Instructor at the St. Cloud Technical & Community College in the Land Surveying/Civil Engineering technology program. Mr. Clark has a Bachelor's Degree in Civil Engineering and a Master's Degree in Infrastructure Systems Engineering (Civil), both from the University of Minnesota. In addition, he has a Secondary Mathematics teaching certificate from the College of St. Scholastica.

Dan Kvaal, LSIT, St. Cloud Technical & Community College

Dan Kvaal is a Land Surveyor in Training with 12 years of surveying/engineering related experience with both public and private organizations. He is in his fifth year as an Instructor at the St. Cloud Technical & Community College in the Land Surveying/Civil Engineering technology program. Dan has an Associates Degree and Bachelor's Degree in Land Surveying/Mapping sciences and is currently concluding a Master's Degree in Business Administration (MBA) from St. Cloud State University.

SURVEY SAFETY

Presented by **Doug Thies**

This session will include a presentation on basic field safety and Personal Protective Equipment (PPE). The presentation will also contain current MnDOT safety information including, safety culture Improvement, RED BOOK (Pre-task planning) and safety metrics. Please come with any questions that Doug may be able to address with regard to safety in the field.

Doug Thies – Minnesota Department of Transportation

Doug Thies is a District Safety Administrator with the MnDOT Metro District for the past 16 years, where he is responsible for safety & health issues relating to highway construction and maintenance. Prior to MnDOT he worked 18 years in the safety/risk management field working for a number of fortune 500 companies. In addition to his duties with MnDOT he has run a parallel career in the fire service serving as a firefighter/EMT with the Eden Prairie Fire Department for 19 years. He is a faculty instructor with Minnesota State Colleges & Universities where he teaches fire, rescue, EMS and Safety courses. He has served on a number of boards and commissions. Doug is the Vice-Chairman of the MN Emergency Response Commission, a position he was appointed to by the Governor.

SURVEY STAKING: UPDATE OF 35W/CROSSTOWN & 1-94

Presented by **Mike Sjodin**

In this session there will be a review of general statistics and an update on the 35W Downtown to Crosstown project. In addition, we will touch on costs of the projects and current payments made thus far and the 35W & Lake St. Transit Station. We will also cover the 6-45'W x 90'D storm water holding tanks project that starts up this season along with a monitoring system with two permanent total stations for monitoring any movement during construction of holding tanks.

Mike Sjodin – Minnesota Department of Transportation

Mike Sjodin graduated from the University of Wisconsin with a Bachelor's Degree in Geography with a minor in GIS/Cartography. He started working for the State of Minnesota in 2000 as a student worker for MnDOT's Geodetic Unit at Central Office. Mike was hired on a full time basis with East Metro Surveys in 2002 as a survey tech/rod man. He is now the Construction Survey Manager for the West Metro Survey Office where he oversees all construction projects in the west metro. As a survey crew chief Mike has worked on several projects from Unweave the Weave, 494 Unbonded Overlay, 280 & Larpender Bridge, 694 & Snelling, 35E Unbonded Overlay, 35E MnPass and too many smaller projects to count. Mike's last project was working on as a crew chief was the 35W Downtown to Crosstown and 94 project.

THE EVOLUTION OF THE SURVEY MONUMENT

Presented by **Jerry Penry** (*Biographical Reference: The Geographical Center of the United States and North America*)

The culmination of the surveyor's work is the placement of a monument to mark the location of the boundaries upon the ground. Unfortunately, the importance of placing a lasting monument was often overlooked due to it being a burden to transport and prohibitive in cost. For most of the early surveys, the General Land Office left it up to the contract surveyor to furnish the monuments. Most were pits and mounds, wooden stakes or marked field stones. Many conscientious surveyors who wanted to make a lasting impression of their work, began developing ideas for iron or other permanent monuments. A variety of patents began to be issued with a wide diversity of different and unique designs. The monument remains important today and technology is keeping pace to ensure the corner locations are adequately marked.

TopoDOT DEMONSTRATION OF AUTOMATIC FEATURE EXTRACTION FROM POINT CLOUD DATA

Presented by **Ted Knaak**

The latest technical developments in point cloud processing have resulted in dramatic increases in feature extraction productivity. TopoDOT has dramatically automated breakline extraction tools such that little to no manual adjustment is required—all while maintaining the highest in quality and accuracy standards. In addition, new analysis tools automatically analyze and document information such as volume, clearance, utility pole, pavement distress, road surface and curve geometry and many more all with little to no requirements for model and/or feature extraction.

