SURVEY TECHNICAL WORKSHOP

Breezy Point Conference Center • March 11-13, 2025

DEPARTMENT OF TRANSPORTATION

Sponsored by the Office of Land Management

Cover photo submitted by Melissa Fischer

Welcome to the 27th Annual Survey Technical Workshop

March 11 – 13, 2025

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

Director, Office of Land Management ..... Joseph Pignato
Assistant Director, Survey & Mapping ..... Geoff Bitner
Workshop/Training Coordinator ..... Lorianna Yang
A/V Support ..... Fred Bertram
Workshop Support ..... Jack Drouin

Workshop Planning Committee:

Nathan Anderson ..... MnDOT (St. Paul)
Geoff Bitner ..... MnDOT (St. Paul)
Jeremy Erickson ..... MnDOT (Detroit Lakes)
Lance Frost ..... Stonebrooke Engineering
Joe Hamlin ..... MnDOT (Metro)
Peter Jenkins ..... MnDOT (Retired)
Bud Jorgenson ..... MnDOT (St. Paul)
Melissa Fischer ..... MnDOT (Metro)
Sarah Keeling ..... Washington County
Troy Klein ..... Wright County
Justin Kraus ..... MnDOT (Mankato)
Maria Mejia Batrez ..... MnDOT (Rochester)
Richard Morey ..... MnDOT (Retired)
Michael Nelson ..... MnDOT (Metro)
James Schneider ..... MnDOT (St. Paul)
Travis Shorter ..... MnDOT (St. Paul)
Christian Sovak ..... MnDOT (St. Paul)
Kevin Sutherland ..... MnDOT (Duluth)

FROM THE WORKSHOP COMMITTEE

The Minnesota Department of Transportation welcomes you to the 2025 Survey Technical Workshop. This event marks the **27th 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 previous evaluation forms and made every attempt to improve the workshop based on the comments and suggestions made by attendees. Please remember to fill out the presenter evaluation form you received when you checked in at the registration table. We encourage you to fill it out as you complete each session, so it won't be such a daunting task to complete at the end of the workshop.

Please note: Attendees will be emailed a quick Workshop Summary Evaluation after the 2025 Survey Technical Workshop. Please take a moment to complete the survey when you receive it, as your feedback is important to us for planning future workshops. 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, presenter 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 you would like to speak more privately with a vendor in the display area in the Minnesota I & II rooms during the workshop, 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 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 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, a special thanks 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:

- **Workshop Program** – The program contains the schedule, session descriptions, and presenter and vendor biographies.

- **Quick Reference Guide** – This is for your convenience in finding sessions of interest.

- **Presenter Evaluation Form** – Please turn in this form at the end of the workshop. This evaluation is essential as we consider pertinent topics for future workshops. It also provides us vital information about how specific topics were received and about the workshop presentations in general.

- **Name Tag** – Please wear the name tag you will receive when you sign in 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.

- **Tuesday, March 11 Lunch Ticket** – If you have purchased Breezy Point Lodging Package or the Meeting/Meal Package, you will find the March 11 lunch ticket in the back of your name tag at workshop check in. 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 to your room. If you have purchased commuter meals for additional days outside of the lunch on March 11, your meal tickets can also be picked up at the Breezy Point registration desk.

THANK YOU
FOR SUPPORTING
MNDOT'S 2025 SURVEY
TECHNICAL WORKSHOP

DEPARTMENT OF TRANSPORTATION

2025 SURVEY TECHNICAL WORKSHOP SCHEDULE

TUESDAY, MARCH 11, 2025

WHITEBIRCH I & II			
9:00 AM	***WORKSHOP REGISTRATION***		
10:00 AM	***WELCOME AND OPENING REMARKS*** Geoff Bitner, Assistant Director Office of Land Management		
10:15 AM	***THE SURVEYOR'S ROLE IN LAND PRESERVATION*** Chris Ambourn & Sam Gibson		
11:15 AM	***ROADS TO CONSERVATION: HOW DOTS HELP SAVE THE WORLD*** Christopher Smith		
12:15 PM	**LUNCH IN MINNESOTA I & II**		
	WHITEBIRCH I	**WHITEBIRCH II**	**LAKESIDE RM.**
1:15 PM	***TRIMBLE'S AUGMENTED REALITY*** Tony Edelbrock Evan Traxler	***MINDFULNESS-BASED STRESS REDUCTION (MBSR): INTRODUCTORY SESSION*** Dr. Debra Lindh, Ed.D.	***TERRESTRIAL SCANNING: FIELD TO OFFICE*** Brett Blomquist Bryan Nagorka
2:15 PM	***PHOTOGRAMMETRY AND LIDAR DRONE SURVEYS*** Luis Rojas	***FUNDAMENTALS OF SURVEY EVIDENCE AND MEASUREMENTS*** Sam Gibson	***MESH VS SILO: UNCOMPLICATING DATA*** Bradford Folta
3:15 PM	**BREAK IN MINNESOTA I & II**		
3:30 PM	***OMBUDSMAN ORIENTATION*** Jim Skoog	***WORK ZONE SAFETY – SAFE WORK ZONES FOR ALL*** Sarah Keeling Timothy Parkos ***Repeated at 8:00 AM 3/13***	***FLYING INTO THE FUTURE - HOW TERRESTRIAL, AERIAL, AND MOBILE BASED LIDAR WORK TOGETHER FOR DIFFERENT TRANSPORTATION PROJECTS*** Dylan Jones Katy Rudolph
4:30 PM	**ADJOURN**		
5:30 PM	**DINNER IN MINNESOTA I & II**		

DEPARTMENT OF TRANSPORTATION

2025 SURVEY TECHNICAL WORKSHOP SCHEDULE

WEDNESDAY, MARCH 12, 2025

6:45 AM	**BREAKFAST IN MARINA DINING ROOM**		
	WHITEBIRCH I	**WHITEBIRCH II**	**LAKESIDE RM.**
8:00 AM	***GIS TOOLS TO HELP THE SURVEYOR*** Daniel Braun Jay Haskamp	***PRELIMINARY BRIDGE UNIT SURVEY AND ROADWAY NEEDS*** Cary Gries	***CARLSON SURVEY BASICS*** Luis Rojas
9:00 AM	***TERRESTRIAL SCANNING & CONVENTIONAL SURVEY FOR ENGINEERING AND DESIGN*** Ryan Beltrand Matt Vinopal	***PLAN READING 101*** Mike Sjodin	***UNDERSTANDING LEGAL DESCRIPTIONS*** Richard Morey
10:00 AM	**BREAK IN MINNESOTA I & II**		
10:15 AM	***PLSS MONUMENT GRANT AND LEGISLATIVE UPDATE 2025*** Alison Slaats Patrick Veraguth	***ELECTRONIC FILES 101*** Justin Kraus	***MNDOT'S MOBILE LIDAR WORKFLOW: FROM ACQUISITION TO DELIVERABLES*** Dylan Jones Colin Lee
11:15 AM	***REVIEW OF THE 1852 STATE LINE SURVEY ALONG THE ST. LOUIS RIVER: A DIAGRAM OF SURVEY BETWEEN A STATE AND A TERRITORY (PART 1)*** Anthony Lueck	***TEMPORARY TRAFFIC CONTROL – WORKER SAFETY*** Jeff Morey	***CST APPLICATION & TEST PREPARATION*** Norman Ellerbrock
12:15 PM	**LUNCH IN MINNESOTA I & II**		
1:15 PM	***STATUS OF THE 1852 STATE LINE BOUNDARY BETWEEN MINNESOTA AND WISCONSIN AND RECOVERY OF MILE POST MONUMENTS (PART 2)*** Anthony Lueck	***BRIDGE STAKING: AN OVERVIEW FOR BEGINNERS*** Adam Olson	***RDOAI, DRONE DATA PROCESSING AND REAL-WORLD RESULTS*** Tanner Laverdiere
2:15 PM	***THE SURVEYORS AND INSTRUCTIONS FOR ESTABLISHING THE ORIGINAL TOWNSHIP SURVEYS IN MINNESOTA*** Don Borcherding	***THE FUTURE OF SURVEYING*** Dan Forsberg	***IMPLEMENTING SURVEY TARGETS INTO AERIAL MAPPING*** Miles Strain
3:15 PM	**BREAK IN MINNESOTA I & II**		
3:30 PM	***MNDOT RIGHT OF WAY: BOUNDARY DETERMINATION, MONUMENTATION, AND RECORD RESOURCES*** Geoff Bitner	***MONITORING AND ANALYZING SURFACE DATA WITH LIDAR: CASE STUDIES IN MSE AND WALL ANALYSIS*** Michael Cook	***OBTAINING MAXIMUM ACCURACY FROM LOW-COST DRONE SYSTEMS USING BOTH SINGLE AND ZERO GROUND CONTROL POINTS*** Jeffrey Walsh
4:30 PM	**ADJOURN**		
5:30 PM	**DINNER IN MINNESOTA I & II**		

