PROPOSAL

GIS TECHNICAL CONSULTING SERVICES RELATED TO PUBLIC UTILITIES

CITY OF COLUMBUS, OHIO DEPARTMENT OF PUBLIC UTILITIES

COLUMBUS, OHIO

June 6, 2014

WOOLPERT

DESIGN | GEOSPATIAL | INFRASTRUCTURE

WOOLPERT
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June 6, 2014

Greg J. Davies, Director
Department of Public Utilities
City of Columbus, Ohio
910 Dublin Rd
4th Floor
Columbus, OH 43215

Re: Professional Services for GIS Technical Consulting Services Related to Public Utilities

Dear Greg:

We are pleased to submit our proposal to provide GIS Technical Consulting Services.

As proven by our continued service to the City of Columbus, Department of Public Utilities, we are confident no other firm is more qualified to complete your GIS related tasks. Woolpert can move quickly, smoothly, and confidently into operation. With Woolpert, you will not pay for a learning curve.

I'm very pleased to offer my 36 years of city experience back to DPU. I feel that my work at the city of Columbus prepared me for my present position as Project Director for one of the oldest and largest Geospatial firms in the country. Through those years I learned the many needs of the DPU and GIS. I know we can leverage this into a very successful relationship that will serve the Department and rate payers of the city of Columbus.

I am very proud of the full spectrum of professional GIS-related services that we are able to provide, including data conversion and development, field data collection, GIS staff augmentation, GIS needs assessment and Business Process Analysis, GIS application development, GIS integration, and other GIS services. This experience will be demonstrated in our attached project approach and qualifications.

Woolpert has assembled a team of expert companies to serve the City. This team includes:

- Woolpert, as the Prime Consultant
- DLZ, an MBE located in Columbus, Ohio
- Donahue IDEAS, LLC, an FBE also located in Columbus, Ohio
- Emerging Technology Integrators, Ltd. (ETI), an MBE located in Columbus, Ohio

Recognizing that you will be reviewing multiple proposals, we would like to highlight some of the important points that differentiate our team:

- Woolpert has been providing professional surveying and engineering services since 1911, GIS services since 1980 and GPS services since 1986. Woolpert continues to grow to add specialty services and depth. We now have more than 600 staff nationwide.

- You will note that our team contains familiar faces from our past working experiences with your group. Woolpert brings professionals who are familiar with your team and business approach. Our combined years of work and project experience in the areas outlined in this proposal will serve you well. The professionals identified are available and committed to your project.

- Woolpert is the industry leader when it comes to municipal utility mapping and GPS collection expertise. We are proud of our national and local reputation and our project experience. Please review the projects that we have highlighted and contact our references.

- Woolpert has developed specialized tools for infrastructure location and condition assessment projects, including proprietary software that streamlines the process of data collection, safety and QA/QC procedures.

- Woolpert's systems analysts and GIS software developers have developed winning applications for numerous Public Utilities across the United States, including the City of Columbus, Honolulu Board of Water Supply, Nashville Metro Water/Sewer District, Miami-Dade Water/Sewer, Cleveland Water, Oakland County Water Resources, and many more.

In summary, I offer you a team with a proven record of success. We are excited about this opportunity to work with you and look forward to continuing our successful working relationship. Please do not hesitate to contact us if you have any questions or require additional information.

Sincerely,

Michael E. Merchant, GISP
Woolpert, Inc.
One Easton Oval, Suite 310, Columbus, OH 43219
Direct 614.827.6176 l Office: 614.476.6000 | Cell: 614.795.3865
mike.merchant@woolpert.com | www.woolpert.com

SECTION 1

WOOLPERT

DESIGN | GEOSPATIAL | INFRASTRUCTURE

PRIME CONSULTANT AND SUBCONTRACTORS

Woolpert, Inc. is the prime consultant for this opportunity to work with the City of Columbus. Woolpert has offices throughout the United States, including our Columbus, Ohio and Indianapolis, Indiana offices, where we will be performing most of the work for the City's project.

Columbus Location:
One Easton Oval, Suite 310
Columbus, OH 43219
614.476.6000

Indianapolis Location:
7635 Interactive Way, Suite 100
Indianapolis, IN 46278
317.299.7500

Woolpert's City of Columbus Contract Compliance Number: 20-1391406

Woolpert delivers dynamic consulting and design services worldwide to clients who require architectural/engineering assistance, technology integration, or a combination of both. Our clients range from nationwide military programs to small towns, and from college campuses to private industry. We solve clients' problems through results-focused consulting, creative yet practical design, and the appropriate use of technology.

Our clients—whether in the private sector or federal, state and local government—benefit from Woolpert's professional expertise over a wide range of services in design, geospatial and infrastructure management. Specific services that Woolpert provides include: architectural/ engineering design, design-build, aviation design, energy solutions, sustainable design, planning, surveying, photogrammetry and mapping, remote sensing, information management, enterprise asset and maintenance management systems, Geographic Information Systems (GIS), permitting, watershed management, water/wastewater design and analysis, and regulatory compliance. Our multi-office, multi-disciplinary capability distinguishes us from other firms. With more than 600 professionals in 21 offices across the United States, the firm has the relevant experience, professional expertise, technical support, and quality review personnel to complete virtually any assignment in the given timeframe.

Woolpert's history spans a century of client satisfaction. Founded in 1911, the firm's original services included civil engineering, land surveying, and landscape engineering performed by founder Charlton D. Putnam. In 1931, a partnership was established in the name of Putnam & Woolpert.

In 1938, the firm began engineering projects funded by the Rural Electric Cooperative under the Rural Electrification Administration. The company rapidly expanded and in 1942 became known as the Ralph L. Woolpert Company, Consulting Engineers.

Services added in the 1960s and 1970s included community development, photogrammetry, airport planning and design, park planning, landscape architecture, traffic engineering, and environmental studies. In 1979, the firm's name was changed to Woolpert Consultants. Soon afterward, Woolpert began providing GIS and architectural services. In 1997, the firm became a limited-liability partnership, and the name was changed to Woolpert LLP. In 2005, Woolpert converted to a corporation and changed its name to Woolpert, Inc.

Woolpert has established working relationships with several City certified minority and female business enterprises, two of which we have included as part of our project team: DLZ and Donahue Ideas, LLC.

DLZ

6121 Huntley Rd.
Columbus, OH 43229
Office: 614.888.0040
Fax: 614.436.0161
City of Columbus Contract Compliance Number: 31-1268980

For the City of Columbus' project, DLZ will be providing application development services and conversion services if needed. With more than 550 employees at 19 office locations throughout the Midwest, DLZ is a recognized leader in the architectural/engineering and environmental industries. The strengths and successes of DLZ are best illustrated by its seven full-service professional consulting firms: DLZ National, Inc.; DLZ Ohio, Inc.; DLZ Michigan, Inc.; DLZ Indiana, LLC; DLZ Illinois, Inc.; DLZ Industrial, LLC; and DLZ Kentucky, Inc.