Ted Knaak - President of TopoDOT

Ted Knaak is President of TopoDOT LLC, a company dedicated to increasing the value proposition of point cloud project data. TopoDOT® software offers a comprehensive solution to data management, data quality assessment and extraction of high quality topographies, assets, 3D models and analyses from point cloud project data. He has over twenty five years of experience in the LiDAR industry. Prior to founding TopoDOT, together with Dr. Johannes Riegl, Ted founded Riegl USA in 1993 to market and apply Riegl LiDAR technology in industries throughout North America. Earlier in his career, Ted was a control systems analyst for GE Space Systems. Ted holds Master of Science Degrees in Electrical and Mechanical Engineering from Brown and Drexel Universities.

TRIMBLE DATA PREPARATION FOR CONSTRUCTION SURVEYS

Presented by **Dylan Jones**

Having trouble preparing corridor data for stakeout on your field collector? Wondering how to package an alignment, profile, and surface in a more simplified process? In this session you will learn tips, tricks, and workflow procedures for importing a corridor design data, QA/QC of alignments, surfaces & corridors, and exporting to the Trimble Access RXL format – the optimal format for Trimble Access road stakeout. Additionally, you will learn how make use of aerial imagery, corridor editing tools, and reporting options. This will be a software based tutorial using the latest versions of Trimble Business Center and Trimble Access.

Dylan Jones – Frontier Precision, Inc.

Dylan Jones is an Applied Geospatial Engineer for Frontier Precision. As a graduate from the University of Minnesota with a degree in GIS, Dylan began his geospatial technology career at Frontier Precision in 2014. He is a Trimble certified trainer, technical support, applications and training specialist for the states of Minnesota and South Dakota. Dylan focuses his efforts on GNSS, Robotic, LiDAR and Imaging solutions. He currently resides in Minneapolis working out of the Maple Grove office for Frontier Precision.

WOODY PLANTS ON MINNESOTA'S NOXIOUS WEED LIST: 2020 CHANGES AND ADDITIONS

Presented by **David Hanson**

Minnesota's Noxious Weed Advisory Committee recently completed risk assessments for several woody species. As of January 2020 these species have either been added to or moved to a new category in the noxious weed list. During this session, we will first discuss

a few definitions; such as, what is a noxious weed anyway? Then, we'll look at how to identify five of the recently "tweaked" woody species on the noxious weed list.

David Hanson – Minnesota Department of Transportation

After 18 years in the computer industry, Dave returned to school and completed a Bachelor of Science degree from the University of Minnesota in Assessment and Modeling of Natural Resources followed by a Master's Degree focusing on Urban and Community Forestry.

As an ISA Certified Arborist and Urban Forester at the University of Minnesota, Dave taught plant identification skills to ISA Certified Arborists, Master Gardeners, Municipal Employees and anyone else listening, including CCM crews and a classroom full of dendrology students. Now, as a Vegetation Management Specialist with MnDOT, Dave still teaches identification and management skills while honing his own skills daily – on questions from every corner of Minnesota.

ZIEGLER CONSTRUCTION TECHNOLOGY GROUP PRESENTATION

Presented by **Tom Abell** (*Biographical Reference: Stringless Paving and Milling*) and **Jim Linn**

This presentation will provide an overview of current Trimble construction technology systems and offerings utilized by construction companies and preview any new or emerging technologies in the construction market.

Jim Linn – Technology Support Manager at Ziegler CAT / SITECH Northland

Jim has been supporting Ziegler's construction technology portfolio since 2012 in various roles. He has focused on providing technical assistance and training for our customers' efforts in both machine control and site positioning applications with an emphasis on Intelligent Compaction and UTS guided solutions (grading, paving, and milling).

FINAL THOUGHTS & CLOSING

Presented by **Peter Jenkins** (*Biographical Reference: Welcome & Opening Remarks*)

Vendors and Exhibits

AYRES ASSOCIATES, INC.

With a team of 300+ innovative problem-solvers nationwide, we stand with integrity behind thousands of projects that strengthen communities and our country's infrastructure, economy, and environment.

Clients notice our project managers' ability to translate and transform every detail into actionable, understandable, smoothly coordinated pieces of a successful project. Side-by-side with our client partners, our project managers serve as the confident, communicative navigators at the helm of each project.

Their tools and expertise include geospatial, civil and municipal engineering, transportation, structural design and inspection, river engineering and water resources, architecture, landscape architecture, environmental, planning and development, and telecommunications and SUE.