DEPARTMENT OF TRANSPORTATION

2025 SURVEY TECHNICAL WORKSHOP SCHEDULE

THURSDAY, MARCH 13, 2025

6:45 AM	**BREAKFAST IN MARINA DINING ROOM**		
	WHITEBIRCH I	**WHITEBIRCH II**	**LAKESIDE RM.**
8:00 AM	***DATUMS & COORDINATE SYSTEMS: PREPARING FOR THE NEW DATUM*** Geoff Bitner	***WORK ZONE SAFETY – SAFE WORK ZONES FOR ALL*** Michael Buhr Timothy Parkos **REPEAT**	
9:00 AM	***TREE IDENTIFICATION COMPARISONS: SOME ARE NOXIOUS WEEDS!*** Christina Basch Dave Hanson	***GROUND CONTROL AND CHECK SHOTS FOR PHOTOGRAMMETRY & REMOTE SENSING PROJECTS*** Adam Smith	***TURNBACKS AND JURISDICTIONAL TRANSFERS OF RW*** Keith Jellinger
10:00 AM	**BREAK IN MINNESOTA I & II**		
	WHITEBIRCH I & II		
10:15 AM	***BLUFF SURVEYS*** Craig Wensmann		
11:30 AM	**ADJOURN**		

2025 SURVEY TECHNICAL WORKSHOP
March 11 – 13

Session Descriptions and Presenter Biographies

WELCOME AND OPENING REMARKS

Joseph 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 MnDOT, Joe worked for a local Minnesota consulting firm for ten years as a structural design engineer. He graduated from North Dakota State University with a degree in Civil Engineering.

Geoff Bitner – Assistant Director, MnDOT Office of Land Management
Mr. Bitner is a licensed Land Surveyor and supervises the Survey & Mapping Section 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. Since then, he has held positions in Right of Way Mapping, Geodetics, Platting, and most recently as the Assistant Director of the Office of Land Management. Mr. Bitner holds a Bachelor of Science Degree from Salisbury University in Maryland and a Master of Science Degree from the University of Minnesota.

OPENING SESSIONS:

THE SURVEYOR'S ROLE IN LAND PRESERVATION

Presented by **Chris Ambourn & Sam Gibson**
Most commonly surveyors are known for their role in making large parcels of land into many small parcels, indelibly altering the landscape forever. This session will explore a case study of the preservation of a very large parcel within Washington County thus preserving its character and footprint for public use forever. The project required not only an extensive survey of the property but required creative thinking and cooperation between multiple governmental and private partners. The presentation will be given by the private surveyor and the county surveyor who were instrumental in connecting the required stakeholders and to leading the project to its successful completion.

Chris Ambourn – Short Elliott Hendrickson
Chris began his surveying career in high school in northwestern Wisconsin. He went on to graduate from Michigan Tech with a BS in Land Surveying and for the following 25 years has worked throughout the midwest, and Alaska, as a crew chief, survey tech, licensed surveyor, and department and regional manager for large and small firms of many types. He is currently the Regional Practice Leader for the Survey Team at SEH in St. Paul, where he

leads a diverse team of 33 licensed land surveyors and technicians throughout Minnesota and Iowa.

Sam Gibson – Washington County
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 has served as the County Surveyor for Washington County Minnesota since October 2019.

ROADS TO CONSERVATION: HOW DOTS HELP SAVE THE WORLD

Presented by **Christopher Smith**
Departments of transportation (DOTs) are tasked with constructing and maintaining the nation's transportation infrastructure. This task is required to balance the need for safe and effective transportation infrastructure with harms to various other resources, including fish and wildlife. In support of these sometimes-opposing objectives, a new scientific discipline emerged called road ecology. Road ecology is the study of ecological effects, both positive and negative, of roads and highways. Effects may include noise, water pollution, habitat loss, degradation and fragmentation, air pollution, and direct mortality to wildlife (i.e., roadkill).

This presentation will discuss the challenges and opportunities created during the construction and maintenance of transportation infrastructure, with a focus on highways. Local and national examples of conservation practices employed by DOTs will be discussed. Did you know that MnDOT has constructed over 150 wildlife passageways in the last 15 years? Come learn more about how DOTs are helping save the world.

Christopher Smith – MnDOT
Christopher (Chris) is a wildlife biologist is MnDOT's Office of Environmental Stewardship where he assists projects with regulatory compliance involving wildlife. He has been with MnDOT for nine years, and prior to that he worked at the Minnesota Dept. of Natural Resources in the Nongame Wildlife Program. Chris is certified by The Wildlife Society as a Certified Wildlife Biologist and holds a bachelor's degree in fisheries and wildlife and a master's degree in conservation biology from the University of Minnesota. He also holds a second master's degree in legal studies. Chris has spent his career working on complex conservation challenges, with an emphasis on the conservation of endangered amphibians, reptiles, and insects.

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

BLUFF SURVEYS

Presented by **Craig Wensmann**

This session will provide a surveyor's perspective and guidance on performing bluff surveys and defining key elements of a bluff. Even with published rules and guidance documents, the nature of bluffs and differences in measuring methods can cause issues and potential conflict between the surveyor, the landowner, the public, the governing authority, etc. In this session, we will try to review the intricacies of the rules and guidance documents to formulate a more consistent and accurate approach amongst surveyors on how to define and measure bluffs.

Craig Wensmann – Bogart, Pederson & Associates

Craig Wensmann is the Owner and President of a private land surveying and civil engineering firm named Bogart, Pederson & Associates, Inc. located in Becker, MN. Between his studies at St. Cloud Technical and Community College and St. Cloud State University to become a licensed land surveyor, and the 25+ years of performing land surveys in central Minnesota, Craig has garnered a wide range of specialized knowledge in his profession and continues to humbly learn each day through his interactions with his clients, the public and a variety of governing agencies.