A Minority-Owned Business Enterprise, DLZ serves the Midwest and Great Lakes Region. DLZ's multidisciplinary staff includes architects; civil, traffic/transportation, structural, mechanical, electrical, geotechnical, sanitary, chemical, and construction engineers; environmental specialists; land and community planners; computer applications specialists; surveyors; drillers; geologists; landscape architects; interior designers; ecologists; and specification writers. Complementing this group are CAD personnel, clerical personnel, accountants, and purchasing specialists. Our personnel work together to solve problems, saving client's money and delivering sound designs and systems.

To support its diverse staff, DLZ maintains state-of-the-art facilities and equipment, including interoffice networked systems using MicroStation, AutoCAD, various other design software packages, Global Positioning Systems (GPS), laser scanning, and surveying equipment. In addition, DLZ has a complete in-house materials testing laboratory.

The professional consulting firms combined under the corporate umbrella of DLZ have been providing architectural, mechanical, electrical, environmental, hydrology and hydraulics, geotechnical, sanitary, civil, structural, surveying, drilling, geology, and laboratory services (soils, concrete and materials testing) for more than 60 years.

DONAHUE IDEAS, LLC

2780 Airport Drive
Columbus, OH 43219
Office: 614.532.6773
Fax: 614.532.6779
City of Columbus Contract Compliance Number: 06-1716807

For the City of Columbus' project, Donahue IDEAS will be providing application development services and conversion services if needed. Donahue IDEAS, LLC is a **Female Business Enterprise** (FBE) with the City of Columbus, Ohio. This company is an Ohio-based civil engineering firm that provides services in planning, research, design, construction administration assistance and asset management for utilities. The firm also has extensive experience in data and information management for treatment facilities and operations. The company was chartered in 2004 and has three offices in Ohio: Columbus, Cincinnati, and Cleveland. Donahue IDEAS has expertise in a variety of services including planning, design/construction administration, operations assistance, and asset management/information management.

EMERGING TECHNOLOGY INTEGRATORS, LTD

6230 Busch Blvd
Columbus, OH 43229
Phone: 614.431.7266
City of Columbus Contract Compliance Number: 81-0617093

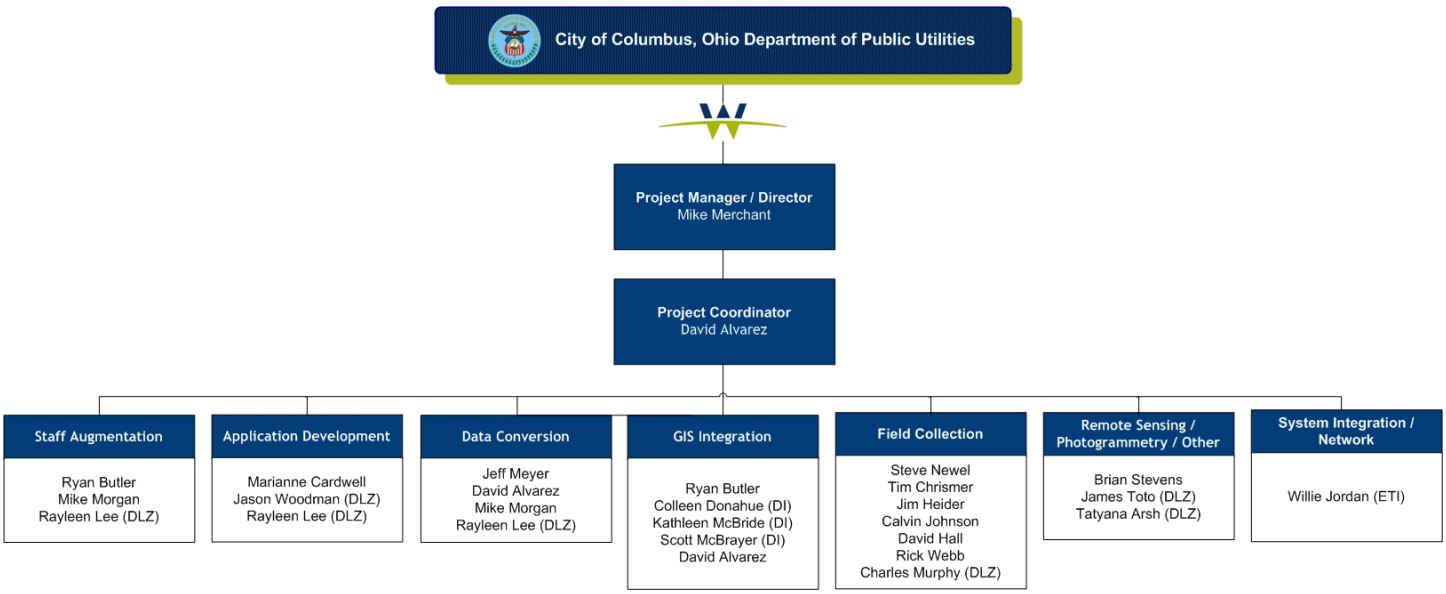
For the City of Columbus' project, Emerging Technology Integrators (ETI) will be providing system integration and network services. Emerging Technology Integrators, Ltd. (ETI), headquartered in Columbus, Ohio, was founded in 2003 to help small to medium size businesses and schools adopt advanced information technology. ETI provides powerful information technology solutions coupled with reliable support and proven implementation skills.

Designated by the State of Ohio as a **Minority Business Enterprise** (MBE), ETI's mission is to provide integrated solutions and services in all areas of business, logistics, education, and other industries, based on the latest advances in emerging technologies by offering a new level of value and growth potential coupled with reliable support and proven implementation skills.

ETI's knowledge, experience, trust, and integrity set them apart from other vendors. A strategic partnership with this organization results in a network that is secure, reliable, and powerful and a client that is better organized, connected, and successful.

ORGANIZATIONAL CHART

The following organizational chart shows the project team for the City's project.



PROJECT APPROACH

Due to the many services requested in the RFP, Woolpert has documented our typical processes for GIS/GPS Data Collection/Conversion/Development, Needs Assessment and Business Process Analysis, GIS Application Development/Integration, Remote Sensing/Photogrammetry/Other, and System Integration/Network, These processes can be adjusted as needed to support the needs of the City.

GIS/GPS DATA COLLECTION/CONVERSION/DEVELOPMENT

UNDERSTANDING GIS DATA CONVERSION

Woolpert is one of the largest GIS services firms in the U.S. As the premier provider of GIS services in Ohio, Woolpert specializes in providing GIS services to public utility clients and has provided conversion services to over 20 similar organizations over the past five years.

