



Supplemental Information (3.4.1)

Team Composition



Woolpert, Inc. (Woolpert) is a global provider of architecture, engineering, geospatial (AEG), and strategic consulting services to a wide variety of public, private, and government clients. With over 60 office locations internationally, Woolpert offers integrated services that encompass multiple disciplines in a large network of offices across multiple geographic regions. Woolpert has more than 1,919 full-time employees, 1,300 domestic employees, and 300+ international employees. Woolpert's 52 years of geospatial experience includes 5 statewide projects, and more than a million square miles of aerial acquisition collected and delivered to our clients.

A long-standing industry leader in mapping and surveying, Woolpert has built and vetted a global network of aerial platform and sensor providers that help in the collection of aerial imagery and elevation data, layering traditional methods with innovative new technologies to collect and process data efficiently for areas of interest (AOIs) around the world. Beyond these core capabilities, we've garnered a national reputation as a leader in systems development, GEOINT, IT support, GIS analysis, database design, and application development, to name a few.

Woolpert employs registered land surveyors and professional engineers with licensures in nearly 50 states and Guam; certified photogrammetrists; certified CAT-A hydrographers; GISP certified-GIS professionals (many of whom are Security+, Network+, and Esri-certified); certified mapping scientists; project management professionals; commercial multi-engine rating licensed pilots; unmanned aircraft system pilots; and sensor operators. Additionally, with 145 staff members dedicated specifically to the survey discipline, Woolpert can field 70 survey crews at any given time to support ground-based survey and emergency response requirements. Our diverse, worldwide clientele (each with a unique goal to meet) for lidar and photogrammetry services have allowed us to participate in and become familiar with the various formats, accuracies, and specifications in the development of data standards. Our staff of certified hydrographers are experienced in designing, planning, and implementing primary and secondary bathymetric data acquisition efforts, including the interface of acoustic (multibeam (MB), echosounder, and side scan sonar) and airborne lidar bathymetry. In addition to possessing and operating different sensors, Woolpert has used a variety of platforms (i.e., vessel, remote survey platforms, and aircraft), for data acquisition.



Resolution Group, Inc.

Resolution Group, Inc. (RGI) is an Indianapolis based, Disadvantaged Business Enterprise (DBE) ,and Woman-Owned Business Enterprise (WBE) civil engineering firm founded in 2008 specializing in survey, right-of-way engineering, roadway and intersection design, stormwater quality and management, hydraulic and bridge design, environmental permitting, utility coordination, and inspection services for contractors, consultant partners and public/private sector clients.

Along with their specialties, RGI can provide land surveying, construction surveying, right-of-way engineering and acquisition services, roadway and bridge design, traffic analysis, signal design, bridge inspection, signing and light design, utility coordination, permitting, drainage/hydraulics, site development, construction inspection, storm water quality management plans, erosion control design, and construction storm water inspection.



VESPA GROUP

Founded in 2014, **Vespa Group LLC (Vespa)** is an Indianapolis based technology consulting firm that has established a brand for bringing great value to a variety of public and private sector organizations. A Certified Service Disabled Veteran Owned Small Business (VOSB), Vespa employs 65 staff with an expertise in cloud solutions, data architecture and analytics, artificial intelligence and machine learning (AI/ML), enterprise architecture, staff and resource management, and advance cyber training.

As a Microsoft Gold cloud partner, Vespa has proven its ability to deliver world class cloud solutions with a focus on security, identity, infrastructure and platform, data analytics, productivity, and mobility. Additionally, Vespa Group is an



official Microsoft Certified Cloud Solution Provider (CSP) who can resell into both the Microsoft commercial and U.S. government clouds.

Vespa staff have been architecting data storage solutions for software applications, data warehousing, archiving, and data aggregation. Their services include designing data models, implementing and developing databases within MS SQL Server, MySQL, and MongoDB, just to name a few. They have experience with a wide range of application and system architectures and are accustomed to working with complex customer requirements.

In the area of AI/ML (whether real-time predictive analytics using Azure ML, incorporating Cognitive Services into an application, or developing custom models and algorithms), Vespa Group can assist with integrating cutting-edge technology into new or existing applications.



Founded in 1980, **VS Engineering (VS)** is a full-service consulting firm that specializes in solving infrastructure needs. The team offers a diverse cross-section of engineering experience to any project. Their professional engineers are highly skilled in large, collaborative teaming design and construction projects—yet remain ready to solve a local sidewalk, drainage or utility issue. In addition to water, wastewater, stormwater, and MS4 regulatory compliance services, VS has the experience and capacity to manage transportation and roadway, bridge and structural, site development, survey and right-of-way, and construction management projects.

VS specializes in providing innovative solutions in the areas of public infrastructure, large institutional civil/site needs, and energy sector land solutions and survey services. VS' core services are impact/feasibility studies, planning design and construction observation and inspection. Their in-house engineering services include roads, roundabouts and trails, traffic signals, signing and lighting, bridges and small structures, stormwater, water and wastewater, NEPA Services, wetland mitigation and permitting, survey and right-of way, site development, and utility coordination.



Founded in 2023, **Washington Columbia and Company** is an Indiana based consulting firm with expertise and focus on providing top tier technology and people solutions to public and private sector organizations and projects. Washington Columbia and Company's staff and extensive partner network provide unique value in its ability to quickly adapt and respond to client needs and provide the right experts to tackle the most challenging business problems.

Born out of 25 years of military service, Washington Columbia and Company understands the critical importance of planning, timeliness, and communications to execute and achieve mission success. Washington Columbia and Company is certified as an Indiana Veteran Owned Small Business (VOSB) as well as an Indiana Minority Business Enterprise (MBE).



Keystone Aerial Surveys, Inc. (Keystone) specializes in providing quality aerial surveys throughout North America. Since 1963, Keystone has flown millions of survey miles throughout the U.S. on projects with varied specifications. Their flight department is experienced in the acquisition of digital imagery and lidar from high and low altitudes using both ABGPS and IMU. Keystone has special qualifications for flying large aircraft statewide and multiple county projects in one season, and is an expert in the execution of projects over all types of terrain and weather conditions as well as in restricted airspace. They have extensive experience in contract management of large, complex projects where quality control and communication are paramount.

Keystone has successfully completed many statewide projects as well as township and county work. Over the last six decades they have evolved and grown with the technology of the times without altering their long-standing commitment to acquiring and delivering quality aerial photography. **Over the past three years, Keystone has successfully performed as a Woolpert subconsultant for aerial data collection for 10 projects.**

Project Team

- **Certified GIS and Project Management Professional** [Ryan Bowe](#) will serve as the team's designated [Project Manager](#). Ryan is currently serving as the First Vice President for the Indiana Geographic Information Council. She



will continue as President in May 2024. She is a co-chair to the Elevation Working Group, Chair for Partnerships Committee, and a member of multiple committees including Conference, Communication, and Membership. She will also be co-chairing the Geospatial Coordinator's Forum this month.

- **ASPRS-Certified Photogrammetrist and GIS Professional Brian Stevens** will serve as the team's designated **Program Director**. Brian is the Program Director for countywide and statewide GIS/base mapping (Lidar/orthoimagery) programs, serving in the capacity of a technical project manager, building specialized teams, and coordinating planning, acquisition and production of base mapping GIS data, while also engaging with clients daily to assess their needs and create responsive, effective and accurate solutions.

A Woolpert Vice President, Brian brings not only this expertise to the team but full corporate commitment as he continues to provide quality services to state of Indiana.

A skilled project management team and experienced support staff are integral to the success of this Program. Our team brings a balance of technical skills and practical insights gained through an average of 20 years of experience. Woolpert's multidiscipline capabilities set us apart. Our team not only has the technical skills to perform the services requested—we also understand and appreciate how the end products will be used, allowing us to proactively address quality concerns before they become a problem. Our approach to geospatial projects is collaborative and cohesive. We engage key staff with clients from the start and preserve continuity of a team throughout a project.