BRIDGE STAKING: AN OVERVIEW FOR BEGINNERS

Presented by **Adam Olson**

This session is designed to give someone, who has never staked a bridge before, a brief overview on what goes into bridge staking. It will touch on the basics of the plan, pre-construction office work and the field work involved.

Adam Olson – MnDOT

Mr. Olson studied Surveying and Construction Technologies at North Dakota State College of Science in Wahpeton, ND, and has been involved with MnDOT's Survey Operations since 1997. He worked as a Student Worker for the Fergus Falls office until September 1998 when he started full time for Metro East Surveys in Oakdale. In February of 2004, Mr. Olson began working as a Crew Chief and in July 2004, was officially promoted to Crew Chief (Transportation Specialist). In August 2013 he was promoted and is currently working as an Engineering Specialist. During his time with MnDOT, Mr. Olson has worked on many bridge projects including the Lafayette Bridge over the Mississippi River (US Highway 52), the St. Croix River Crossing over the St. Croix River (MN Highway 36/WI Highway 61), and the Smith Ave High Bridge over the Mississippi River (MN Highway 149).

CARLSON SURVEY BASICS

Presented by **Luis Rojas**

This presentation will discuss how to setup projects in Carlson Survey, working with field codes and using field-to-finish, creating surfaces, working with boundaries and writing legal descriptions.

Luis Rojas – Carlson Software

Luis Rojas is a Civil Engineer that has been in the land development industry for over 25 years where he has supported, trained and helped adopt mobile, desktop and field solutions for hundreds of organizations and users in the Architectural, Engineering and Construction (AECO) industry around the world. Some of the applications that he has implemented include Carlson, Civil 3D, Revit, and Navisworks for companies such as Skanska, Siemens,

Parsons, Arup, NRCS, and US Army. Luis has been a speaker at industry events including Autodesk University, UAV Expo, RTC, AEC Next, HLSA conference, CLSA-NALS conference, LSAW conference, WSPLS conference, Mn DOT Workshop, and others nationally and internationally in Europe, Asia, and South America.

CST APPLICATION & TEST PREPARATION

Presented by **Norman Ellerbrock**

The CST Application and Test preparation will provide the technicians with the information needed to complete the application easily and to get ready to take the CST exams. The application will be reviewed, and some tips will be provided. Sample problems from the CST Sample Exams will be reviewed as will some not included on the exam. The presentation will wrap up with test taking tips to help reduce the stress of the exam taking experience.

Norman Ellerbrock – Four Points Land Surveying & Engineering

Norman is a Professional Land Surveyor licensed in Illinois, Iowa and Missouri. He has been actively practicing surveying for 36 years. Norman started Four Points Land Surveying in October of 2010. Norman is the CST Chair and has been on the CST board for 6 years. He is past president of the Illinois Professional Land Surveyors Association, Chair of the Illinois Professional Land Surveyors Foundation and is on the Missouri Society of Professional Surveyors Board of Directors. His passion is to educate technicians and empower them to be the best.

DATUMS & COORDINATE SYSTEMS: PREPARING FOR THE NEW DATUM

Presented by **Geoff Bitner** (*Biographical Reference: Welcome and Opening Remarks)*

Datums and coordinate systems define the daily work of surveyors. It is important to understand the fundamental elements that are used to define datums. Some of the topics covered in this session will be ellipsoids, geoids, datums (NAD83, NAVD88), and reference frames (NAD83 2007, NAD83 2011). Grid coordinate systems are how surveyors work in a datum and can be found in equipment settings, computer software, construction plans, and reports. This presentation will cover the underlying principles of coordinate systems that you need to know. We will also talk about the new datum, how you can prepare, and what you can expect.

ELECTRONIC FILES 101

Presented by **Justin Kraus**

In this session we will briefly review the planset that was gone through in Plan Reading 101. We will start with DGN's, tins and corridor models that are a probable product from our design groups. We will review the files and make some minor modifications and show you how to adjust the settings properly to load into Trimble Business Center (TBC). Once they are in TBC we will show you some tools, settings, and modifications that can be helpful to make sure they come into Trimble Access correctly and are user friendly. Once we have them ready for the survey controller, we will go through some "in the field work flows" in Trimble Access.

Justin Kraus – MnDOT

Justin joined MnDOT in the Spring of 2010 as a Student Worker in District 7 Surveys. He took lead as a Crew Chief in the Spring of 2012 and has worked on many of the district's

larger projects. Justin now works as an Engineering Specialist, overseeing staking projects and supporting the survey crews in District 7.

Justin is interested in new and emerging technology in the survey field, especially regarding construction staking. He enjoys his role as he can use his years of survey experience to provide tools and information to the survey teams which leads to efficient staking in the field.

FLYING INTO THE FUTURE - HOW TERRESTRIAL, AERIAL, AND MOBILE BASED LIDAR WORK TOGETHER FOR DIFFERENT TRANSPORTATION PROJECTS

Presented by **Katy Rudolph and Dylan Jones**
Learn how the integration of data from various sources come together to produce detailed deliverables. LiDAR, GNSS, and Total Station data can easily be merged using Trimble Business Center to manage a project's lifecycle. Combining these datasets gives users the ability to check their LiDAR point cloud against control, generate surface feature breaklines, extract asset location and condition, and finally export/publish/share the results. In this session we will explore tools and commands that you can use to meet and exceed your expectations.

Dylan Jones – Frontier Precision
Dylan Jones is a Geospatial Accounts Manager at Frontier Precision working out of their Maple Grove, MN location. He has been involved with Surveying, Mapping, Scanning and GIS since 2014 when he joined the company. Previously, Dylan has held roles in Technical Support and Training.

Katy Rudolph – Frontier Precision
Katy is an Account Manager on the Unmanned team at to Frontier Precision. She has been with frontier since 2019. She provides UAS solutions, support, and training to a number of industries including civil engineering, survey, public safety, law enforcement, utilities and energy in the MN, WI, and IA territories.

FUNDAMENTALS OF SURVEY EVIDENCE AND MEASUREMENTS

Presented by **Sam Gibson** (*Biographical Reference: The Surveyor's Role in Land Preservation)*
The land surveyors' core tasks of establishing and retracing boundaries are sometimes obscured by a focus on the precision readily achieved with modern measurement tools. This presentation will explore the fundamentals of measurement and evidence as it relates to these core land surveying functions. The concepts of accuracy vs. precision, errors of closure, tolerances, and significant digits will be applied to the concepts of priority of evidence, and burden of proof to explore the appropriate application of measurement tools and results to the responsibilities of the land surveyor.

GIS TOOLS TO HELP THE SURVEYOR

Presented by **Daniel Braun & Jay Haskamp**
In an industry experiencing exponential growth in project opportunities and a decreasing workforce, many surveyors are wondering how they can be more efficient. Join us as we explore the many ways GIS can be used every day by surveyors to increase safety, productivity, situational awareness, and value, resulting in increased efficiency and

ultimately answering the call to do more with less. This session will focus on ESRI, AutoCAD (C3D), and Trimble workflows.

Daniel Braun – Frontier Precision
Daniel Braun is a GPS/GIS professional with Frontier Precision based in Minnesota with over a decade of experience in geospatial technology. With a career spanning utilities, government, and environmental sectors, Daniel has honed his expertise in designing and implementing advanced GIS solutions. Daniel combines his technical knowledge and passion for problem-solving to sell, support, and develop customized GPS/GIS solutions tailored to meet the diverse needs of his clients.