Our staff includes more than 20 Geographic Information Systems Professionals (GISP). Woolpert serves the GIS needs of a diverse client base with a staff of more than 50 people dedicated to GIS services. Our specialization in utilities data conversion means that:

- Our staff understands how utility systems are designed and built so they can make intelligent decisions when building data conversion process/flows that **will work seamlessly with geospatial applications and enterprise systems**.
- All of our technicians are comfortable reading and interpreting easements, construction documents, description books, etc.
- Our conversion staff has experience in placing utilities features using geo-referenced source documents and heads-up digitizing techniques to construct features that accurately depict the real-world system.
- Woolpert has developed and perfected conversion processes that recognize the complex multi-source environment of utilities system conversion. These tools are designed to

automate the manual or automated input of attribute data with **maximum accuracy and minimum keystrokes**.

- We have constructed GIS placement tools that are specifically optimized for construction of utility GIS geometric networks. Woolpert's tools are designed to work with ESRI's junction and edge feature types.

- We understand the security requirements of public utilities systems and have developed processes and procedures designed to maintain **the highest levels of security** in maintaining client data.

- We have already developed source data management, QA/QC process/tools and PRF systems that are in use in converting similar datasets that can be immediately **adaptable to the needs of the City**.

METHODOLOGIES FOR GIS DATA CONVERSION

There are four methods that are typically used to develop GIS utility data:

- Digitizing
- Dimensional construction and orthogonal development
- GPS field data collection
- Underground utility identification

Woolpert recognizes that each method may be valid depending on the situation and has the tools and capabilities to perform whatever conversion method is best for the client. Woolpert has outlined each methodology below.

Digitizing

Digitizing is the quickest method of developing GIS data. However, the resulting data is only as accurate as the source documents. In some cases, the GIS data may need to be extended or completed through field data collection techniques.

Digitizing has three basic steps:

- **Data Preparation.** Drawings are scanned, and known points are registered on the drawings to corresponding points on the base map in a process known as geo-referencing. This allows the scanned source documents to be used for head-up digitizing.

- **Network Construction.** The source document utility lines are traced to create digital layers that represent data on the hardcopy documents. A utility network is built to connect pipe segments, valves, and other features and create a system.

- **Input Attribution or Extract from Databases.** The attributes for each feature are added, either by manual input of data from source documents or by extraction from databases. Attribute entry is often the most difficult and most complex part of a conversion effort and special attention is given to developing an optimal process for this effort.

Dimensional Construction

This method uses a complete base map and accurate source documentation. The base map should be a rectified or semi-rectified image—typically, a digital orthophoto.

Planimetric or cadastral data can then be digitally constructed using the orthophoto as a backdrop. Utility infrastructure can be placed in reference to the planimetrics using dimensions supplied by the source documentation—for example, a fire hydrant is placed 15 feet from the street centerline.

Dimensional construction applies accuracy to subsurface features based on the accuracy of surface features. In addition to an accurate base map with limited planimetrics, source documentation must be up-to-date, consistent, and geographically and referentially accurate. While full dimensional construction is seldom used for utility construction, some use of dimensional techniques are often employed.

GPS Field Data Collection Methods

Woolpert is the largest private owner of Trimble GPS equipment in the U.S. As such, Woolpert is unsurpassed in providing GPS services for projects of all sizes. Field data collection efforts can be used to supplement and extend digitized base map data. There are two basic GPS (global positioning system) techniques that can be used for field inventory collection efforts: real-time kinematic (RTK) and real-time differential (RTD). The value of each technique is that features that are found in the field can be positioned and networked on the GIS map immediately in the field. Data that is found through field collection efforts is accurate and reliable.

Woolpert has developed an automated data collection tool, SmartSurveyor™, to streamline GPS survey and data collection processes. This method uses ruggedized PCs to capture and record the spatial position and related attributes of features. The data is recorded in an easily downloaded database format fully compatible with ArcInfo and other ESRI products. There is no need for additional conversion efforts. The GIS can be virtually built in the field.

There are four basic steps to collecting utility inventory data:

- Digitized maps are loaded onto ruggedized, pen-based PCs.
- Structures are located and inventoried, and attributes are also collected and added. Attributes include the condition of each located structure.
- The utility network is generated while in the field—connections are built during the inventory process.
- The databases are connected in the office—the features can be connected to orthophotos.

RTK

Real-time kinematic (RTK) positions the features that are found in the field within a 3- to 5-cm range. This method captures the *X, Y,* and *Z* coordinates. However, RTK requires two-person crews and is the costlier of the field collection options.

RTD

Real-time differential (RTD) positions the features that are found in the field within 1-meter accuracy. Features that are near each other can be located within submeter relative accuracy. More importantly, this method only captures the *X* and *Y* coordinates of features. This method costs less than RTK because it only requires one-person crews.

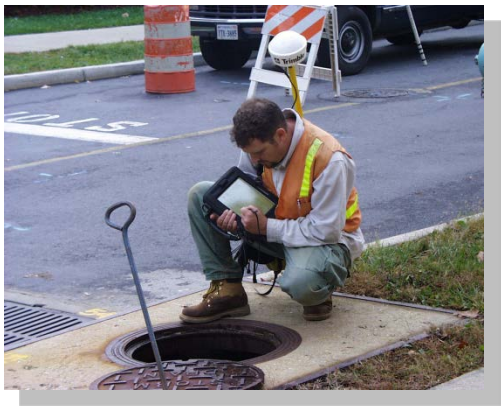
Additional information regarding our field data collection procedures is described below.

Underground detection is used to locate buried system features, such as pipes. This method usually isn't necessary for gravity systems like sanitary sewers that require manholes at all angle changes. But it can be helpful for locating underground water systems that aren't well documented. Underground detection is generally done using electromagnetic locators. Once a system feature is located with a detection method, the point can be collected with SmartSurveyor™ and GPS.

While underground detection provides data that is highly accurate, it is the most costly method of locating utilities because of the equipment, setup time, and personnel needed to use the method. This method should be used only if necessary to improve accuracy or to complete the water system. This is a last-resort method.

FIELD SURVEY METHODS

All structure information collected in the infrastructure inventory will be done utilizing an appropriate GPS unit and pentablet computer. A two or three person field crew (depending on need) will navigate the project site utilizing source documents where available, locating storm and sanitary sewer structures. Once a structure is found and opened, the crew will make appropriate measurements. While obtaining attribution for the structure, all pipes will be drawn on the screen of the pentablet computer and attribution will be obtained for each incoming and outgoing pipe and populated in the database. As structures often have multiple pipes, each pipe at this point will only have upstream or downstream attribution until the destination of each pipe is determined. As the crew navigates in the direction each pipe has indicated, the next structure will be located and accessed. At this point connectivity can be verified, from top-side only, and the pipe can be extended to its relative upstream or downstream structure.



Woolpert's field collection software validates the upstream and downstream attributes on each end of the pipe being connected in the field. If the data matches, the pipe is drawn between the two structures. If the data does not match, the field crew member is alerted through a warning generated by the software in the form of a pop-up box. The field crew member can then verify the information and close the pop-up box, thus creating the pipe or correcting the information which will also create the pipe. The crew will follow each sewer line to the next appropriate structure.