Project Organization Chart

The individuals shown in the organization chart below are expected to be the most involved in this Indiana Orthoimagery and Elevation Program. Our key project personnel possess the relevant experience, professional registrations, certifications, licensure and accreditations to successfully perform all of the required services as stated in the SOW. Their resumes following in this section.

PROJECT MANAGEMENT

PROJECT DIRECTOR

Brian Stevens, CP, GISP

PROJECT MANAGER

Ryan Bowe, GISP, PMP

QUALITY MANAGER

Mike Venegas, CP

PRODUCTION MANAGEMENT

Matt Worthy, PMP

SURVEY & CONTROL SERVICES

Required Product Deliverables

- Supplemental Control

TEAM LEADS

Lead Surveyors

William Dougherty, PS
Resolution Group, Inc. (WBE)

AERIAL DATA ACQUISITION

Required Product Deliverables

- Flight Plans
- Quality Control Report

TEAM LEADS

Flight Operations

Jonas Svoboda
Keystone Aerial Surveys, Inc.

LIDAR PRODUCTS

Required Product Deliverables

- QL1 Lidar Point Cloud (8ppsm)
- 2-foot Digital Elevation Model (DEM)
- 2-foot Intensity Image
- Hydrographic Breaklines
- Quality Control & Accuracy Report

Optional Product Deliverables

- QL1 Lidar Point Cloud (25ppsm)
- Building & Vegetation Classification
- 2-foot Digital Surface Model (nDSM)
- 2-foot Normalized DSM (nDSM)
- Raw Swath Data

TEAM LEADS

Lidar Processing

Ben Beckman

Elevation & Derivatives Processing

Zachary Schuler

Quality Control

VS Engineering, Inc. (MBE)

ORTHOIMAGERY PRODUCTS

Required Product Deliverables

- 6-inch Orthoimagery
- 3-inch Orthoimagery (Lake Michigan)
- Quality Control & Accuracy Report

Optional Product Deliverables

- 3-inch Orthoimagery

TEAM LEADS

Orthoimagery Processing Brandon McKenzie

Quality Control

Vespa Group, LLC (IVOSB)
Washington Columbia & Company (IVOSB)

ADDITIONAL PRODUCTS

Required Product Deliverables

- FGDC-compliant Metadata

Optional Product Deliverables

- 1- or 2-foot Contours
- Building Footprints
- Planimetric Data
- Landcover/Land Use Data
- Other Remote Sensing Technologies

TEAM LEADS

GIS & Derivatives Processing

Kayla Keller

AI/ML Center of Excellence

Daniel Ngoroi, GISP, CMS RS

DATA HOSTING

Required Product Deliverables

- QA/QC Viewer (SmartView Connect)
- OGC-Compliant Streaming (STREAM:RASTER)

TEAM LEADS

Digital Innovations

Christopher Morabito



Brian Stevens, CP, GISP

Program Director

- Program Director for countywide and statewide GIS/base mapping (Lidar/orthoimagery) programs, serving in the capacity of a technical project manager, building specialized teams, and coordinating planning, acquisition, and production of base mapping GIS data, while also engaging with clients daily to assess their needs and create responsive, effective, and accurate solutions.
- Bridges the gap between clients and project staff to ensure scopes, schedules, and budgets align with clients' needs, implements stringent QA/QC protocols, performs final QC of deliverables, and works with the project team to trouble-shoot technical challenges and provide ongoing training.
- As a part of his effort to continue to strengthen Woolpert's project teams, Brian remains active in industry organizations and seeks small business partners with niche services. He excels at securing in-state partners to keep clients' money in their local economies, and frequently collaborates with clients and subconsultants to increase awareness of emerging geospatial applications.
- Has been leading the Ohio Statewide Imagery Program (OSIP) since its inception in 2006. Under these contracts, his team has produced a wide range of derivative products to enhance the states' return on investment, including an interactive solar map and various feature extraction derivatives. Brian also manages orthoimagery and lidar projects for various state agencies, such as the ODNR, as well a nationwide basemapping and utility inventory contract with private clients.
- A leader in the geospatial industry, is active in industry forums—presenting as a subject matter expert in topics such as the applications of statewide imagery programs, data fusion, mobile mapping, aerial lidar, and the United State Geological Survey's (USGS's) 3DEP Lidar Program. He is currently working with Woolpert's in-house photogrammetrists and researchers to develop new applications and workflows for existing geospatial technology.

Years of Experience

27 years

Education

Bachelor of Science, Geography and GIS

Professional Registration(s)

ASPRS-Certified Photogrammetrist (#1293)

Certified GIS Professional (#67817)

Relevant Experience

Ohio Statewide Imagery Program (OSIP) 1, 2 & 3—Ohio. Program Director who has managed/directed the OSIP program since its inception. The Ohio Statewide Imagery Program 3 is a contract issued by the State of Ohio for the acquisition of professional geospatial services such as orthoimagery, lidar, oblique imagery, parcel conversion, and remote sensing analysis. The scope of this contract includes the entire geographic area of the state of Ohio and immediately adjacent territory. Woolpert also successfully performed similar work under the OSIP 1 and OSIP 2 contract, which resulted in the current OSIP 3 contract.

Hydrology/Drainage and 2-Foot Contours—Franklin County, Ohio. Program Director /Principal for the management of work performed in conjunction with the Ohio Statewide Imagery Program (OSIP) and contracted through the County of Franklin, OH. Woolpert generated a countywide hydrology layer using catchments (6-acre in the rural areas and 20-acre in the urban areas) within the HUC12 around the county boundary totaling ±544 square miles.

On-Call GIS Consulting Services Contract—Columbus, Ohio. Program Director /Principal for this on-call services contract to provide professional services in support of the Department of Technology and other city departments' GIS applications and projects.

Fairfield County Base Mapping Program—Fairfield County, Ohio. Program Director /Principal providing services to Fairfield County since 2006. The 2020-2025 project involves a new 5-year base mapping program – Countywide 12-inch orthoimagery and CAUV crop delineation (Summer of 2020, 2022 and 2025), QLO lidar upgrade (Fall of 2020), Countywide 3-inch orthos (Spring of 2021 and 2024). The new color 8-bit, 4-band (R, G, B, and NIR) stacked digital orthoimagery encompassed the entire land area of the county, or ±508.5 square miles including a 100-foot buffer zone outside the county boundary.

Clinton County Base Mapping Program and Imagery Hosting—Clinton County, Ohio Program Director /Principal for maintaining a 20 plus year history with Clinton County dating back to 1999 when Woolpert provided the County with digital orthophoto-based GIS and parcel map conversion services. Most recently (2019) Woolpert collected new 4-band, 8-bit digital orthoimagery at a 3-inch and 6-inch pixel resolution to update the existing countywide orthoimagery collected by Woolpert in 2014. The project area encompassed all 412.4 square miles of the county, with an additional 100-foot buffer zone to ensure seamless mosaicking of the tiled orthos.

City of Toledo GIS/SAP Integration, City of Toledo—Toledo, Ohio. Program Director /Principal for Woolpert's contract with the City of Toledo to provide impervious surface mapping services to the City of Toledo, update the current GIS and SAP billing data for more accurate billing, develop a methodology for keeping the disparate data sets up to date, assess the stormwater management program for existing and future revenue and resource needs, recommend improvements to the billing methodology to increase in revenue generation, and develop a map-based interface and other activities for public outreach and communication.