Jay Haskamp – Frontier Precision
Jay Haskamp is the Emerging Technologies Manager at Frontier Precision based out of Waite Park, MN. 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. He has a love for new technologies and always tries to stay on the cutting edge of new ideas relating to the geospatial industry.

GROUND CONTROL AND CHECK SHOTS FOR PHOTOGRAMMETRY & REMOTE SENSING PROJECTS

Presented by **Adam Smith**
This presentation will cover MnDOT's protocol for establishing ground control and collecting check shots for aerial and terrestrial based mapping projects. This will include background on what this data is used for and its importance. There will also be a section on tips and tricks for target placement and a deep dive into testing absolute vertical accuracy.

Adam Smith – MnDOT
Adam Smith is the Photogrammetry & Remote Sensing Unit Supervisor for the Minnesota Department of Transportation. He has been working in the field of surveying and mapping for over 20 years. During this time, he performed many functions including geodetic\construction surveying, creating geospatial products from imagery and point clouds, project management, developing internal UAS and mobile lidar programs, and leading MnDOT’s Photogrammetry & Remote Sensing Team.

Mr. Smith received a B. S. in Conservation with a minor in GIS from the University of Wisconsin at River Falls and a M.S. in Infrastructure Systems Engineering from the University of Minnesota. He holds certifications as an ASPRS Certified Photogrammetrist (CP) and Geographic Information System Professional (GISP).

IMPLEMENTING SURVEY TARGETS INTO AERIAL MAPPING

Presented by **Miles Strain**
This session will show the audience how physical targets, and their survey values are ingested into aerial mapping for both imagery and lidar processing. The session will start out with a brief history of photogrammetry and a brief overview of what to expect when working with different resolutions and scales. From there we'll transition into how targeting is ingested into some of the imagery and lidar workflow processes necessary to complete downstream aerial mapping programs. We'll share project examples of the good, the bad, and the ugly of targeting, including some real-life experiences Miles has endured throughout his 39-year career. In addition to the presentation, we'll give participants an opportunity to

test their acuity skills with an anaglyph stereoscopic setup to view target samples and engage in some three-dimensional "I Spy" inspections.

Miles Strain – 95West Aerial Mapping
Miles Strain is the Aerial Services Manager for 95West Aerial Mapping. He earned a Bachelor of Science in Geography, with a minor in Cartography from the University of Wisconsin - River Falls. He's a Certified Photogrammetrist with the American Society for Photogrammetry and Remote Sensing and a Registered Professional Photogrammetrist in the State of Oregon.

Miles has over 39 years of experience in the geospatial industry and has spent his entire professional career working in the State of Minnesota. Miles has extensive experience working on projects ranging in size from 10 acres up to statewide level programs throughout the United States. Miles' project experience covers hundreds of corridor projects for MnDOT, managing numerous other state DOT agencies, various MnDNR projects, many large and small scale mining operations, and a wide range of State and Local government programs throughout the United States.

MESH VS SILO: UNCOMPLICATING DATA

Presented by **Bradford Folta**
Bring your frustrations, bring your complaints, let's chat! Data has been around forever; back then, it usually focused on a single process, and it was easy to hone into a project because it was the focus. Today, we have so much data that we often forget the project. That's where the data governance and systems approach comes in. In this talk, we will learn that it's not just about mesh vs. silo methodologies and how to use them to promote data effectively and efficiently with colleagues and stakeholders.

Bradford Folta – Honey Badger Analytics
Bradford Folta has an MPSc in Environmental GIS and experience in many industries. He approaches systems from a process perspective. If you think about it right, nothing is unsolvable. Feel free to discuss a topic with him and watch him discuss complications, issues, and sticks in the mud. His passion for geospatial and geomatics shows when he rants or gets nerdy.

MINDFULNESS-BASED STRESS REDUCTION (MBSR): INTRODUCTORY SESSION

Presented by **Dr. Debra Lindh, EdD**
This interactive session introduces Mindfulness-Based Stress Reduction (MBSR) through three key concepts: Use of Self, Traditional MBSR, and The Champion's Mind. Participants will engage in two foundational mindfulness exercises – a Body Scan and a Mindful Breathing Visualization – to cultivate awareness, focus, and resilience. Designed for practical use, this session provides tools for integrating mindfulness into both daily life and at work. Each participant will receive a handout packet complete with an action plan to apply these techniques beyond the session, supporting overall wellbeing.
Key Learning Objectives:

- Define MBSR and its benefits for stress management and overall wellbeing.
- Explore the Use of Self in mindfulness practice in real-time.
- Introduce The Champion's Mind as a framework for resilience and peak performance.

- Guide participants through a Body Scan to develop present-moment awareness and stress reduction.
- Facilitate a Mindful Breathing Visualization to enhance focus and resiliency.

Dr. Debra Lindh, EdD – MnDOT
Dr. Debra Lindh is a trauma-informed practitioner and advocate in the field of mental health and wellbeing, with a strong focus on workplace wellbeing, stress management, and mindfulness. As the Organizational Health Consultant at the Minnesota Department of Transportation, she brings over 20 years of experience in operations management and applied social science research, the last 12 have been dedicated to trauma-informed, evidence-based practices. She holds certifications in Mental Health First Aid, QPR Suicide Prevention, and Mindfulness, and serves as an Adjunct Graduate Professor.
Her work has earned numerous accolades, including the Organization Development Network's Best Student Research Paper Award for her doctoral research on employee stress, mindfulness practices, and innovative mixed-methods measurement (2013), and Feedspot's Best of PTSD honors for 2025, 2024, 2023, and 2022.
She holds a Bachelor of Science in Organizational Communication and Philosophy, a Master of Arts in Organizational Leadership, and a Doctor of Education in Organizational Development. Outside of her professional roles, Dr. Deb enjoys cooking with her kids and friends, exploring nature with their rescue dog Max, and hosting her hobby podcast.

MNDOT'S MOBILE LIDAR WORKFLOW: FROM ACQUISITION TO DELIVERABLES

Presented by **Dylan Jones** (*Biographical Reference: Flying Into The Future…)* **& Colin Lee**
This session will provide a comprehensive overview of the Minnesota Department of Transportation's (MnDOT) implementation of mobile Lidar technology. Attendees will gain insights into the MnDOT mobile Lidar department, its objectives, and the diverse applications of the system. We will delve into the technical aspects of the workflow, including the MX90 mobile LiDAR system, PosPac processing, and Trimble Business Center (TBC) software. This session will cover setting ground control, data acquisition, trajectory processing, QA/QC, feature extraction, and deliverable creation.

Colin Lee – MnDOT
Colin Lee is a certified photogrammetrist and mapping supervisor at the Minnesota Department of Transportation (MnDOT). With 18 years of experience at MnDOT, he specializes in the application of various remotely sensed data. He holds an undergraduate degree in geography from the University of Minnesota – Twin Cities.

MNDOT RIGHT OF WAY: BOUNDARY DETERMINATION, MONUMENTATION, AND RECORD RESOURCES

Presented by **Geoff Bitner** (*Biographical Reference: Welcome and Opening Remarks)*
This presentation will focus on components of MnDOT's right of way. We will talk about the significance of alignments, highway corridors, plats, monuments, and the various records that surveyors have access to. Whether you are a MnDOT employee who stakes the right of way or a surveyor from outside the department, you should expect to leave with a better understanding about the process and where to find answers to your right of way questions.