As pipes are encountered where destination cannot be determined, a node will be used as a placeholder and delivered as such for further investigation (in conjunction with the City staff). The node will have a unique ID and will be placed on the end of the pipe. The City and Woolpert can query these nodes at a later date, and after resolving connectivity or other related issues, these nodes can be incorporated in the database. The resolution could be anything from confirmation from City staff to field connectivity verification testing.

Once in the general location of the utility feature as indicated upon the source documents provided, Woolpert will search for the feature. If the feature cannot be found within a reasonable time frame, it will be given an inventory status of "Not Found". If access to a feature cannot be obtained, it will be given the inventory status of "Inaccessible".

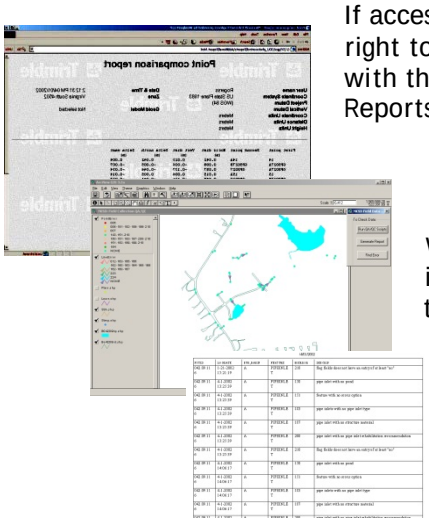
During the inventory sweep, features will be classified as *RTK GPS, Total Station, Impeded,* or *Not Found*. This classification catalogs the type of inventory that is attained by the survey crews and can assist with locating problematic features for the reporting process. During the field collection, Woolpert will provide and review at project meetings a list of all structures designated as *Impeded*, or *Not Found* with City staff. The following classifications will be used to designate the inventory status of a feature:

- **RTK GPS**—any structure for which GPS X, Y, Z coordinates were captured.
- **Total Station** - any structure with limited GPS signals due to obstructed view of the sky (tall buildings, trees, etc.) will be identified as "obscured" and can be located by conventional methods.
- **Impeded**—any structure that cannot be accessed during the initial field collection due to existing conditions making access dangerous or inappropriate – paved over, sealed shut, parked cars, dogs, etc.
- **Not found**—any structure shown on source documents that cannot be found during the initial field investigation.

Note: Regardless of the inventory classification, attributes will be collected whenever feasible.

In the event that the GPS user is unable to position a utility structure using the GPS technique, he will 'manually position' the structure by placing or digitizing the structure in the graphical database. This is accomplished by referencing the structure to the planimetric base map that will be loaded onto the data collectors. The accuracy of the locations using this approach would be 5 to 15 feet, dependent upon existing nearby planimetric data. The city estimates that 99% of the structures will be able to be positioned by GPS techniques.

For customer relations, field personnel will carry a letter from the City that authorizes the work for this project. An official temporary contractor's badge may also be helpful to inform property owners that the surveyors are working for the City. Woolpert will provide samples of these letters that previous clients have written for the City's review.



If access is hampered or made impossible due to high fence lines, trees or brush, right to trespass, paved over, parked cars, etc, Woolpert will address these issues with the City as defined below under the section entitled, Problematic Feature Reports.

PROBLEMATIC FEATURE REPORTS

Woolpert has developed a budget for a field inventory survey involving an initial **"one-pass"** sweep of the full inventory. Surveyors will move through the system collecting an inventory in a single pass. Problematic issues such as paved over, inaccessible structures or pipe connectivity issues will be flagged for follow-up by the appropriate methodology in a subsequent data collection effort. Woolpert has an arsenal of tools to gather information from the depths of manholes, but the initial project approach does not involve entering the structures.

One attempt during the primary sweep will be made to gain access to a manhole or structure. If safe access cannot be gained to the manhole, or the manhole cannot be found on the first attempt, the manhole will be attributed as such. Problematic issues flagged by the field crews will be reported to the City via a project website and will be discussed in the

project meetings. Problematic features will be grouped by delivery areas and posted on the project website after the first sweep is completed. The City will be notified of the posting and given rights to edit the data. Once the project team has determined the appropriate course of action to resolve the issues related to a 'problematic' feature, Woolpert will return to the field for one final visit to complete the inventory and update the resolved problematic feature. If for some reason the structure still cannot be inventoried, the feature will be annotated with the appropriate information and submitted to the City. We anticipate some City assistance throughout the field effort to deal with specific matters. Roles and responsibilities will be defined during the kick-off meeting and refined after the completion of the Pilot Test Area.

Woolpert's experience has shown that often times schedules become delayed when dealing with these 'problematic' issues either as a result of a limited amount of resources available to the client or due to a breakdown in communication between project participants. In order to remain on schedule and maintain the flow of data throughout the inventory process, Woolpert suggests that a close review of this process be conducted by Woolpert and the City and that a mutually beneficial process be developed in order to avoid delays.

The overall estimate is based on making one trip to the structure for the initial survey and inspection. A budgetary estimate is also included for an additional trip for a problematic feature resolution sweep, and is estimated at 500 hours. If the amount of problematic features exceeds this estimate, Woolpert will request to negotiate additional hours to cover the added costs.

ACCURACIES AND TOLERANCES

Setting these data collection expectations is extremely important. Accuracy is the definition of the "exactness" of the measurements taken. Tolerance is the "acceptable range" (plus and minus) for each piece of attribution.

In the case of the City of Columbus, and as is typical for most projects of this nature that Woolpert has completed, a structure depth accuracy will be recorded to the nearest 0.1'. Typical accuracy requires that 90% of the field-checked measurements are correct, within the agreed-upon tolerance range. This criterion differs for objective versus subjective attributes. The agreed-upon accuracies and tolerances will dictate the field data collection efforts required and the final acceptance criteria for the data.

For a project of this type, Woolpert generally proposes a 90% accuracy standard, as well as the following tolerance ranges for measured data:

Data Tolerance Ranges	
Measurement	**Tolerance**
X, Y, Z coordinate (GPS)	Not greater than +/- 0.2'
X, Y, Z coordinate (Digitized)	Not greater than +/- 15'
Invert depth measurements	Not greater than +/- 0.1'
Pipe diameter, width, height	The measurements for these attributions are considered either right or wrong for the purpose of accuracy

Objective data is either right or wrong; therefore tolerance ranges are not necessary. Collectively, these standards will be finalized during the initial meetings.