Ryan Bowe, GISP, PMP

Project Manager

- Geospatial Manager with more than 20 years of experience specializing in all aspects of geospatial data acquisition, creation, management and delivery. With a passion for all things geospatial including but not limited to metadata creation, data quality control, and quality assurance (QA/QC), she will oversee all aspects of the Indiana Orthoimagery and Lidar Program. She has an intimate understanding of the needs and wants from the Indiana GIS Community, as she (in addition to working with and supporting our prior Indiana Geospatial Management Team) has been active with IGIC for several years and will be taking a leadership role as the incoming IGIC President.
- In addition to her responsibility to oversee all aspects of the Indiana Orthoimagery and Lidar Program, she will also have direct input with designing and implementing custom QA/QC processes for each individual program task using Woolpert's ISO 9001:2015 procedures and verifies that requirements for accuracy, completeness, consistency, and aesthetics of the mapping and GIS products are met.
- Proficient with ArcGIS Pro, Microsoft Office Suite, Microsoft 365 tools and apps, Adobe Photoshop, Global Mapper, MicroStation, Adobe InDesign, Visual Studio, C#, FME (Safe Software), Pix4D, Esri Drone2Map, Oxygen XML Editor, and Microsoft Project.
- Experienced with geodatabase creation and has project experience involving lidar, imagery, orthophotography, remote sensing, compilation, and cartography.

Years of Experience

20 years

Education

Master of Geographic Information Science

Bachelor of Arts, Anthropology/Sociology

Professional Registration(s)

GISCI Certified GIS Professional (#67155)

Project Management Professional (#3250752)

Relevant Experience

Indiana Statewide Imagery and Lidar Program. [Assistant Project Manager](#) responsible for interacting with the Program Director (Kent Park) and Woolpert Staff involved with the Imagery Program. In addition, she functioned as a conduit for communication with active participants (i.e. buy-ups). She was also involved with completing data translations and conversions, writing metadata, and conducting final QA/QC of geospatial information. Base deliverables included 4-band imagery and QL2 lidar covering the entire state of Indiana. Cities and counties had the option to buy up from the standard product of 1-foot resolution, 4-band orthophotography to 6-inch or 3-inch resolution imagery through a cooperative purchasing agreement with the State of Indiana.

Ohio Statewide Imagery Program (OSIP) 1, 2 & 3—Ohio. [Task Manager](#) whose duties were to oversee and manage all aspects of final product deliveries, which consisted of orthoimagery, lidar, planimetric and topographic mapping and included the base and all buy-up projects. The scope of this contract includes the entire geographic area of the state of Ohio and immediately adjacent territory. Woolpert also successfully performed similar work under the OSIP 1 and OSIP 2 contract, which resulted in the current OSIP 3 contract.

Clinton County Base Mapping Program and Imagery Hosting, Clinton County, Ohio. [Project Manager](#) responsible for all aspects of the geospatial components needed and created for the County. From her extensive background with data management, she also oversaw the completion of data translations and conversions, writing metadata, and conducting final QA/QC of geospatial information. There is an extensive list of deliverables that includes new color 8-bit, 4-band (R, G, B, and NIR) stacked digital Orthoimagery (2022), QL1 lidar (2023) and countywide building outlines (2022) and edge-of-pavement mapping (2024).

Fairfield County Base Mapping Program, Fairfield County, Ohio. [Project Manager](#) responsible for all aspects of the geospatial components needed and created for the County. From her extensive background with data management, she also oversaw the completion of data translations and conversions, writing metadata, and conducting final QA/QC of geospatial information. There is an extensive list of deliverables that includes color 8-bit, 4-band (R, G, B, and NIR) stacked digital Orthoimagery (2021 & 2024), QLO lidar (2022), landcover delineation (2017) and CAUV Crop Delineation (2022 & 2025).

GIS Building Outline Dataset Enhancement, Franklin County Auditor, Columbus, Ohio. [Project Manager](#) and QA/QC Risk Management Officer who served as the Quality Control Team Lead responsible for overseeing the writing of metadata and preparation final deliverables for various projects including orthoimagery, lidar, remote sensing and data development (compilation). While managing her team members, she also managed the QC phases. Franklin County, Ohio hired Woolpert to update and enhance its building outlines to support both local municipality and county GIS business objectives. Woolpert, Inc. performed high resolution photography services for the City of Columbus (+544 mi²) in 2019. Using those pictures, Woolpert applied a proprietary analysis process to validate the outlines of discreet buildings in highly dense urban areas, such as a city. Woolpert used an Interactive Automated Feature Extraction process to produce the building outlines. The team utilized off-the-shelf remote sensing software, proprietary software and applications to perform automated feature analysis incorporating both imagery and lidar data.



Luis (Mike) Venegas, CP

Quality Assurance Manager

- Responsible for providing design and oversight of the firm's ISO 9001:2015 certified Quality Management Program (QMP) based on PMI and Lean Six Sigma methodologies.
- Collaborates with team leaders to develop quality procedures, analyze reports and performance data to identify trends and outliers, develop corrective action plans, and drive continual improvement.
- Performs measurements and audits, and monitors key performance indicators (KPIs), metrics and other process performance data, ensuring team adherence to project-specific QA/QC workflows as well as ISO and Woolpert Geospatial QMS quality standards.
- Interacts with all levels of management and project leadership to develop quality policy, objectives, and track and report key performance metrics.

Years of Experience

26 years

Education

Bachelor of Arts | Geography

Professional Registration(s)

ASPRS Certified Photogrammetrist (#1568)

Lean Six Sigma Yellow Belt (ICYB) (ID 48960220)

Certified ISO 9001:2015 Lead Internal Auditor (C-433282)

Relevant Experience

Quality Assurance Manager who provided oversight and adherence to the firm's QMS program for the following clients:

- US Army Corps of Engineers (USACE): 12 projects
- Naval Facilities Engineering Command (NAVFAC): 28 projects
- National Geospatial Intelligence Agency (NGA): 10 projects
- Army Geospatial Command (AGC): 6 projects
- United States Geological Survey (USGS): 4 projects
- County/Municipality/University: 10 projects

Lee County Cooperative Aerial Project 2023 | Auburn, Alabama. **Quality Manager** who provided oversight and adherence to Woolpert's ISO Program in support of this joint project between the cities of Auburn, AL; Opelika, AL; Lee County, AL; and Auburn University to acquire 3-inch and 6-inch, 4-band orthorectified imagery and digital terrain products to support 1-foot contours.

Mississippi River Corridor Low Water Lidar Acquisition—Mississippi. **Quality Manager** who provided oversight and adherence to Woolpert's ISO Program in support of this task order that involved the acquisition and processing of lidar elevation data along the Mississippi River corridor from Old River to just above Venice, LA, near river mile 12 within the New Orleans District. The proposed 575 square mile project supports channel improvement and obtains measurements of the bare ground surface as well as top surface elevation data for USACE analysis.

2021 Post-Hurricane IDA, 3-inch Aerial Imagery and Lidar Collection—Louisiana. **Quality Manager** who provided oversight and adherence to Woolpert's ISO Program in support of this task order that involved the acquisition and processing of 3-inch 4-band digital aerial imagery and lidar elevation data along 6 levee systems within the New Orleans District that supported emergency response for damage assessment following Hurricane Ida in Louisiana. Immediately upon receipt of the task order, Woolpert deployed four (4) aircraft to the project location to begin collection of the airborne data as conditions allowed. The 575 square mile project supported channel improvement.

Color IR Digital Orthophotography for the Beneficial Use Monitoring Program (BUMP) (FY22)—Coastal Louisiana. **Quality Manager** who provided oversight and adherence to Woolpert's ISO Program in support of this task order that involved the acquisition and processing of color infrared aerial imagery and orthophotography to support USACE New Orleans District Beneficial Use Monitoring Program (BUMP). The project consisted of 6 locations totaling 1,043 square miles along the Louisiana Gulf Coast.

St. Charles Parish Lidar Topographic Mapping— Louisiana. **Quality Manager** who provided oversight and adherence to Woolpert's ISO Program in support of this task order that involved photogrammetric mapping, lidar topographic mapping, digital orthophotography and GIS processing for this USACE task order consisting of four U.S. Army installations. Mapping was compliant with SDSFIE standards and delivery of the data was made in Esri GDB, Esri elevation formats (TIN, GRID, Terrain) and GeoTIF formats.