MONITORING AND ANALYZING SURFACE DATA WITH LIDAR: CASE STUDIES IN MSE AND WALL ANALYSIS

Presented by **Michael Cook**
LiDAR technology has become an essential tool for surveying, mapping, and engineering firms. Its ability to rapidly collect high-resolution, three-dimensional data has transformed the way we approach many types of projects. This presentation will focus on two case studies that highlight the benefits of LiDAR technology for monitoring and analyzing surface data.

Through these case studies we will explore the use of static LiDAR scanners for wall monitoring. We will discuss the importance of collecting quality data to accurately measure subtle wall movements. We will present our findings from a recent project in which we used a terrestrial LiDAR scanner to monitor the movements of a retaining wall over time. We will also discuss the challenges we faced and the lessons we learned from this project.

Our presentation is intended for surveying and mapping, geospatial, engineering, and construction firms that are interested in learning about the benefits of LiDAR technology for surface data monitoring and analysis. We hope to inspire attendees to consider using LiDAR technology for their own projects and to share their experiences with the broader community.

Michael Cook – TopoDOT
Michael Cook has over 15+ years of experience in the LiDAR industry. He's one of the originating team members for TopoDOT and is currently their Application Consultant. Our primary product is TopoDOT®, a point cloud software solution to manage data, assess its quality and to extract high quality topographies, assets and 3D models. Michael is a LiDAR Specialist by day and an Engineer by night. Michael holds a Bachelor of Science in Mechanical Engineering from the University of Central Florida.

OBTAINING MAXIMUM ACCURACY FROM LOW-COST DRONE SYSTEMS USING BOTH SINGLE AND ZERO GROUND CONTROL POINTS

Presented by **Jeffrey Walsh**
Topics covered include mission planning, weather, survey control, GPS processing. The presentation will show accuracy assessments from recent surveys using low cost drone systems with minimal and no ground control.

Jeffrey 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 10 different states across the U.S. Regarding sUAS technology, Jeff is primarily focused on providing photogrammetric processing services capable of attaining design-grade vertical accuracy. Jeff has a Professional Masters in GIS & Remote Sensing from the University of Minnesota, is an ASPRS Certified Photogrammetrist, a GISP, a Remote Pilot, and Private Pilot.

OMBUDSMAN ORIENTATION

Presented by **Jim Skoog**
Have you ever used a bolt on top of a fire hydrant as an elevation benchmark? Have you ever worked on a job where there were discrepancies between civil and structural plan sets? Has a minor surveying error early on resulted in major headaches down the road? This session will introduce you to the Ombudsman program and will prepare you to work with the Ombudsman on an unresolved customer issue. After attending this session, you will

have a better understanding of how survey technology can be used in an Ombudsman case, and you will be ready to respond to requests for assistance in the future.

Jim Skoog – MnDOT
Jim Skoog leads MnDOT's award-winning Ombudsman program, which helps the agency be fair and responsive to the public. Under his leadership, the program has been recognized for excellence in innovation and outstanding customer-centered outcomes. When he is not serving the public to advance customer trust in his role as Ombudsman, Skoog enjoys spending time with his family. Skoog holds a bachelor's degree from the College of St. Scholastica and a master's degree from the University of Minnesota.

PHOTOGRAMMETRY AND LIDAR DRONE SURVEYS

Presented by **Luis Rojas** (*Biographical Reference: Carlson Survey Basics)*
This presentation will discuss the use of drones in survey from both a photogrammetry and LiDAR perspective. Difference in workflows and processing methods to obtain a map will be shown. Different applications will be used including machine learning based point cloud extraction tools.

PLAN READING 101

Presented by **Mike Sjodin**
In this session I will be going over how to read a plan set geared towards beginners. I will highlight some important parts of the plan set and how to read them. I will also highlight things to look out for and things to pay attention too. This will be a two-part class with Justin Kraus (Electronic Files 101) showing how to extract data out of the electronic files. The plan sets will be the same project, which is an ORD designed project roundabout.

Mike Sjodin – MnDOT
Mike 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 the Geodetic survey office and was hired on full time with East Metro Surveys in 2002 as a survey tech/rod man. As a survey crew chief, he has worked on several projects from Unweave the Weave, 494 Unbonded Overlay, 280 & Larpenteur Bridge, 694 & Snelling, 35E Unbonded Overlay, 35E MnPass, 94 and 35W Downtown to Crosstown just to name a few. He has worked with MnDOT Metro Surveys for 25 years now and is now the Construction Surveys Supervisor for the West Metro Survey Office where he oversees all survey duties on construction projects in the west metro.

PLSS MONUMENT GRANT AND LEGISLATIVE UPDATE 2025

Presented by **Alison Slaats & Patrick D. Veraguth**
This session will describe the PLSS Monument Grant, provided updates on the grant recipients and share progress to date. Updates on proposed legislation to continue grant funding will also be provided.

Alison Slaats – MnGeo, MNIT Services
Alison Slaats is the Director of the Minnesota Geospatial Information Office (MnGeo), part of Minnesota IT Services and the Minnesota Chief Geospatial Information Officer (GIO). Alison has been working in the GIS field for 30 years. At MnGeo Alison leads a team that works on GIS programs and GIS services for Minnesota state agencies and the Minnesota GIS community. In 2023 MnGeo hired a surveyor to be a permanent part of the MnGeo team.

Patrick D. Veraguth – Douglas County
Patrick has been in the Surveying industry for 31 years, 20 years for Winona County and 11 years currently with Douglas County. Patrick is very passionate about Remonumentation. He has dug and established hundreds if not thousands of corners in his survey career. As chair of the GAC PLRC PLSS Remonumentation Legislation Sub Committee, he is working on finding an avenue to remonument all the Section corners in the state.

The State of Minnesota is moving ahead with the new PLSS grant that we were blessed with in 2023. Many counties have applied for this grant, make sure you do not miss the boat next time. We will be presenting on the grant application, answer any questions about it and talk about Remonumentation as well.

PRELIMINARY BRIDGE UNIT SURVEY AND ROADWAY NEEDS

Presented by **Cary Gries**
Survey Points and locations needed for bridges over water, roadways, or Rail Roads. Scanning needs. Difference between ORD and OBM. What information we can pull from files sent to us and what we need to be provided. BIP sheets, what information is needed and who is responsible. Alignments and Profiles provided by Survey and Roadway.

Cary Gries – MnDOT
Cary Gries is the ES in Preliminary Bridge Unit. She started in the bridge department, MnDOT in September 1998 in Final Design then moving to Preliminary. She received a BS degree In Business and Industrial Psychology at USD in SD with a Math minor. Later, going back to school in MN for Drafting.

RDOAI, DRONE DATA PROCESSING AND REAL-WORLD RESULTS

Presented by **Tanner Laverdiere**
This workshop will give an overview of the benefits of using a UAV to capture data. We will then cover how the platform works and the user interface. We will go over some of the AI based analytics tools and their real-world benefits. We will conclude with a demonstration of some of the workflows and have a Q&A.