For more information, please contact Matthew Vinopal, CP, CMS-Lidar, GISP, at VinopalM@AyresAssociates.com. 608.443.1200 (office), 608.443.1221 (direct), or 608.212.2013 (mobile) or visit www.AyresAssociates.com/.

CARLSON SOFTWARE, INC.

Founded in 1983, Carlson Software, Inc. is a leading provider of office and field software for land development markets, including land surveying, civil engineering, mining, construction, accident reconstruction and GPS-assisted machine control. Carlson Software is headquartered in Maysville, KY, with additional offices in Boston and The Netherlands.

Carlson Software has a goal: to be the premier, independent software provider for the related markets of surveying, civil engineering, mining and construction. We continue to deliver the most complete suite of software solutions ever offered for these industries by a single company. We believe this is what the industry wants: the best hardware, provided by hardware companies manufacturing GPS, total stations and scanners, and the best application software for all equipment, manufactured by independent, non-aligned software companies focused on ease-of-use, powerful feature sets, technical support and software integration and cross-product compatibility. That's where we come in - Carlson Software offers the complete suite of solutions, across the disciplines of data collection, surveying, engineering design and drafting, mine planning and modeling, construction estimation and machine control. For more information, please contact Ladd Nelson by phone at 563-583-8552 or by email at lnelson@carlsonsw.com.

FRONTIER PRECISION/TRIMBLE, INC.

Frontier Precision has been a leading supplier of high quality Survey, Mapping, GIS, and Construction Build equipment and supplies since 1989, a Trimble Dealer since 1991. With offices in 11 Midwestern States, Frontier has become one of Trimble's largest volume dealers. Frontier boasts 6 Trimble Certified Service Centers, with 8 Trimble Certified trainers. With one of the most experienced teams in the country, Frontier Precision brings more expertise to the market and the most technologically advanced solutions than anyone in the area. Frontier proudly represents Trimble, DJI, Spectra Precision, Nikon, Seco, and

Senceive Monitoring Products. For more information, please contact Frontier Precision at www.frontierprecision.com or 1-800-944-8557.

HISTORICAL SURVEYORS

At this display you will have an opportunity to view some antique survey equipment, literature and relics. It is a great way to learn about the past and gain an understanding of what “walking in their footsteps” means.

The Historical Surveys collection stems from the interest David Claypool and Lisa Hanni have in the instruments and measuring methods used by earlier surveyors. On display are tools Surveyors have used in the field for data collection and measurement, drafting and calculating tools used in the office to produce maps, and recovered artifacts. These items range from the 1800’s through the 1980’s. Together with Fred Johnson, they have put together a hands-on traveling educational display which is shown at various venues throughout the year. Several people have donated equipment and artifacts that continue to enhance the collection.

KLEIN SURVEY SYSTEMS, INC.

Klein Survey Systems is a supplier of high quality, reasonably priced, survey mapping and construction equipment. In January of 2020, Klein Survey Systems was awarded a contract with the State of Minnesota to supply GPS, Survey and Mapping equipment to state agencies, counties, and other government subdivisions. We sell and support Carlson software and equipment, Spectra software and equipment from Trimble, GeoMax software and equipment from Leica, Javad GNSS receivers, and Teledyne laser scanners.

We have over 50 years of experience in the industry. When the time comes to upgrade or add new equipment, we encourage you to “think outside the box” and give us a chance to show you how you can spend less, do more, and make your work (and life) easier. For more information visit our website at www.kleinsurvey.com or contact Jason Scott at 402-477-1111 or email at jason@kleinsurvey.com.

LEICA GEOSYSTEMS, INC.

Leica Geosystems is best known for its broad array of products that capture accurately, model quickly, analyze easily and visualize and present spatial information. www.leica-geosystems.com. Please contact Chris Rotegard at 612-385-6067 or email him at chris.rotegard@leicaus.com for more information.

MINNESOTA DEPARTMENT OF TRANSPORTATION RECRUITMENT

Ashley Scherek, the MnDOT Recruiter will have a MnDOT Jobs booth, and will be available on Wednesday to discuss job opportunities in the surveying field with the Minnesota Department of Transportation. Services provided will include education about MnDOT jobs, resume review, tips and tricks for applying to State jobs and discussion about your career goals. For more information, please contact Ashley Scherek at: Ashley.Scherek@state.mn.us.

MnCORS

MnCORS staff will be on hand to describe the current network/server configuration that supports the system and to answer questions regarding issues users may be experiencing. We welcome and encourage any suggestions or comments you may have regarding ways to improve. For more information, please contact Nathan Anderson at: nathan.anderson@state.mn.us.