Steven (Matt) Worthy, PMP

Production Manager

- Oversees geospatial data projects that range from standard GIS mapping to multi-sensor data acquisition and processing, including airborne topographic lidar, and digital imaging and remote sensing sensors. His dedication to customer satisfaction from project start-up to completion is why he was chosen for his role as Production Manager for this State of Indiana initiative.
- Accustomed to managing large, complex projects involving many individual and subcontractor team members. Commonly oversees programs worth over \$1M annually, often covering nation or region-sized project areas.
- Skilled in all facets of GIS data compilation, production of digital cartographic datasets and models, and development of geospatial data processing. Matt has managed geographic data creation and maintenance projects in North America, South America, Europe, Africa, and Asia.
- Extensive experience with a variety of government agencies including NGA, USACE, USGS, AGC, and NAVFAC and their projects' varied deliverables.

Years of Experience

9 years

Education

Bachelor of Science | Geographic Information Systems

Professional Registration(s)

Project Management Professional
(#3700829)

Relevant Experience

USGS GSPC IV Program—United States. [Production and Project Manager](#) where Woolpert was again selected by the USGS as a Prime Contractor to provide professional mapping and surveying services for the production of graphics and spatial vector and raster digital data under the Geospatial Products and 3DEP Services v.4 (GPSC IV) A/E IDIQ Contract for services throughout the United States, its territories, and possessions. Standard task order deliverables have included kick-off meetings with both USGS personnel and project customers; lidar data acquisition including weekly acquisition progress reports; ground control survey field work; ground control and land cover classification check points; lidar data processing; hydrologically flattened DEMs; classified lidar point clouds in LAS format; FGDC compliant metadata in XML format and a final task order report. GPSC IV task order has involved elevation derived hydrography (EDH) and tasks involving high-precision airborne geophysical surveying services.

Trimble Vegetation Management—Illinois. [Production and Project Manager](#) where Woolpert was selected to collect high point density airborne lidar from a piloted-fixed wing aircraft. Woolpert's sensors collected an average of 35-40 ppsm for the projects' area of interest. This data was calibrated with ground control to deliver 15cm accuracy RSME. The data was then classified into several classes, including Poles, Wires, Vegetation, Ground, and Buildings. Wires and poles were then vectorized and ingested into Trimble's Lidar Analyzer software before being utilized in Trimble's Vegetation Manager software for the client.

National Geospatial-Intelligence Agency (NGA) Programs—International. [Production and Project Manager](#) where Woolpert has provided GIS/Mapping/Photogrammetry services in support of the National Geospatial-Intelligence Agency (NGA) under the Omnibus Program (1999-2003), Global Geospatial Intelligence Program (2003-2013), Foundation GEOINT Content Management Program (2014-2018), and the Janus Geography Program (2018-present). Since 1999, we have delivered foundation GEOINT products that meet the current standards for NGA topographic and elevation products. Work has included stereo/monoscopic feature extraction; feature content management; conflation and integration; pinpoint content maintenance and enrichment; imagery interpretation and analysis; terrain extraction; metadata application; and product finishing. Woolpert has utilized 2D Commercial Imagery, baseline GIS Data, commodity GIS data, crowd-sourced GIS data, and a variety of other GFI to provide the following services: Topographic Data Store (TDS) data collection; Multinational Geospatial Co-Production Program (MGCP) data collection; data assessment/evaluation; data integration/conflation; and data enrichment/conditioning. Technical activities have included: performing photographic interpretation and imagery analysis; organizing and utilizing ancillary source imagery, data and intelligence databases; assessing, conflating, and integrating multiple source datasets; data translations, attribution, and editing; applying custom QA/QC processes. To perform these activities Woolpert uses ESRI ArcGIS applications, government-furnished GAIT software (quality control/data integrity), and Global-EGD streaming satellite imagery services.

Fluor-BWXT Portsmouth Annual Survey—Piketon, Ohio. [Production and Project Manager](#) where Woolpert has performed annual aerial surveys of the Department of Energy's Portsmouth Gaseous Diffusion Plant. For nearly 10 years, Woolpert has collected 3-inch (4-band) orthoimagery and 6 ppsm lidar in support of Fluor-BWXT's decontamination and decommissioning operations.

Georgia Power Volumetrics—Georgia. [Production and Project Manager](#) where Woolpert has surveyed various Georgia Power facilities and generated volumetric assessments of specified material stockpiles on a quarterly basis for nearly 20 years. Each survey requires either 3-band stereophotography or lidar data to be collected from piloted aircraft with precise temporal accuracy to ensure accurate analysis.



William Dougherty, PLS Surveyor

- Design and survey experience includes numerous residential, commercial, retail, and industrial developments, encompassing land, water, infrastructure, transportation, and more. Clients appreciate his collaborative and enterprising mindset, which is reflected in his many ongoing client partnerships.
- Responsible for the progressive master planning and infrastructure design of a Park 100 Business Park, which now spans over 2,200 acres, and consists of 20 million square feet of buildings. He also managed the site design and master planning of the state-of-the-art Indianapolis Colts Training Facilities, where he coordinated a subsequent expansion.
- Frequently participates in public outreach opportunities and was awarded the Golden Hammer Award for leading Woolpert's volunteer efforts in the design of two Habitat for Humanity Communities, consisting of over 200 houses.
- Collaborates with the National Lieutenant Governors Association on strategies for economic development and helped to generate solutions for the redevelopment and revitalization of blighted neighborhood areas as part of a non-profit Neighborhood Alliance Committee. Further experience includes assisting in the revamping of zoning and development standards as a member of three different Mayor's Task Force Committees.

Years of Experience

44 years

Education

Bachelor of Science | Construction Technology
Associates | Architectural Technology

Professional Registration(s)

Professional Land Surveyor | IN
(#LS80880038)

Relevant Experience

Runway 5R-23L and Taxiway D Strengthening and Capacity Enhancements (Part B), Indianapolis International Airport (IND)—Indianapolis, Indiana. [Surveyor](#) for this Woolpert design led reconstruction of Runway 5R-23L and Taxiway D for the purpose of strengthening the pavements and accommodating the capacity demands at the Indianapolis International Airport (IND). This includes grading and drainage, paving and marking, airfield lighting and signage, and NAVAIDs. Additionally, the project involved constructing a new Taxiway C8/D8 crossover taxiway system and realignment of Taxiway N to eliminate the need for taxi operations on the crosswind runway, Runway 14-32.

Proscenium Development, Anderson Birkla Investment Partners, LLC | Carmel, Indiana. [Survey Manager](#) for the design of this \$60 million, mixed-use, downtown development includes 225 luxury one- and two-bedroom residential units and high-end amenities designed to appeal to the walkability and social needs of the millennial generation. It will also have 20,000 SF of retail space and 60,000 SF for office use, centered on a 1.8-acre public green space.

Bean Creek Redevelopment | Indianapolis, Indiana. [Survey Manager](#). Woolpert was contracted by the city of Indianapolis to provide survey and engineering design services for neighborhood drainage improvements in five areas. Data collection, including topographic and right-of-way survey information, was carried out by the Woolpert survey crew. They also conducted limited geotechnical analysis of soils, and cores for existing conditions of pavements. The engineering team leveraged existing information of the site areas and created a preliminary hydraulic model, as well as proposed design solutions. Detailed stormwater design with construction drawings and specifications was delivered to the client. Woolpert also provided permit assistance through utilizing the bidding documents to **prepare necessary applications**.

Cincinnati Casino Horizontal Design, Rock Gaming—Cincinnati, Ohio. [Surveyor](#) responsible for contract review, status updates to the client, revenue projections, and scheduling. Woolpert provided design services for development of the site used for the Cincinnati Casino. This project consisted of the following design areas: site demolition and preparation design mass grading design; on-site civil design; combined sewer relocation for future use; construction support and bidding/award support; construction site master planning and utility service; retaining wall design; and execution management.