Tanner Laverdiere – RDO Equipment
Tanner Laverdiere is the Construction Technology Software Product Manager for RDO Equipment, based out of Missoula, MT. He started as a diesel mechanic at RDO Equipment before moving into a Product Specialist role in 2015. His background is in install, repair, diagnostics, and training on Topcon machine control and survey equipment. In his current role he manages the Topcon Office portfolio, RDOai cloud-based drone processing and analytics platform, and Topcon Aptix jobsite management software.

REVIEW OF THE 1852 STATE LINE SURVEY ALONG THE ST. LOUIS RIVER: A DIAGRAM OF SURVEY BETWEEN A STATE AND A TERRITORY (PART 1)

Presented by **Anthony Lueck**
On June 4, 1852, George Stuntz accepted a contract from the Surveyor General of the General Land Office to survey the Boundary Line between State of Wisconsin and the Territory of Minnesota. Commencing at a meander corner on the St. Louis River, near its mouth at Lake Superior; thence westerly 18 miles up the river to the foot of the first rapids above the Indian Village; and thence, across land, running due south to the River St. Croix.

The survey line along the St. Louis River continued westerly from where Township surveys ended, and Indigenous lands remained. This presentation will review the field notes of the survey along the St. Louis River and a resulting Diagram of Survey map. This often-forgotten State Line survey is a part of the underlying framework for present Township Survey maps in Wisconsin and Minnesota. A variety of map exhibits will be presented; along with Land Surveyor correspondence and letters; era 1852.

STATUS OF THE 1852 STATE LINE BOUNDARY BETWEEN MINNESOTA AND WISCONSIN AND RECOVERY OF MILE POST MONUMENTS (PART 2)

Presented by **Anthony Lueck**

On June 4, 1852, George Stuntz accepted a contract from the Surveyor General of the General Land Office to survey the Boundary Line between the State of Wisconsin and the Territory of Minnesota. On October 20, 1852, George Stuntz would survey a meridian running South of the first rapids above the Indian Village on Nicollet's Map. The terrestrial State Line would run due South a distance of 40 miles 75 chains 84 links reaching the St. Croix River on November 10, 1852. The Surveyor General had specific instructions for the survey of the State Line and the Mile Post Line monuments. A Diagram of Survey for the State Line was filed with the Commissioner of the General Land Office on January 3, 1853. The 1852 Mile Post monuments have nearly disappeared completely from recovery. A general history of the State Line survey and map will be presented, along with a review of survey records after the original survey. An analysis of past and recent recovered Mile Post monuments for the State Line will be made in regard to protecting the original Boundary Line.

Anthony Lueck – North Country Land Survey

Anthony Lueck is a Licensed Land Surveyor in Minnesota and Wisconsin. His surveying experience began in 1981 as an Engineering Technician with the U.S. Forest Service-Engineering Department in Ely, Minnesota for seven years. Tony worked as a Survey Technician with the St. Louis County Land Surveyor's Office for eleven years in Duluth, Minnesota. Received his Minnesota Land Surveyor License in 1996 and Wisconsin Land Surveyor License in 1997. Tony worked as a Professional Land Surveyor with Krech, Ojard & Associates-Consulting Engineers on a variety of Engineering and Municipal projects for 8 years. He has been self-employed as a Land Surveyor at North Country Land Surveyor, Inc. in Duluth, Minnesota and Superior, Wisconsin since 2009. He is a member of MSPS and WSLS, and the Minnesota and Wisconsin historical societies.

TEMPORARY TRAFFIC CONTROL – WORKER SAFETY

Presented by **Jeff Morey**

Attendees will learn about Temporary Traffic Control Standards and Guidance in the state of MN. Some topics to be covered are the MN MUTCD MN Manual on Uniformed Traffic Control (MN MUTCD) what it is and who and how it affects work on MN roadways.

Jeff Morey – MnDOT

Jeff Morey has worked 45 years with MnDOT, 21 years as Highway Maintenance Worker in the Metro District. He spent 16 years of that as a Lead Worker and 13 years with Metro District Traffic Engineering/Work Zones as a Transportation Specialist. During this time, he designed temporary traffic control plans and provided assistance to MnDOT construction and contractors in the field. He spent 11 years with Central Office Traffic Engineering and 3

years as a Pavement Markings/Traffic Device specialist and the rest as a Work Zone Standards Specialist. In this role he provides guidance to industry and Government agencies, maintaining and updating TTC resources, and provides training and presentations at conferences.

TERRESTRIAL SCANNING & CONVENTIONAL SURVEY FOR ENGINEERING AND DESIGN

Presented by **Ryan Beltrand & Matt Vinopal**

Ayres has adopted the integration of terrestrial scan data with conventional survey methods combined with Unmanned Aircraft Systems (UAS) as our standard project approach for engineering and design projects. This strategy enables us to utilize the most suitable acquisition technologies for each project and to consolidate the data into a cohesive dataset. We ensure the preservation of the integrity related to the timing and methodology of the individual datasets, while also maintaining the overall accuracy inherent to these various technologies.

Ryan Beltrand – Ayres Associates

Ryan is a survey manager with Ayres Associates out of the Green Bay, WI office and manages Ayre's survey operations in Northern Wisconsin, Minnesota and North Carolina. He is a Professional Land Surveyor in WI, IL TX, NM, and NC with 20 years of experience in design, construction, and boundary related surveys. He has an AS degree in Civil Engineering Technology from Northeast Wisconsin Technical College and a BS degree in Land Surveying from Michigan Tech.

Matt Vinopal – Ayres Associates

Matt is a senior project manager within the Geospatial Division. He is dedicated to overseeing all aspects of high-accuracy lidar and photogrammetric projects for multiple departments of transportation (DOTs). Matt oversees all aspects of these projects from start to finish to ensure that accuracy requirements and specifications are exceeded for these highly detailed projects.

TERRESTRIAL SCANNING: FIELD TO OFFICE

Presented by **Brett Blomquist & Bryan Nagorka**

In our presentation on terrestrial scanning using the Trimble SX12 and Riegl VZ-600i, we will explore the full workflow from field data collection to office processing. We will cover best practices for efficient scanning, data registration, and extraction, ensuring accuracy and reliability in our deliverables. A key focus will be the field-to-office procedures, including point cloud extraction, and our final deliverables in CAD. Additionally, we will present short case studies showcasing real-world survey requests we handle, highlighting unique project requirements and solutions. Lastly, we will discuss the common challenges we encounter both in the field—such as environmental obstacles and site accessibility—and in the office, including data management and extraction challenges, offering insights into how we overcome these issues to maintain efficiency and precision in our workflows.

Brett Blomquist – MnDOT

Brett began his career as a summer helper at a private engineering firm, where he got hands-on experience in the field. He learned the ins and outs of construction surveying, working on various projects and learned skills. He then transitioned to working with MnDOT. In this role, Brett was exposed to a wide variety of surveying tasks. He took on new

challenges, adapting to the requirements of public sector projects and contributed to the development and maintenance of transportation infrastructure.

Brett has now worked up in MnDOT and is a LiDAR scanning processor, where he utilizes advanced technology to create high-precision maps and models. Working with LiDAR processing has been instrumental in providing accurate data for various project outcomes and advancing the field of surveying.