FIELD EQUIPMENT

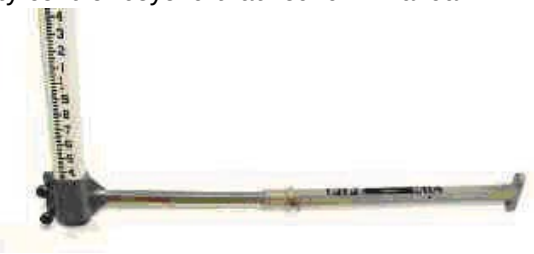
This section describes typical equipment that field crews will use to collect the required data. This section also highlights a few pieces of equipment that make Woolpert very efficient and cost-effective while performing field work:

- In performing all survey-grade observations of the utility structures, Woolpert will use **Trimble's R8 dual-frequency GPS/GLONASS receivers**. Woolpert will apply real-time corrections to its data using the established VRS system to minimize setup costs and errors. If needed, all conventional location areas obscured from GPS, Woolpert will utilize 3-second survey quality conventional total station instrumentation.

- **Ruggedized pentablet computer** data collectors tethered to the RTK receiver will allow real-time GIS creation in the field by storing GPS positional data with required attribution for utility structures. The City's planimetric data will be loaded onto the pentablet computers. This information will be used by the crews to navigate through the subbasins.

- **Wireless Cameras** will be connected via Bluetooth technology to the pentablet computers for taking pictures of the outfall infrastructure. To keep the photo's related to the proper structure, the camera and PC automatically rename the photos to the structure name in the database. This process provides for a level of quality control beyond that found in manual techniques.

- Sample of **customized survey tools** to assist in a "topside" inventory (as shown in photo to the right). In addition, specialized lights, measuring devices, tools and other standard surveying gear will be available for field investigation efforts.



DATA DEVELOPMENT QUALITY ASSURANCE AND QUALITY CONTROL

Quality control is built into every step of our methodology guaranteeing overall quality for the City of Columbus. Steps are taken to ensure quality control from the beginning of the field inventory, to the network connectivity and to the final delivery of data.

As the City is well aware, "quality assurance" is defined as having the appropriate processes and procedures in place to allow for the collection and processing of the needed data. "Quality control" is the continuous checking of the data during the individual steps of the process to ensure the data is of the highest quality. This section identifies some of the many key quality assurance procedures that Woolpert will employ for this project.

Quality control for this project is divided into two categories: (1) field quality control, and (2) office quality control. The two phases combined will provide accurate and consistent data for the City. Through a system of procedures, redundancies and verifications we can provide precise and accurate data to populate the database. Field quality control is the starting point for data collection, and every phase of data collection relies on the quality control procedures to insure its accuracy. From the first attribute collected to the last, consistency is the key. The job of the field crew is to interpret and record data in a way that is duplicable to others. The process and resources used by Woolpert enables a high level of confidence in data capture. **The following are some of the steps we will utilize in our QA/QC process**:

- **Data Dictionary.** The data dictionary is the roadmap to the database. It defines every feature and every choice of attribute description about a feature. Development of the data dictionary is key to the success of a project. It facilitates collecting the desired attributes of the features and ensures that those attributes integrate into the database. With the City of Columbus's input and Woolpert's understanding of industry standards, a data dictionary will be developed to fit the needs of the project.

- **Domain Pick-Lists.** Every feature in the data dictionary will be described by its attributes. To standardize the description of the attributes, domain pick-lists will be used. When the user chooses to describe a feature's attributes, a list of predetermined choices will appear. This list will eliminate syntax errors in the database by homogenizing attribute descriptions. This provides a uniform dataset that is easier to manipulate and maintain.

- **Field Procedures**. Well thought through procedures and standard operating procedures are the backbone of data collection. They significantly reduce the occurrence of errors, and assist with increasing the quality of the gathered field data. At the beginning of this project, Woolpert will outline the process and procedures based on experience developed while performing utility inventory projects around the country.

- **National Geodetic Survey Stations.** As standard practice the field crews will navigate to and observe National Geodetic Survey (NGS) existing control stations before any structures are inventoried each day. At the end of each day the last observation will be made to the same NGS control station. These control check observations will help to ensure pertinent settings are in place and positional accuracy is maintained throughout the inventory process. In addition, independent field control checks and evaluations of the collected GPS data will ensure integrity of the positional data.

- **Visual Referencing.** Spatial accuracy will be evaluated through a visual inspection procedure. The visual inspection will be performed by comparing the GPS location of a feature, and the planimetric data within database. The visual inspection process will take place on-screen in real time on the pentablet computers. Before the field crew leaves the feature in the field, the GPS location will be verified. This will help detect errors caused by cycle-slips in the GPS signal and allow the field crew to re-observe the feature's position if necessary.

- **GPS Data Settings.** The settings of the GPS equipment help determine the level of accuracy in the collected data. By optimizing the settings for the local project area, Woolpert can filter out a large percentage of erroneous readings. The more credible the signal being analyzed, the more accurate the position will be recorded, thus controlling bad feature placement.

- **Viewing Data Positioning Parameters.** Each crew is trained to continually monitor signals received from the GPS satellites. A bad satellite configuration or sunspots (intense bursts of radiation form the sun) can degrade the accuracy of the GPS signal to unusable levels. Woolpert is conscious of all positioning parameters that affect accuracy and remains aware of fluctuations that cause instability.

- **System Networks.** Once the field database information has been through the QC process, pipe tracings will be performed on the sewer data to ensure that it is connected and that the pipes flow in the correct direction. If there are anomalies, or issues, the files are sent back the field

crews for validation. This process is cyclical, and can be repeated until the file comes back without anomalies.

- **Data Reviewer Extension.** Data reviewer is an extension for ArcMap developed by ESRI. Woolpert has integrated the Data Reviewer Extension in their workflows. We will use QA/QC rules based on the database design and the City of Columbus's input to verify the quality of the data. Data Reviewer consists of a series of tools that support both automated and visual analysis of the data. It can be used to detect anomalies with features, attributes, and relationships in your database. Data checks contain the analysis rules and can be scheduled to run automatically or run as necessary. Results of the analysis are logged in a Reviewer session, which is used to manage the life cycle of the analysis. Depending on the type of analysis that is been perform, the anomaly can be corrected as part of database maintenance or investigated further.

This QC tool will also compute quantity counts on the occurrence of unique values of all attributes, so that anomalies among attributes that are not fully constrained by domains (such as dates, job numbers, elevations, and IDs) will be identified.

FIELD SAFETY AND ENVIRONMENTAL CONTROL

Woolpert is very concerned about the health and safety of our employees, and the health and safety of City residents and staff when in work areas. For this reason, Woolpert takes safety and environmental control seriously. The following is a summary of the firm's approach to safety and environmental control:

- **Field Safety Manager and Staff Training.** The health and well-being of employees are very important to Woolpert. The firm understands the potential dangers of a large field data collection project in urban and suburban areas. Through past experience we have found that the most informed workers are the safest workers. Team members will receive specific training and instructions to assist in protecting them from the dangerous elements associated with this project. Woolpert will assign a Field Safety Manager who will be responsible for informing all team members of the safety guidelines. The Field Safety Manager will evaluate and coordinate the needed training, if any, of team members prior to the commencement of field activities. Safety training will conform to the Code of Federal Regulation, Title 29 (OSHA) and other applicable federal and state regulations. In the event of conflicting requirements, OSHA standards will prevail.