Ivy Tech Masterplan East Central Regional Campus, ITCC—Indianapolis, Indiana. [Surveyor](#) responsible for setup review and approval, resource allocation, and project management. Woolpert was selected by ITCC to develop a Masterplan for their East Central campus. New, target and obsolete facilities were inventoried to determine future utilization. The planning team used a data-driven process applying customized modeling criteria developed with the college to assess space types on the campus including classrooms, teaching labs, offices, office service, study, general use, special use and campus support space. The process was directly integrated with the space inventory, in order to determine the impact of proposed future changes on space for location or program. The Masterplan deliverables were contained in AutoCAD.



Ben Beckman

Lidar Specialist

- Responsible for performing and leading the calibration and processing of lidar data acquired by aerial lidar systems, employing and/or developing software, integrations, and methodologies for lidar calibration, automation, point cloud filtering, and QA/QC as well as proprietary data calibration procedures to optimize data accuracy.
- Lidar product specialist who performs IMU and lidar point processing, calibration, editing and classifies lidar data and adhering to project-specific workflows.
- Responsible for lidar data editing and filtering; and data accuracy reporting, to ensure the data meets project required accuracy.
- Proficient in the use of software that includes ArcGIS, TerraSolid, Applanix POSPac, Python, GeoCue lidar Workflows.
- Experienced in various types of mapping standards such as ASPRS, NMAS and National Standards for Spatial Data Accuracy, Spatial Data Standards for Facilities, Infrastructure and Environment and A/E/C/ CADD Standards.

Years of Experience

14 years

Education

Bachelor of Science | Geographic Information Systems

Relevant Experience

Mississippi River Corridor Low Water Lidar Acquisition—Mississippi. [Lidar Specialist](#) responsible for data processing that includes ground filtering, classification, DEM creation, hydrologic breakline compilation for this task order involved the acquisition and processing of lidar elevation data along the Mississippi River corridor from Old River to just above Venice, LA, near river mile 12 within the New Orleans District. The proposed 575 square mile project supports channel improvement and obtains measurements of the bare ground surface as well as top surface elevation data for USACE analysis.

St. Charles Parish Lidar Topographic Mapping—Louisiana. [Lidar Specialist](#) responsible for the lidar data processing that includes ground filtering, classification, DEM creation, and hydrologic breakline compilation. Breaklines were collected where necessary to support 1-foot contours and at all waterbodies. Using the classified LAS files and breaklines, Woolpert produced Digital Terrain Models (DTMs), Digital Surface Models (DSMs), and 1-foot contour products for the Parish. Accuracy of the elevation models was assessed using the lidar check points collected in the field. The scope of this task order involved the acquisition and processing of topographic airborne lidar data for 311 square miles in St. Charles Parish, Louisiana. This project was a follow-on project to a parish-wide 3-inch ground sample distance (GSD) 4-band orthophotography project previously completed.

Forestry Imagery and Lidar Mapping—Morgan and Scott Counties, Tennessee. [Lidar Specialist](#) responsible for the lidar data processing that includes ground filtering, classification, and producing lidar-derived topographic elevation models and contours meeting QL1 standards for this 105 square mile forested area in North-Central Tennessee. The project also involved the acquisition of processing of 4-band 12" GSD orthoimagery.

3-inch Aerial Imagery and Lidar Collection—Louisiana. [Lidar Specialist](#) responsible for the Lidar data processing that included ground filtering, classification for lidar elevation data. This project supported emergency response for damage assessment following Hurricane Ida in Louisiana. This project included the collection of data along six levee systems within the New Orleans District. Mr. Beckman also assisted with the production of deliverables that included a lidar calibration report and Lidar and ortho accuracy reports.

Aerial Imagery Acquisition, Digital Orthoimagery Production, Lidar Acquisition, Digital Elevation Dataset Production and New Compilation of GIS Planimetric Mapping, LINK_GIS Partnership—Kenton and Campbell Counties, Kentucky. [Lidar Specialist](#) responsible for developing budget, price, and technical scope and also dynamic project planning for project estimates. Woolpert supported LINK-GIS by producing new orthoimagery, lidar data, and planimetric mapping in Kenton and Campbell Counties in Northern Kentucky, covering Kenton and Campbell Counties \pm 353 mi² (914 km²). New 4-band (RGB and NIR) digital aerial imagery was obtained across the project area using the ADS100 multi-spectral camera to support the production of orthoimagery at a 3-inch pixel resolution. Woolpert performed softcopy aerial triangulation to densify the control across the project area. Using the new lidar bare earth data, Woolpert produced a lidar derived DEM made specifically for orthoimagery production. Woolpert produced new 4-band digital orthoimagery at 3-inch pixel resolution, with accurate X, Y ground coordinates, and RGBI scale values from 0 to 256. Data was delivered in the Client's existing tiled format, 2,500' x 3,500' tiles. Woolpert performed Airborne GPS and IMU processing, resolving kinematic corrections for the aircraft position using aircraft GPS and static ground GPS (1-Hz) for each geodetic control (base station) within the AOI limits. Woolpert produced a DTM by using the lidar mass points, lidar derived breaklines, and surface (3-D) planimetric and hydro features. Woolpert produced new hydro mapping in accordance with the USGS version 2.1 Elevation-derived Hydrography Specifications.



Zachary Shuler

Lidar Specialist (Elevation & Derivative Processing)

- Leads Woolpert's calibration and processing of lidar data acquired by aerial lidar systems from Leica, and other proprietary systems.
- Performs IMU and lidar point processing; calibrate, edit, and classify lidar data.
- Processes and leads a team of analysts in processing lidar data into deliverable products, such as Digital Elevation Models (DEMs), Digital Surface Models (DSMs), classified point cloud data, and LAS and ASCII (XYZ) files.
- Experienced in the use of a diverse range of software, including MicroStation, TerraSolid, Global Mapper, QT Modeler, LP360, GeoCue, and Esri's ArcGIS suite to produce intensity images and extract hydrographic and planimetric features such as rivers, shorelines, streams, lakes, ponds, docks, seawalls, ditches, bridges, curbs, and vegetation.
- Performs lidar boresighting and editing for flightline accuracy and specification compliance, as well as lidar accuracy reporting.
- Develops software, integrations, and methodologies for lidar calibration, automation, point cloud filtering, and QA/QC; develop proprietary data calibration procedures to optimize data accuracy.
- Possesses substantial experience in hydrologic feature breakline compilation using lidar intensity imagery.

Years of Experience

16 years

Education

Bachelor of Arts | Geography

Relevant Experience

Ohio Statewide Imagery Program (OSIP)—Ohio. [Lidar Specialist](#) responsible for the post-processing, QC and classification of the collected lidar data. Specifications included county/city-based coverage in 1-meter (or denser) lidar point density, delivered in 2,500' x 2,500' or 1,250' x 1,250' grid tiles (based upon the ortho buy-up that each County/City selects (6-inch or 3-inch)). This contract, issued by the State of Ohio, is for the acquisition of professional mapping services: lidar, natural color oblique imagery, four-band orthoimagery, and the ability to provide information from any other remotely sensed data source.

Indiana Statewide Orthoimagery and Lidar Program—Indiana. [Lidar Specialist](#) responsible for the post-processing, QC and classification of the collected lidar data to produce new statewide 1.5-meter lidar products and hydro-flattened DEM. The scope of this statewide initiative included photogrammetric, GIS, QA/QC, surveying and program development and outreach services. A fleet of aircraft outfitted with Leica ADS digital sensors captured 1"=200' scale 4-band DOI (±37,162 square miles at a 12-inch [with option 6- and 3-inch]) pixel resolution throughout the state. The data supports future applications of contours, planimetric mapping, feature extraction, building footprints, land cover/use, impervious surface mapping, 3D modeling, H&H modeling, and wetlands delineation.

Minnesota Statewide Lidar Program—Minnesota Department of Natural Resources. [Lidar Specialist](#) responsible for the post-processing, QC and classification of the collected lidar data determine bare earth and non-ground points. He compiled breaklines to perform the hydrologic flattening of water bodies and the gradient hydrologic flattening of double-line streams with all breakline/hydro feature vector data created delivered in Esri geodatabase format. Woolpert collected and processed high-resolution lidar data at an average post spacing of 1.5-meters for nearly half of the entire state of Minnesota.