Bryan Nagorka – MnDOT
Bryan earned his two-year degree in Land Surveying and Mapping from St. Paul College, which laid the foundation for his career in the surveying and construction industry. He started at MnDOT as a student worker, gaining hands-on experience and building his skills in the field. Over the years, he worked his way up to become a Construction Surveying Crew Chief, spending 11 years in construction and developing expertise in various aspects of roadway and infrastructure projects. As his career evolved, he transitioned into working with LiDAR data, becoming a scanning processor where he has specialized in terrestrial scanning and point cloud processing for over three years. With 15 years at MN DOT, his experience spans from traditional surveying and construction to advanced 3D scanning technology, helping drive innovation in geospatial data collection and analysis.

THE FUTURE OF SURVEYING

Presented by **Dan Forsberg**
This session will review technology as it changes project design and construction.

Dan Forsberg – Leica Geosystems
Dan Forsberg is a Licensed Land Surveyor who has worked on projects small and large with understanding of complications and resolutions on all project sizes from field and Manager perspectives.

THE SURVEYORS AND INSTRUCTIONS FOR ESTABLISHING THE ORIGINAL TOWNSHIP SURVEYS IN MINNESOTA

Presented by **Donald Borcherding**
The Deputy Surveyors, instructions, timing and closures for establishing the Guide Meridians and Standard Parallels in the 4th and 5th PM surveys in Minnesota.

Donald Borcherding – Yaggy Colby Associates (Retired)
Don Borcherding 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. He has published 2 books “Explorations of Lt. Andrew Talcott 1819-1820” and “Surveying the Northern Boundary of Iowa”. He gives frequent presentations as “Captain Andrew Talcott” or “Captain William Clark”.

TREE IDENTIFICATION COMPARISONS: SOME ARE NOXIOUS WEEDS!

Presented by **Christina Basch & Dave Hanson**
Session focus is on tree identification topics. From a brief overview of identification characteristics to a quick look at comparing one species in a Genus to a second species in

the same Genus. What separates them, what to look for. This discussion will involve looking at several nonnative species, some are considered noxious weeds.

Christina Basch – MnDOT
Christina is a vegetation management specialist for MnDOT's Office of Environmental Stewardship. She previously worked for the Minnesota Department of Agriculture as a Noxious and Invasive Weed specialist based out of southeast Minnesota. She has a bachelor's in applied science – Biotechnology, and Professional Science Master's in Conservation Biology from the University of Wisconsin – Stout. Christina has been managing and teaching about invasive species around Minnesota for the last 8 years and has extensively worked with high priority noxious weeds in Southeast Minnesota.

Dave Hanson – MnDOT
Dave works in MnDOT's Office of Environmental Stewardship. He 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, he still teaches identification and management skills while honing his own skills daily – on questions from every corner of Minnesota.

TRIMBLE'S AUGMENTED REALITY

Presented by **Tony Edelbrock & Evan Traxler**
In this session, we will cover the new advancements in Trimble's Augmented Reality hardware and software. In addition to the new advancements, we are going to cover some of the areas of Trimble's Augmented Reality that have been released in the past that some of you might and might not know about already. The other main area of Trimble's Augmented Reality is Trimble AR Viewer. Other Trimble products that we will cover are Trimble Access, Trimble Connect, etc. We hope that you are able to attend this session to hear about Trimble's Augmented Reality products.

Tony Edelbrock – Frontier Precision
Tony Edelbrock is an Applied Geospatial Engineer for Frontier Precision, Inc. He started his career in 2004 working as a Survey Technician for the Stearns County (MN) Survey Department and in 2016 moved on to become a Senior Survey Technician with the Wright County (MN) Survey Department. He came to Frontier Precision in 2018 and is recognized as a Level III Certified Survey Technician with the National Society of Professional Surveyors. He provides training and technical support for Frontier Precision covering Minnesota and North Dakota. He currently works out of the Waite Park, MN office.

Evan Traxler – Frontier Precision
Evan Traxler is an Applied Geospatial Engineer at Frontier Precision and based out of the Maple Grove, MN office. Prior to Frontier Precision, he was enrolled at South Dakota State University where he obtained his undergraduate degree in Geography and GIS. He then went on to obtain his Master's in Geography from SDSU as well. As an Applied Geospatial Engineer, he works primarily with support and training for both In-Person as well as Virtual/Over-the-Phone at Frontier Precision. Evan supports primarily the southern half of Minnesota, as well as assisting with the rest of the Upper Midwest and Pacific Northwest.

TURNBACKS AND JURISDICTIONAL TRANSFERS OF RW

Presented by **Keith Jellinger**

Turnback: The release of a roadway and accompanying right of way from MnDOT to a lower road authority. In this session we will discuss the: Purpose of Turnbacks, MnDOT Turnback process , Associated Mapping required - Authorization/Picture Map, Final Products - Notices of Release and Quit Claim Deed.

Keith Jellinger – MnDOT

Keith Jellinger is the Office of Land Management's Property Conveyance Unit Lead and has worked 12 Years with MnDOT. He has been a professional Land Surveyor for 7 years and graduated from North Dakota State College of Science and St. Cloud State University.

UNDERSTANDING LEGAL DESCRIPTIONS

Presented by **Richard Morey**

Legal descriptions have a language all their own which may seem confusing to those not used to dealing with it. This session will provide an introduction to that language with a focus is on understanding and interpreting narrative legal descriptions. The goal is to be able to interpret a narrative legal description, not necessarily to be able to write one. Graphic legal descriptions such as subdivision plats and Registered Land surveys will not be covered. A knowledge of the PLSS and survey calculations is assumed.

Richard Morey – MnDOT (Retired)

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, which included the Legal Descriptions Unit. Rick has received the Minnesota Society of Professional Surveyors' Surveyor of the Year and the Rathbun award for advancing the surveying profession. He holds a Masters of Geographic Information Science from the University of Minnesota where he served as an adjunct professor. He also served as chair of the MSPS Government Relations Committee.

WORK ZONE SAFETY – SAFE WORK ZONES FOR ALL

Presented by **Michael Buhr, Sarah Keeling, and Timothy Parkos**

In this session we will cover communication and coordination to effectively create a safe working environment to include planning, setup, and site awareness. We will also discuss the most common risks for surveyors, hazards to watch for and actions to avoid ensuring the safety for yourself, your team and the public. There will be a small discussion on the importance of Temporary Traffic Control Zones to include some of the latest statistics from the 2024 Work Zone Awareness Survey. The survey results were generated courtesy of The Associated General Contractors of America. Research data from the upper Midwest. This session will be an open dialog encouraging real time Q&A.

Michael Buhr – Washington County Public Works

Michael Buhr is from Mackinaw City, Michigan and currently works for Washington County Public Works as a Survey Technician 2. Michael started his professional journey with the Minnesota Department of Transportation as a Transportation Associate in the spring of 2021. In November 2021, he began working with Washington County by assisting in the maintenance of the Public Land Survey System and evaluating along with calculating plat boundaries.

Michael most recently obtained his bachelor's degree in Land Surveying and Mapping from Saint Cloud State University in the fall of 2024. Managing full-time employment alongside his academic pursuits posed significant challenges in terms of time management, decision-making, and achieving a harmonious balance in life. Nevertheless, he is committed to continuous learning and dedicated to enhancing my professional capabilities. I have successfully completed the Fundamentals of Surveying examination and will be preparing for the Professional and state-specific examinations. In Michael's free time he loves hiking and exploring new areas, fishing, hockey, and remodeling homes.