NATIONAL GEOGRAPHIC SURVEY (NGS)

NGS will exhibit information on products and services available. Stop by and speak with NGS representatives and your Northern Plains Regional Advisor, David Zenk. Get answers to your geodetic questions by contacting Davis Zenk at dave.zenk@noaa.gov.

QUANTUM SPATIAL, INC.

Quantum Spatial, Inc., the nation's largest independent geospatial data firm, provides geographic insights to the largest government and corporate organizations that need geospatial intelligence to mitigate risk, plan for growth, better manage resources and advance scientific understanding. A pioneer in advanced mapping technology, Quantum Spatial's end-to-end solutions and services deliver the industry's highest data quality and accuracy, while leveraging the widest array of technologies for analyzing all types of terrains. Customers use the company's acquisition, processing, analytics and visualization solutions in a range of technical and scientific disciplines – from geology and biology, to hydrology, forestry and civil engineering. Utilities, oil and gas producers, engineering and construction firms, as well as the military and major government agencies, are Quantum Spatial customers. Quantum Spatial has multiple offices around the country. For more information contact Miles Strain at mstrain@quantumspatial.com.

TopoDOT

Team TopoDOT is located in Orlando, Florida. TopoDOT is a comprehensive software solution for processing point cloud data produced by airborne, mobile and terrestrial laser scanners as well as data produced by image based UAV systems. TopoDOT offers a highly productive process to manage data, assess quality and extract CAD and GIS deliverables from point cloud data to seamlessly feed downstream operations. The extensive TopoDOT user community predominately serves the geospatial, civil engineering and construction markets. For more information, please contact the TopoDOT team info@topodot.com, 1 407 248 0160, www.topodot.com

WHIRRX

Whirrx was founded by professional land surveyors and remote sensing experts after flying drone surveys as a service for 4 years. Their team spent 6+ years of research and 4+ years of commercial work to refine the drone equipment, operational procedures and back-end proprietary software processing pipeline to enable drones to finally be used for true engineering design surveys. Their primary focus is the surveyor and civil engineer. For more information, please contact Jeff Walsh at: jeff@whirrx.com.

MEAL MENUS DURING WORKSHOP

Tuesday, March 17:

Lunch: "Build Your Own Sandwich & Soup Buffet"

Dinner: "Deluxe Dinner Buffet" (BBQ Ribs, Roast Turkey)

Wednesday, March 18:

Breakfast: "Buffet Style:"

Lunch: "Down South Buffet (Fried Chicken)"

Dinner: "Comfort Food" (Swiss Steak & Roast Pork Loin)

Thursday, March 19:

Breakfast: "Buffet Style"

- ***Breakfast will be served in the Marina Dining Room***
- ***Lunch, Dinners & Breaks will be served in the Minnesota Rooms!***

WEBSITE ADDRESSES FOR YOUR INFORMATION

Minnesota Department of Transportation, Office of Land Management –
<http://www.dot.state.mn.us/landmanagement/>

MnDOT's Geodetic Unit –
<http://www.dot.state.mn.us/surveying/geodetics/index.html>

MnDOT Right of Way Mapping –
<http://www.dot.state.mn.us/surveying/mapping.html>

MnDOT CORS/VRS Network –
<http://mncors.dot.state.mn.us/Map/SensorMap.aspx>

MnDOT Right of Way & Survey Workshops & Training
<http://www.dot.state.mn.us/landmanagement/calendar.html>

MnDOT Survey Tools & Technology
<http://www.dot.state.mn.us/surveying/toolstech/index.html>

MnDOT Photogrammetric Unit –
<http://www.dot.state.mn.us/surveying/photogrammetrics.html>

National Geodetic Survey – <http://www.ngs.noaa.gov/>

US Coast Guard Navigation Center – <http://www.navcen.uscg.gov/>

The Minnesota Secretary of State – <http://www.sos.state.mn.us/>

Minnesota Association of County Surveyors – <http://www.macinfo.us/>

Minnesota Society of Professional Surveyors – <http://www.mnsurveyor.com/>

The Minnesota State Legislature – <http://www.leg.state.mn.us/>

National Highway Institute – <http://www.nhi.fhwa.dot.gov/default.aspx>

International Right Of Way Association – <https://www.irwaonline.org/>

Federal Highway Administration – <http://www.fhwa.dot.gov/>



WORKSHOP NOTES