- **Crew Safety.** It is important that key industrial sites be aware of the presence of field crews and their purpose. It is equally important that the crews be respectful of the residents and their property. In an effort to help make crews more identifiable, ID badges will be worn while in the field. The badges will have a photo of the crew member. Crews will conduct themselves in a professional manner at all times. It is important for team members to be aware of the surrounding environment and the dangers it may present. All crews will be equipped with a cell phone to contact the appropriate authorities if a situation should arise. A list of phone numbers and addresses of local hospital, fire, police, emergency services, and animal control will be provided to each crew. Situations that are deemed a threat to Woolpert or City personnel will be reported immediately.

- **Blood-Borne Pathogens Protection.** The needs of this project may include entry into some sanitary sewer manholes for inspection. Woolpert recognizes the risks associated with exposure to sewage and will work to make this environment as safe as possible. All Woolpert employees who work in direct contact with the wastewater inspection phase of the project receive training on how to protect themselves against the risks of blood-borne pathogens. Standards,

including the use of personal protective equipment and following decontamination procedures will help minimize the risk of exposure. All employees will be offered a Hepatitis B vaccination.

- **Confined Space Entry.** If necessary, Woolpert will outfit field crews with pole cameras in order to minimize the number of confined space entries needed to collect the data for this project. Entering a confined space can be a complicated and dangerous aspect of any project. If a confined space needs to be entered, it is Woolpert's goal to administer to the safety of our crews. Using accepted entry practices, well-trained/experienced personnel, and appropriate safety equipment will allow field crews to complete this task. Confined space entry will be conducted according to OSHA standards. All entry and attendant personnel will be trained and certified. At least two people are required for confined space entry. All confined space entry will be performed with a mechanical retrieval system. Atmospheric monitoring will be performed prior to and during entry to determine oxygen deficiencies or the presence of toxic or flammable gas. Approved personal protective equipment will be worn at all times during entry.

- **Vehicle Safety.** Woolpert vehicles utilized on this project will be using public roads. For the safety of field crews and the public, it is important that all vehicles and operators be up to code. All drivers will, of course, have a valid driver's license and will be properly insured. Each vehicle will meet quarterly safety inspections. Any vehicle that will be used in traffic control situations will be equipped with caution/strobe lights. All vehicles will be equipped with a first aid kit and emergency first aid instructions in case an emergency situation should arise.

- **Traffic Control.** Many of the structures associated with this project are located in or near roadways. To administer the safety of motorists, pedestrians and the data collection crew, Woolpert will adhere to a strict work zone traffic control (WZTC) policy that will be determined with the City and during the kick-off meeting. All team members involved in data capture in a roadway corridor will be trained in traffic control procedures. Any data capture that involves closure of a major roadway will be coordinated through the City of Columbus. Professional judgment will be used to arrive at the best traffic controls for a particular work site depending on the nature of the activity, location and duration of work, type of roadway, traffic volume and speed, and potential hazard. Note: for estimated purposes, no special needs, equipment or patrol officer assistance are estimated at this time.

- **Animals.** At times throughout the data collection process, Woolpert crews will encounter unattended animals. In most cases, animals are friendly and do not affect data collection. In other cases, steps must be taken to reduce the risk that the unattended animal may pose. Crews will attempt to contact any property owner whose fenced or caged animal prevents a safe passage to the data gathering process. If contact to the property owner cannot be established or the situation cannot be resolved, the area will be treated and reported as difficult access through the submission of a Problematic Feature Report to City staff. Crews will also be issued a pepper spray deterrent device to protect themselves against aggressive animals. City will provide assistance for any private property issues.

GIS STAFF AUGMENTATION

Woolpert specializes in providing professional services across many service areas, including GIS Services. As part of the suite of services offered, Woolpert also provides on-site and off-site staff augmentation services for our clients. These services are typically provided for specialized services for which Woolpert has established a high degree of experience and expertise, or as a follow-on to work Woolpert has previously performed. The Woolpert Team is proposing experienced GIS staff that is already based in Columbus to support the City's onsite needs on an as needed basis for engagements of any length.

NEEDS ASSESSMENT/BUSINESS PROCESS ANALYSIS

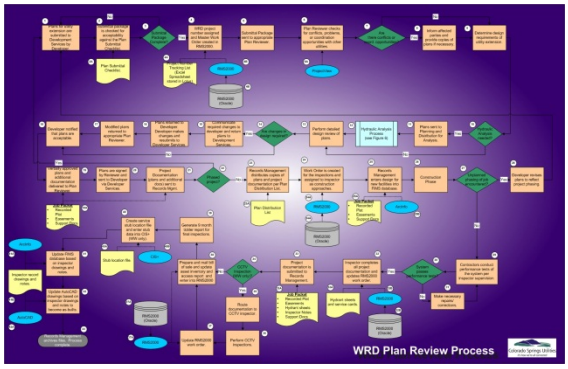
IDENTIFY AND MAP WORK PROCESSES

Where appropriate to asses existing business processes Woolpert Team Members will evaluate existing work processes. If not already identified in work performed recently, the following areas will typically be discussed and documented:

- What data is available, what formats, and how is it stored?
- Who uses the data?
- Who will use this data?
- What data needs to be created to support cross-department information sharing?
- What processes can make this data more easily integrated?
- What processes can make these applications more easily integrated?
- How should it be accessed?
- What other tasks will need to be completed, and how should they be prioritized?
- How will the existing GIS data be integrated into the sewer and water modeling software?
- What is the estimated timeline and budget required to create and support the system?

The results will be compiled into a series of AS-IS process flow diagrams. These diagrams will document the existing operational work processes as they relate to the existing information systems.

PREPARE AS-IS CONDITIONS REPORTS



All information collected from the tasks defined above will typically be documented in an AS-IS Existing Conditions Report that will be submitted to the City for review and feedback. The collected information will be gathered and assembled into a report documenting the existing conditions grouped under the following categories:

- Data
- Standards and quality control procedures
- Resources: staffing/training, technical support
- IT hardware and software
- Database design and system integration workflows
- Business processes
- Applications and information systems

PERFORM GAP ANALYSIS

Based on the results from the previous step and from workshops, the Woolpert Team will perform a gap analysis to determine what steps the City would need to take to evolve from the AS-IS condition to the desired TO-BE condition. The gap analysis will:

- Determine the extent to which existing and available information is capable of fulfilling the DPU's requirements

- Outline significant gaps between existing and available information and its supporting business processes and that which participants have indicated they need to perform their job functions
- Define significant gaps between existing and available information currently in use and industry best practices
- Identify potential business process changes that could alter participant needs or more closely align to best practices

DEVELOP TO-BE REPORT INCLUDING GAP ANALYSIS

The Woolpert Team will then typically summarize and report findings of the workshops above including recommendations regarding technology, gap analysis, cost/benefit analysis and what, if any, business practices need modified.