Sarah Keeling – Washington County Public Works
Sarah Keeling started her career working for City of St. Paul Public Works Traffic Operations in 2006 before transferring to the Survey Department in 2016 reconstructing roads and bridges. In 2022 she began working for Washington County Public Works as a Senior Engineering Technician/Crew leader and became the first female crew lead in the Washington County Construction Survey department. Her education and Certifications include MnDOT ADA construction, St. Paul Tech for AutoCAD and the U of M for Civil3D. She obtained Maintenance Operations and Technical Certifications through the U of M LTAP program, member of the Washington County Safety Committee, NSC First Aid CPR & AED certified through the MN safety council, FEMA IS-100C.

Timothy Parkos – Washington County Public Works
Timothy Parkos with Washington County Public Works ROW Inspection specializing in Work Zone Safety Compliance. He has Multiple certifications and trainings provided by Minnesota Department of Transportation to include Temporary Traffic Control Supervision. Tim attended Inver Hills Community College for AA in Criminal Justice, Winona State University, and North Carolina State University for Maintenance Management Program. He has 8 years construction inspection experience, Toward Zero Deaths County Coordinator, Public Works Safety Committee Chairman, has 12 years of experience in Washington County as Parks Maintenance Supervisor, 10 years working for Washington County STS and another 5 years on the Emergency Response Unit at Oak Park Heights.

Vendors and Exhibits

95WEST AERIAL MAPPING

95West Aerial Mapping provides aerial acquisition and geospatial services throughout the United States and Canada. We are committed to offering unique solutions utilizing cutting edge equipment and delivering services tailored to our clients' needs. 95West became the first geospatial provider in the United States to offer large-format imagery and high-density Lidar solutions to be acquired simultaneously, providing greater accuracy and efficiency for our clients' projects.

Our transportation solutions, from roadways to railways to airports, enable our clients to fast-track project completion without sacrificing accuracy or quality. We regularly support major highway construction projects with transportation departments and engineering firms. We routinely work in large scale mapping solutions, such as high-density lidar and low altitude photogrammetry supported by a highly accurate ground control survey.

95West Aerial Mapping, LLC, is a wholly owned subsidiary of Widseth Smith Nolting and Associates, Inc. (Widseth), a Minnesota corporation. As part of a mid-sized multi-discipline organization, we are able to offer additional services and draw on the resources and staff from our twelve office locations across Minnesota and North Dakota to effectively serve our clients. Visit our website at 95westaerial.com to learn more.

AYRES ASSOCIATES, INC.

With a team of 350+ 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, mechanical/electrical/plumbing engineering, landscape architecture, environmental, planning and development, and telecommunications and SUE.

Contact us today to learn more: 800.666.3103 | www.AyresAssociates.com

CARLSON SOFTWARE

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 Luis Rojas at 563-235-7126 or lrojas@carlsonsw.com.

DESERT CREATIVE GROUP

Desert Creative Group is the Master Distributor for Tersus GNSS for the United States and Canada. Founded in 2014, Tersus GNSS has been at the forefront of creating affordable, high-quality, centimeter-accurate positioning technologies for various applications such as UAVs, surveying, mapping, GIS, precision agriculture, construction, engineering, deformation monitoring, autonomous vehicles, and more. Tersus is a pioneer in designing and manufacturing its own GNSS chips, Nuwa field software, and Inertial Navigation Systems (INS), continuously driving innovation in the industry. The diverse Tersus portfolio listed below is available from DCG and its authorized U.S. and Canadian partners.

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, and Seco. For more information, please contact Frontier Precision at www.frontierprecision.com or 1-800-944-8557.

LEICA GEOSYSTEMS, INC.

Our 200 years of passion for surveying demonstrate our ability to deliver precise and accurate instruments, sophisticated software, and trusted services to those shaping the future of our world. Leica Geosystems' pioneers and visionaries have shaped the history of surveying. Over the last two centuries, our company, in its various forms, has continuously delivered world's first innovations, maintaining surveying innovation leadership. From the evolution of theodolites to total stations, and even the miniaturization of laser scanners for practical everyday use, all our innovations aim to increase productivity, improve workflows, and provide richer valuable deliverables. www.leica-geosystems.com. Please contact Dan Forsberg at 612-385-6067 or email him at dan.forsberg@leica-geosystems.com for more information.

MINNESOTA DEPARTMENT OF TRANSPORTATION – RECRUITMENT OFFICE

At the Minnesota Department of Transportation, we strive to find talented employees with innovative ideas to advance Minnesota's nationally recognized transportation system. A MnDOT recruiter will be available to discuss job opportunities in the surveying field. Services provided will include education about MnDOT jobs, resume review, tips and tricks for applying to State jobs, and discussion about your career goals. Please stop by our

display to find out more about what MnDOT has to offer or contact us at jobs.dot@state.mn.us.

RDO EQUIPMENT CO.

Founded in 1968, RDO Equipment Co. sells and supports intelligently connected agriculture, construction, environmental, irrigation, positioning, and surveying equipment from leading manufacturers, including John Deere, Vermeer, and Topcon. RDO has a presence here to support the Surveying and Mapping equipment for the Geospatial markets focusing on construction related workflows.

TOPODOT

TopoDOT offers products and services designed to maximize the value of geospatial point cloud data across all operations active in the planning, design, engineering, construction and maintenance of the world's transportation and civil infrastructure. Our TopoDOT software application achieves the industry's highest levels of productivity and quality in every aspect of the digital twin production process. Our TopoShare process offers the industry's most effective solution to geospatial data governance at the lowest possible cost. And TopoDOT Consulting Services supports our user community in implementing these processes within their operations to ensure the highest levels of productivity, quality and profit.

VERTEX UNMANNED

Vertex Unmanned is industry experts providing turnkey solutions for drone, airborne, and mobile operations for a multitude of industries.

WHIRRX

Whirrx provides post-processing for ANY Drone System which enables a surveyor to fly their own surveys, with their drone of choice, and receive a digital survey deliverable with ground verifiable accuracy of 1 - 1.5 cm (less than 0.06ft) on hard surfaces. This enables any one to achieve the same accuracy as traditional topographic surveys with better resolution, less interpolation, and a superior aerial image deliverable. Whirrx partners with you from start to finish, to rapidly deliver a 3D model and Aerial of the site flown. For more information, please contact Steve Zeets at: Steve@Whirrx.com.

MEAL MENUS DURING WORKSHOP

Tuesday, March 11

Lunch: “19th Hole Buffet”
(Sliced Roast Pork, Broiled Tilapia with Lemon Dill Butter Sauce)

Dinner: “Deluxe Dinner Buffet”
(Roasted Herb Chicken, Broiled Salmon, and Butternut Squash Risotto)

Wednesday, March 12

Breakfast: **“**Buffet Style”

Lunch: “Italian Buffet”

Dinner: “Deluxe Dinner Buffett”
(Roast Beef with Demi Glaze, Herb Crusted Wild Caught Walleye Fillets, and Wild Rice Polenta with Ratatouille)

Thursday, March 13

Breakfast: “Buffet Style”

- ***Breakfast will be served in the Marina Dining Room***
- ***Breaks, Lunch, & Dinners 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/GNSS 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

Federal Highway Administration – http://highways.dot.gov/

International Right of Way Association – https://www.irwaonline.org/

Minnesota Association of County Surveyors – http://www.macsinfo.org/

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

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

National Highway Institute – http://www.nhi.fhwa.dot.gov/

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

The Minnesota State Legislature – https://www.leg.mn.gov/

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

WORKSHOP NOTES