USGS OR_Southeast_D22, USGS Lidar—Southeast Oregon. [Lidar Specialist](#) who performed lidar processing that included ground filtering, classification, DEM creation, hydrologic breakline compilation and DEM flattening for over ±32,872 square miles in southeast Oregon. The data will be used for updates and enhancements to existing work by local governments for stormwater management, urban planning, historic and natural resource preservation, emergency services and hazard assessment support, and provide current, consistent data for regional planning efforts, and the 3DEP mission.

High-resolution Topographic Lidar - USGS, Minnesota SE Driftless Lidar—Minnesota. [Lidar Specialist](#) who performed lidar processing that included data calibration, ground filtering, classification, DEM creation, hydrologic breakline compilation and DEM flattening, intensity imagery production, data QA/QC, accuracy analysis, final reporting and FGDC compliant metadata at the product level for this USGS task order. The scope of this task order involved spring 2021 leaf-off high-resolution lidar survey to be collected over eleven counties (Le Sueur and Olmstead (QL0) and Dodge, Fillmore, Houston, Freeborn, Mower, Rice, Steele, Wabasha, Winona (QL1) plus watershed boundaries) identified as "SE Driftless," Minnesota using the most current USGS Base Specifications (2020 rev. A).

Topographic Lidar across the state of South Carolina, USGS Savannah Pee Dee—South Carolina. [Lidar Specialist](#) who performed lidar processing services for 21,453 square miles that included geometric calibration, ground filtering, DEM QA/QC, hydrologic compilation and flattening, intensity imagery production, accuracy analysis, and reporting. For selected areas within the project, lidar classification of buildings are being developed as a data upgrade.



Christopher Morabito

GIS Specialist (Data Hosting/Digital Innovations)

- Skilled in building data processing pipelines, backend services, web applications, desktop applications, cloud infrastructure management and cloud-native software development practices.
- Led the creation of SmartView Connect, Woolpert's quality control platform for large-scale orthoimagery projects and other geospatial data.
 - In 2019, Chris built the prototype that became Woolpert's STREAM:RASTER platform and he continues to serve as the lead engineer for the product.
- Specializes in finding ways to extend the capabilities of Google Maps Platform and integrate the APIs with other geospatial technologies. He applies his product engineering experience and geospatial knowledge to lead cutting-edge projects.
- Proficient in several programming languages including Python, TypeScript, JavaScript, C#, Kotlin, Java and C++. He has extensive experience with geospatial libraries and tools including GDAL, OGR, PROJ, Rasterio, Fiona, Turf, ArcPy, ArcObjects, and PDAL. He is skilled with web frameworks including Angular, React, Svelte, and Bootstrap. He has built map applications with ArcGIS JavaScript API, Google Maps JavaScript API, Google Maps, Navigation and Driver SDKs for Android, Leaflet, MapBox, and OpenLayers. He is practiced in ArcGIS Online, ArcGIS Enterprise, and CARTO platform management. He is also skilled in database management including PostgreSQL with PostGIS and SQL Server.
- Especially skilled in Google Cloud technology and is certified by Google as both a Professional Cloud Architect and Professional Data Engineer. He has extensive experience managing cloud infrastructure with Terraform and managing Kubernetes deployments with Kustomize and Helm.

Years of Experience

14 years

Education

Bachelor of Science | Computer Science

Professional Registration(s)

Google Professional Cloud Architect
Google Professional Data Engineer

Relevant Experience

SmartView Connect—Woolpert, Inc. [Lead Product Engineer](#) responsible for creating and maintaining the cloud infrastructure, backend service, and web application. SmartView Connect (SVC) is Woolpert's web-based QA/QC platform, created in 2011, for internal production staff and external clients to review orthoimagery and other geospatial products. SVC is a map-centric Angular web application, built on OpenLayers, and it is tightly integrated with Woolpert's STREAM:RASTER service. SVC provides a dynamic workflow engine with markup tools that allow users to draw on the map to create annotated redline markups which are recorded for further action. These markups are deeply integrated into Woolpert's production process and their status is tracked throughout the duration of a project.

STREAM:RASTER—Woolpert, Inc. [Lead Product Engineer](#) responsible for creating and maintaining the cloud infrastructure, backend services, and data processing pipeline. STREAM:RASTER is Woolpert's cloud-hosted raster data service, created in 2019. Woolpert built a cloud-native, scalable data processing pipeline that leverages open-source tools to rapidly process geospatial raster data while preserving image quality. Woolpert also developed a suite of cloud-native services that catalog metadata and serve imagery via Open Geospatial Consortium (OGC) standard Web Map Tile Service (WMTS) and Web Map Service (WMS) endpoints. Woolpert uses STREAM:RASTER internally for production purposes and licenses the product to other organizations as a subscription service.

Newman Facility Placement App Update—Boca Raton, Florida. [Lead Software Engineer and Data Scientist](#) responsible for developing the web application and curating the demographics datasets. Woolpert was selected to update Newman's Facility Placement App, which was also originally developed by Woolpert. Woolpert built a map-centric ReactJS web application with Google Maps JavaScript API. The application uses Google Maps Places API to search for businesses and combines those results with U.S. Census Bureau demographics data for the purposes of site selection. Woolpert constructed the demographics datasets by combining multiple Census Bureau sources and hosted them on CARTO to query via CARTO's SQL API. Woolpert was contracted to update the application to mitigate issues caused by changes to the underlying Places API and CARTO SQL API. Woolpert also updated the demographics data to use the latest-available Census datasets and transitioned the web server from Amazon Web Services to Google Cloud.

Last Mile Fleet Solution (LMFS) Verification, Google, Inc.—Mountain View, California. [Solution Architect](#) responsible for overall system design and development of Terraform configuration, Node.js backend service, Android mobile driver application. Woolpert was selected to build a solution validation program for Google's Last Mile Fleet Solution (LMFS). As a pre-launch trusted tester of the LMFS product, Woolpert was brought in to assess the feasibility and overall developer experience of implementing LMFS for a real-world use case in the last mile delivery industry. As part of the project, Woolpert developed Terraform configurations to provision Fleet Engine API and other Google Cloud infrastructure, a Node.js backend service, and an Angular web app with Google Maps JavaScript API. The web app was used to manage LMFS records, plan routes, monitor vehicle locations, and track shipments. Woolpert also created Android and iOS applications that incorporated Google Navigation and Driver SDKs for Android and iOS to simulate a day in the life of a delivery driver.



Jonas Svoboda, IAM

Flight Operations

- Responsible for the day-to-day operation and long-term planning of pilot and sensor operator teams along with office staff for flight planning, maintenance tracking, and quality control.
- Oversees all aspects of manned aerial data collection from estimating acquisition cost to flight planning, execution, and quality control. He understands the importance of pre-planning and flexibility as he collaborates with clients seeking terrestrial and bathymetric lidar support as well as overseeing imagery data collection efforts.
- Draws from an extensive background in asset, phase, operations and project management, IT and GIS projects for wastewater and stormwater utilities, transportation, parks, and municipal facilities.
- Schedules and budgets by leveraging his experience to make decisions around the equipment or acquisition variables to coordinate the best chance of success for the client.
- Gained extensive experience in understanding, applying, and recommending modifications to client's business processes. In addition, his expertise spans the area of report writing utilizing both SQL Server Reporting Services and Crystal Reports.
- Experienced in all aspects of spatial data integration into enterprise solutions for government clients and is highly skilled in the Esri product suite through implementation and use in a production environment. Through this experience, Jonas has up-close and practical knowledge of potential applications of data being collected and data quality required to support them.