DEVELOP DETAILED BLUEPRINT FOR IMPLEMENTATION

The implementation blueprint pulls together the discrete pieces of each of the earlier phases of this effort into an integrated whole. It identifies the detailed steps needed to implement the recommendations and create the organizational or operational changes. This plan will identify the specific tasks and procedures in a logical order, the responsible parties for each task, recommended start/finish dates for each task, and the budget required for task and each year. Based on discussions from the workshops, tasks will be phased to take into consideration internal City goals, budget constraints, and priorities.

All recommendations and their associated costs and levels of effort will be inputted into a Microsoft Project file. Schedules and sequencing can be manipulated to determine the best distribution of both budget and time requirements across a multi-year implementation period.

GIS APPLICATION DEVELOPMENT/GIS INTEGRATION

WOOLPERT GIS APPLICATION DEVELOPMENT AND INTEGRATION PROCESS

Woolpert has extensive experience in employing similar assignment processes for multiple clients, including the Cities of Indianapolis, Phoenix, and Cleveland, Louisville Water Company, and Miami Dade Water and Sewer Department. Through these engagements, we have developed an approach that leads to successful win-win implementations of enterprise information systems. The formula for success is based on the following principles:

1. Both parties need to work together to achieve a common goal. This requires open lines of communication and a high level of trust.

2. Regular review meetings and status reports are critical. With regular communication, small problems can be quickly identified and addressed before they become large problems.

3. Before development begins, a Software Requirements Specification (also known as a Technical Approach) must be developed so that all parties understand what is to be developed.

4. A structured software design and development methodology that provides flexibility and continuous interaction, known as “Agile”, leads to successful software projects. The Agile approach is described in greater detail below.

DEVELOPMENT OF TECHNICAL APPROACH AND COST ESTIMATE

Woolpert understands that true success comes from win-win engagements in which both parties have a mutual understand of each other's goals and strive to meet them. Accordingly, Woolpert believes that, at the beginning of a project assignment process, an initial meeting should be held to begin the process. The result of this meeting would typically be a Statement of Work, developed by the client, which defines in general terms what is to be accomplished.

Based on that Statement of Work, Woolpert staff will develop a Technical Approach document which combines the elements of a Software Requirements Specification and a Scope of Services.

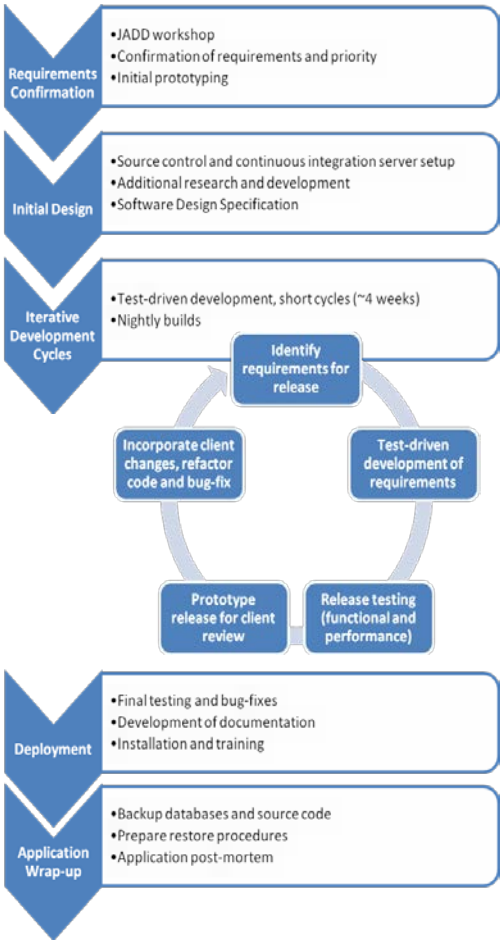
TECHNICAL APPROACH

The Technical Approach documents the process that will be followed by all team members to implement the application. In addition, the Technical Approach serves to determine and document the requirements of the application, or the "what" and the "why":

- What is going to be developed in this application or interface? What are the requirements from the users?

- Why certain requirements and not others? Why does requirement "A" have a higher priority than requirement "B"?

The three items discussed below are used to accomplish these objectives and serve as the primary sections of the Technical Approach document.



REQUIREMENTS

The application should meet all aspects of the requirements list, when complete. The purpose of documenting and prioritizing these requirements is to create a comprehensive list that must be met, to have finished an application or interface. In essence, marking each requirement as complete is an indicator to the project team when a task is finished. Many times, more requirements will be identified than can be completed within the given project or task schedule and budget. Working with the City to prioritize requirements will help determine/justify which requirements can be met within scope, schedule and budget of the task.

COST ESTIMATE

Using the information from the Technical Approach and SRS (if developed), Woolpert's Project Manager will work with his or her team members to develop an estimate of the effort required to develop the proposed application. This effort will be documented into a standardized cost estimating tool that has been developed by Woolpert specifically to capture the best practices in

software development. The product of this tool will be inserted into the Technical Approach document and provided to DPU for review.

SOFTWARE DEVELOPMENT METHODOLOGY

After many years of consulting in custom software development, Woolpert has committed to a widely accepted and proven development process called Agile. The overall goal of the agile approach seeks to balance, providing sufficient planning and documentation to meet a client's needs but also provide the flexibility necessary to successfully and quickly complete software design and development tasks.

This includes an emphasis on:

- Individuals and interactions *over* processes and tools
- Working software *over* comprehensive documentation
- Customer collaboration *over* contract negotiation
- Responding to change *over* following a plan

In simple terms, Woolpert places a great degree of emphasis on delivering working products to customers through extensive and continuous communication with our clients. Using this approach, Woolpert has delivered value quickly and effectively to its clients while avoiding the pitfalls of missed deadlines, not meting client expectations, and budget overruns associated with other methodologies.

Our System Design Life Cycle (SDLC) approach is described by the following steps:

1. **Requirements Confirmation.** Woolpert will conduct an initial *Joint Application Design and Development* (JADD) workshop with DPU staff to confirm the requirements and to begin to present prototypes and ideas for how the application will function/flow.

2. **Initial Design.** During initial design Woolpert, will establish the source control and continuous integration server environments. In addition, the technical lead for the application will work with the assigned development team in performing additional prototyping and R&D to create an *Application Design Document*. This document details implementation strategies, risks, architecture, and technical assumptions.