Years of Experience

21 years

Education

Bachelor of Science | Natural Resources

Professional Registration(s)

Certified Asset Manager | (#1026367)

Relevant Experience

Statewide Orthophotography and Lidar Program | Indiana Office of Technology. [Flight Operations Manager](#) who coordinated a fleet of aircraft outfitted with Leica ADS digital sensors captured 1"= 200' scale 4-band (R, G, B and NIR) digital orthoimagery (±37,162 square miles) at a 12-inch pixel resolution throughout the state. Digital orthoimagery collection and processing with optional 6-inch and 3-inch resolutions were also available. Woolpert is hosting the draft imagery on our SmartView Connect web-based QC viewer with redline tool. **Lidar.** Woolpert acquired QL2 lidar data at an aggregate nominal pulse spacing (ANPS) of 0.7 meters for the entire state of Indiana (36,344 square miles). The project required all facets of a 3DEP lidar project including lidar data acquisition, ground control survey, lidar data processing, and development of the required task order deliverables.

Ohio Statewide Imagery Program | Office of Information Technology. [Flight Operations Manager](#) who coordinated the acquisition of base orthoimagery - 3-band imagery covering the entire state of Ohio and delivering orthorectified and mosaicked imagery at a 6-inch pixel resolution. In addition to the base contract, coordinated follow-on acquisitions to accommodate higher-resolution 4-band imagery, aerial and mobile lidar, oblique aerial imagery, topographic mapping, land use/land cover mapping, parcel mapping, crop delineation, asset management and application development. **2006 – 2010 | Ohio Statewide Imagery Program (OSIP) 1.** Acquired and processed digital multispectral (3-band (RGB), 8-bit) aerial imagery and lidar for the entire state of Ohio (±41,276 square miles). 12-inch pixel true color orthoimagery and 2-meter lidar and derived DEMs delivered in LAS, and ArcGRID raster formats. **2011-2016 | Ohio Statewide Imagery Program (OSIP) 2.** Acquired and processed digital multispectral (3-band (RGB), 8-bit) aerial imagery and lidar for the entire state of Ohio. **06/2017 – 06/2023 | Ohio Statewide Imagery Program (OSIP) 3.** Base deliverables included 3-band imagery covering the entire state of Ohio and orthorectified and mosaicked imagery at a 6-inch pixel resolution delivered in 5,000' x 5,000' tiles as uncompressed GeoTIFFs with World Files; and as individual county mosaics in MrSID format.

2021 Lidar Services, North Central Texas Council of Government (NCTCOG)—Various, Texas. [Flight Operations Manager](#) responsible for sensor and aircraft selection and coordinating the daily efforts of the aerial acquisition team consisting of pilot, sensor operator, flight planning, and initial QC staff. The North Central Texas Council of Government (NCTCOG) program is a multi-year contract to perform Photogrammetric, Surveying, and GIS services throughout 16 Texas counties. For 2021, Woolpert was selected to produce new Leica Terrain Mapper airborne lidar with a USGS v1.2 specification and 0.5-meter post spacing (4ppsm) across 4,598 mi².



Brandon McKenzie

Imagery Specialist (Orthoimagery Processing)

- Establishes and improves team technical competence, quality, and efficiency while monitoring the quantitative and qualitative achievements of the team.
- Earned a reputation for being able to quickly and cost-effectively develop dynamic solutions for challenging mapping projects.
- Incorporates lidar derived DEM, DTM, DSM and TIN data into 3D compilation workflows.
- Provides project deliverable development oversight, creating/refining and implementing technical processes, and furnishing technical support to our markets and practices.
- Proficient in mosaicking, rectification, triangulation, cartography, and compilation. He routinely uses Xpro to process digital and lidar data from Woolpert's Airborne Digital Sensors and has additional knowledge in softcopy digital ortho imagery procedures using Intergraph ImageStation, Inpho, OrthoPro, GeoCue, Socket Set, ERDAS, and TerraModel.

Years of Experience

25 years

Education

Bachelor of Arts | GIS/Remote Sensing and Technical Geography

Relevant Experience

Lidar and Orthophotography—Penn State University, Pennsylvania. [Imagery Production Specialist](#) who produced high resolution 5 cm orthoimagery over the Penn State University Campus. He was responsible for resource planning and scheduling the project phase. His team was responsible for the processing, analysis, and QA/QC of the orthoimagery data for delivery to the client. Woolpert provided aerial lidar acquisition and processing; aerial triangulation; and orthoimagery production for Pennsylvania State University's campus. The geospatial team utilized the Vexcel UltraCam Eagle camera system to collect imagery and Woolpert's ALS80 sensor to collect new lidar data at 4 ppsm from 1,981 m AGL, in order to provide a calibrated ASPRS-compliant. LAS-format dataset. The lidar fundamental RMSE accuracy was less than 10 cm at a 95% confidence level for the unclassified lidar point cloud and for the derived DEM. AT using ImageStation Aerial Triangulation (ISAT) was performed and supported by automatic tie point measurements. Deliverables included a final edited DTM sufficient to support accuracies required for the 5 cm GSD digital orthoimagery.

Lidar and Imagery—Florida Division of Emergency Management (FDEM). [Imagery Production Specialist](#) who produced high resolution 7 cm orthoimagery for back-to-back days in support of change detection at the Piney Point reservoir leak location. He was responsible for resource planning and scheduling the project phase, as well as the processing, analysis, and QA/QC of the orthoimagery data for delivery to the client. Woolpert mobilized fixed wing aerial acquisition assets and completed the first day's data collection within 8 hours of receipt of the emergency request. Woolpert processed the lidar and imagery data and provided the "day one" collected deliverables to FDEM via Woolpert's FTP site within 48 hours of data collection being completed.

Aerial Imagery Data Collection Lidar and Orthoimagery—U.S. Army Corps of Engineers, Air Force Civil Engineer Center- Various, US. [Imagery Production Specialist](#) who produced high resolution orthoimagery for more than 35 U.S. Air Force installations around the world. He was responsible for resource planning and scheduling the project phase. His team was responsible for the processing, analysis, and QA/QC of the orthoimagery data for delivery to the client. Across multiple Air Force installations and using client provided boundaries, Woolpert created flight layouts for Imagery and lidar collection based on a client provided AOIs with an added 100 m buffer. Delivery tiles were generated and any tile that overlapped the installation buffer had flight lines laid out for full data coverage. Ground control supported orthoimagery meeting the American Positional Accuracy Standards for Digital Geospatial Data (Edition 1, Version 1.0 – November 2014). Accuracy was reported and tested as per the Federal Geographic Data Committee (FGDC) Geospatial Positioning Accuracy Standards, Part 3: National Standard for Spatial Data Accuracy (NSSDA) (1998). Orthoimagery was delivered at various size pixels as 8-bit 4-band tiles in GeoTIFF format (with world files), and mosaic in MrSID format (Gen 4, compression 20:1). The tile index was in Esri shapefile format, and a Horizontal Accuracy Analyst report was submitted.

Lidar and Orthoimagery Project—Missouri. [Imagery Production Specialist](#) who produced 7 cm high resolution orthoimagery across three AOIs along the Missouri River. He was responsible for resource planning and scheduling the project phase. His team was responsible for the processing, analysis, and QA/QC of the orthoimagery data for delivery to the client. Stockwell Engineers hired Woolpert to acquire and process lidar and imagery products to support the USACE Omaha District's planning, design, research, and mapping for three locations on the Missouri River: Garrison Reach (407.9 km²) in North Dakota; Fort Randall Reach (242.9 km²) and Gavins Point Reach (232.1 km²) along the South Dakota/Nebraska border.



Kayla Keller

Remote Sensing Specialist (GIS/Derivative Products Processing)

- Remote Sensing Technician with expertise in data management and acquisition, problem solving with a sustainability mindset, and geospatial data analysis.
- Experienced working with impervious surface data, landcover, and structure capture (change detection, having completed tasks related to landcover classification, building footprints, and impervious surface capture).
- Assists with the management of planning, schedules, and budgets while monitoring and reporting hours and usage for all projects for her group.
- Software proficiencies include Python programming language (scripting) which allows her to build project tools and streamline processes, ArcGIS, QGIS, web mapping applications, and the Microsoft Office suite.
- Skilled in derivative product development.
- Provides project deliverable development oversight, creating/refining and implementing technical processes and furnishing technical support to the Woolpert markets and practices. She develops and reinforces QA/QC standards while creating and overseeing the quality of deliverables prepared by team members. She trains, coaches and mentors staff on existing or new technical requirements. She also resolves issues impacting technical project objectives. She leads or supports her team in technical scope and budget/pricing development for proposals and dynamic project planning. She supports client relationships and business development in support of strategic business plan.

Years of Experience

10 years

Education

Master of Science | GIS
(Sustainability)

Bachelor of Science | Geography
(Atmospheric Sciences)

Relevant Experience

2021 Countywide Planimetric Updates, Rutherford County, Tennessee—Rutherford County, Tennessee. [Remote Sensing Technician](#) who gathered all necessary data and set up project files, oversaw tech work, answered tech questions, performed QC, and formatted the final deliverable to client specifications. She also communicated with the PM and monitored the budget. Woolpert was selected to update all planimetric data across the county for Hydrology (poly and lines), structures (poly with elevation), tree and transportation (poly) GIS features using the existing county GIS Schema. The project area consisted of tile deliveries of the entire Rutherford County boundary. Woolpert utilized the most recent aerial imagery provided by the county. The accuracy of planimetric data met the accuracy of the orthoimagery. Woolpert identified what had changed by doing a change detection process used for all updated planimetric features, including the 3D Update for buildings. Woolpert delivered a Geodatabase of updated county planimetric data in 4 incremental deliveries through the lifespan of the project as well as FGDC Metadata. This included buildings with a 3D height attribute depicting the tallest point of the building.

2021 Countywide Orthoimagery, Delaware County, Ohio—Delaware County, Ohio. [Remote Sensing Technician](#) who gathered all necessary data and set up project files, oversaw technician work, answered tech questions, performed QC, and formatted the final deliverable to client specifications. She also captured crop data and classified it per the project plan, communicated with PM, and monitored the budget. Existing ground control and lidar data was utilized to provide the County with the most economical product. The orthoimagery was delivered as a countywide dataset, consisting of 5,000' x 5,000' uncompressed 8-bit, 4-band color GeoTIFF files. Each GeoTIFF ortho file was approximately 100 megabytes in size. Additional deliverables included countywide color and color infrared MrSID (Multi resolution Seamless Image Database) images (20x and 100x compressions), tile index provided in ESRI shapefile format, and CAUV crop delineation layer in ESRI GDB format.

GIS Building Outline Dataset Enhancement, Franklin County Auditor—Columbus, Ohio. [Remote Sensing Technician](#) who gathered all necessary data and set up project files, oversaw tech work, answered tech questions, performed QC, and formatted the final deliverable to client specifications. She also captured buildings per client specifications, communicated with PM, and monitored the budget. Franklin County, Ohio hired Woolpert to update and enhance its building outlines to support both local municipality and county GIS business objectives. Woolpert, Inc. performed high resolution photography services for the City of Columbus ($\pm 544 \text{ mi}^2$) in 2019. Using those pictures, Woolpert applied a proprietary analysis process to validate the outlines of discreet buildings in highly dense urban areas, such as a city. Woolpert used an Interactive Automated Feature Extraction process to produce the building outlines. The team utilized off-the-shelf remote sensing software, proprietary software and applications to perform automated feature analysis incorporating both imagery and lidar data.



Daniel Ngoroi, GISP, CMS-RS

Remote Sensing Specialist (Feature Extraction)

- Extensive experience creating and refining algorithms to extract specific features.
- Leverages his background in application development to modify software used in feature extraction utilizing multiple data sets. His ability to tailor existing cutting-edge technology allows him to implement effective, automated QA/QC measures, and quickly produce high-quality, accurate, and complete datasets.
- Project experience and skills range from creating and refining algorithms to extract specific features, such as swimming pools, forests, rivers, buildings, and impervious surfaces.
- Performs geospatial automation and analysis services using Artificial Intelligence (AI), especially Machine Learning (ML) and Deep Learning (DL).
- Collaborates with Woolpert staff teaming with Esri and Google to leverage Machine Learning (ML) and Deep Learning (DL) capabilities within those platforms.
- Technical skills also include C/C++/C#, Visual Basic, Active Matlab, Fortran, ASP.NET, JavaScript, HTML, PHP, CSS, Java, PL/SQL, .NET, XML, UML, AML, Flex, ArcObjects, MapObjects, OGC Services, ArcGIS Services, Python, Google Maps and Avenue. Experienced with Oracle, Access, MicroStation and MySQL databases, as well as ERDAS IMAGINE, ENVI and eCognition. Proficient in the use of ArcGIS applications, including ArcInfo, ArcView 3.x, ArcIMS, ArcSDE, and FME.

Years of Experience

22 years

Education

Master of Science,
Geosciences/Remote Sensing

Bachelor of Science, Survey

Professional Registration(s)

GISCI Certified GIS Professional
(#65738)

ASPRS-Certified Mapping Scientist
(#RS212)

Relevant Experience

Impervious Surface Areas Measurement Project—City of Indianapolis, Indiana. Remote Sensing Specialist using Woolpert acquired orthoimagery (6-inch pixel, 4-band, 8-bit) as a dataset performed impervious surfaces mapping and 1.5 -meter lidar acquired during the spring, performed impervious surface feature extraction. Steps involved development and implementation of a standard for parcel ID and measurement of the impervious area; development of a customer service interface, review and measurement of identified non-residential parcels, and development of an update process and plan.

Tennessee 3DEP Statewide 0.7M NPS Lidar—Tennessee. Remote Sensing Specialist responsible for creating a building footprint Esri file geodatabase. Daniel led a team that extracted 2D polygon features (“footprints”) for 95% of all buildings larger than 1,076 square feet and 90% of all buildings larger than 538 square feet.

Ohio Statewide Imagery Program (OSIP) 3—Ohio. Remote Sensing Specialist who supports enhanced data deliverables that have included the acquisition of lidar data at a nominal post spacing of 0.7-meter and 1-meter, 4-band imagery at pixel resolutions of 1.5-inch and 3-inch, natural color oblique imagery and feature extraction of building footprints, land use/cover polygons, change detection, solar potential mapping, and impervious surface polygons.

Orthoimagery, Lidar, Landcover, CAUV Crop Delineation—Greene County, Ohio. Remote Sensing Specialist who performed CAUV crop delineation to identify specific crop types, acreage of each crop, and percentage of each crop within County provided parcels.

Ortho/Lidar/Structure Outline-Change Detection Project—Guernsey County, Ohio. Remote Sensing Specialist who provided data analysis of structure outlines and change detection tasks. For Guernsey County, Woolpert developed geospatial datasets for county agencies and general public use. This project consisted of the following: new countywide 1"=100' scale color digital orthoimagery (with a 6-inch pixel resolution); new countywide 1-meter lidar (average point density); new 3-inch 1"=100' scale color digital orthoimagery (covering 50 contiguous square miles); countywide building structures (100 square feet and larger); and change detection.

Lake Erie Watershed Orthophoto, Lidar and Hydrography Project—Erie, Pennsylvania. Remote Sensing Specialist who responsible for the impervious surface tasks associated with this project where Woolpert was contracted to acquire new 4-band, 8-bit digital orthoimagery and 1-meter lidar encompassing the entire 512.4 square mile area of the Lake Erie Drainage Basin to produce 1"=100' scale color digital orthoimagery (with 6-inch pixel resolution); hydrology; and crest delineation for the Lake Erie Watershed project.

Orthoimagery, Lidar, Landcover, CAUV Crop Delineation—Fairfield County, Ohio. Remote Sensing Specialist who performed CAUV crop delineation to identify specific crop types, acreage of each crop, and percentage of each crop within County provided parcels. In 2015 Woolpert acquired new 1"=50' scale 4-band, 3-inch pixel resolution digital imagery and new aerial lidar (0.7-meter USGS QL2) for the County to perform new countywide land-cover delineation including woodland, tillable, pasture, wasteland, urban, and water/wetlands.