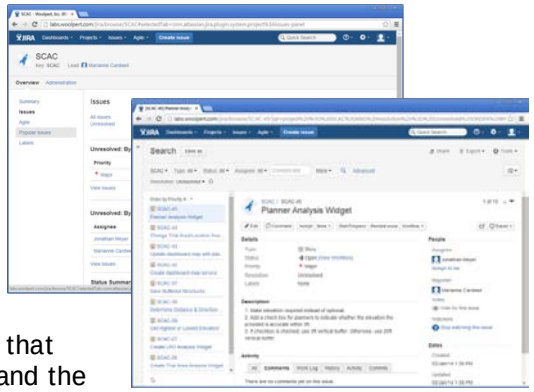
3. **Iterative, Development Cycles (or Piloting).** These are the key components to the agile approach. The application will be developed over the course of several sprint cycles. Each cycle will involve the development of a subset of the application. Functionality, (starting with high priority requirements) will be developed utilizing a test-driven approach. Towards the end of each cycle, the application will undergo additional release testing followed by a *Sprint Meeting* with DPU to review the release. Changes from DPU will be incorporated, code refactored and bugs fixed. The team will then repeat the process as necessary to complete the application functionality. These short release cycles will allow DPU to participate throughout the process, ensure that development activities are reviewed frequently, and that new functionality is introduced in manageable amounts.

4. **Deployment.** Once all functionality has been developed and approved, Woolpert will begin the deployment process. This will include the development of an *Acceptance Plan* for each application, internal testing and bug fixes, an acceptance testing workshop for each application, and the optional development of the *Online Help System* and training materials (*Users Guide* and *Administrators Guide*) for the application. Prior to installation a go-live plan will be agreed upon with DPU to ensure that the logistics of rollout are clear to all parties. The Woolpert team will then install and configure the application, followed by on-site training if

desired. A robust 3-stage (Development/Test/Production) testing and deployment process could be employed as DPU moves to more enterprise solutions in the future.

5. **Application Wrap-up.** Once deployment is completed, Woolpert will back up the databases and source code associated with the application and prepare restoration procedures to ensure that the development environment can quickly be restored to facilitate any necessary corrections or enhancements.

ITERATION TESTING AND ISSUE TRACKING



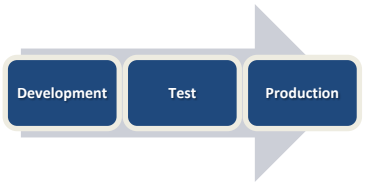
Upon completion of each iteration or development cycle, Woolpert will thoroughly test the application to ensure that all functional requirements for that iteration are met and that the application is ready for iteration release testing at DPU. At this time, Woolpert will deploy the application within a test environment where DPU staff can begin to use and test the application with the intent of flushing out any usability or functional issues as well as bugs. By performing this type of testing at the end of each iteration, issues can be resolved in the following iteration. This would ensure that DPU is getting what they expect throughout the process and the risk of any changes or refactoring of code on the application would be significantly reduced. To help track these issues throughout testing and development, Woolpert utilizes a web-based tracking system for logging bugs, questions, feature requests, and other issues for each milestone over the course of the project.

Users can provide detailed comments regarding the issue as well as screenshots and other pertinent information regarding their environment. This provides a central repository for logging testing feedback and results in technical lead and development staff being notified via email as issues are submitted. The technical lead reviews each issue and then assigns the task to the appropriate developer. Once assigned to a developer, these issues appear as prioritized work items to the developer when entering the respective development environment, i.e. Visual Studio, Flex Builder, etc. Any issues logged during each phase of testing will be addressed prior to the next iteration deployment. As issues are resolved, Woolpert developers will close the work item providing a description as to what they did to resolve the issue. The DPU user who submitted the issue will be notified of its status, and DPU staff with access to the system can login and view all issues and their status at any given time. At the end of each iteration, Woolpert staff will review each issue and its resolution with DPU staff to ensure it is acceptable.

ACCEPTANCE TESTING

In addition to the release testing that occurs during each iterative development cycle, Woolpert employs a rigorous acceptance testing methodology with our clients. Once all functionality has been completed and reviewed by the client, Woolpert runs through the Acceptance Test Plan test cases to demonstrate the successful development of the requirements as documented within the requirements specification and workshops with the client. Each requirement will result in a test case that describes how a user will utilize the application to meet that requirement. Acceptance testing is a confirmation that each requirement has been satisfactorily met and implemented.

STAGED DEPLOYMENT



Based on our past experience in developing large, enterprise-wide applications for clients such as the City of Phoenix, City of Indianapolis, Miami-Dade Water and Sewer, and many others, Woolpert recommends a phased deployment and rollout approach for each application. We recommend that DPU identify three hardware environments (one or more of which may be virtual) to phase the deployment of each application or module.

These environments are as follows:

- **Development.** The development environment serves as the initial platform for deployment. Once applications are ready to be deployed, they are installed and initially tested within the client environment. This is also the environment used for conducting the Acceptance Testing Workshop.

- **Test (aka QA).** The testing environment serves as the platform for conducting performance testing and training. The system is run under a simulated load to ensure the applications will function as designed under normal user load. In addition, the test environment can serve a dual role as a training playground.

- **Production.** The production environment is the environment that is utilized by end-users on a daily basis for performing their job functions. Once an application has gone through acceptance and performance testing on the previous environments, there is little risk in deploying the application into the production environment.

In addition to serving as a low risk approach for the deployment of new applications, this staged deployment approach is also a valuable tool for employing operating system and other software patches and upgrades.

Woolpert proposes utilizing the aforementioned approach and methodology to develop new applications, and the appropriate subset of the approach to modify existing applications.

QUALITY CONTROL

Woolpert's focus on qualified/proficient technical personnel begins in our recruitment process. Extreme emphasis is placed on the screening of future potential employees. These pre-employment screening techniques include careful review of the candidate's written credentials, rigorous interview techniques, and comprehensive reference checks. Beyond the rigorous recruitment techniques, there are three primary ways in which Woolpert maintains a competent technical support personnel base that are qualified and proficient as follows:

1. **Adherence to process—**Woolpert takes quality seriously, and has created a number of standards to ensure that our highly technical projects meet the stringent requirements that our clients place on us, and expect from us. These standards range from coding standards to naming conventions for software deliverables to tools used to achieve project goals. For example, every developer is expected to place all source code under version control so that the full lineage of a piece of an application can be traced. A system analyst is expected to fully document the hardware, software, and client-specific configuration requirements upon delivery of a system. This way there is less chance that work items fall through the cracks, and more chance that our clients receive the deliverables that we have mutually agreed upon.

2. **Peer review—**The work of every member of Woolpert's technical team undergoes a well-defined peer review process at least once a month, which usually coincides with an iteration or milestone. Predefined processes and standards described above are applied to that work, and comments and suggestions are provided by junior and senior team members. The peer review may be done on any relevant project work such as a requirements document, help system, low level code, database design, or other project artifacts. Furthermore, the Woolpert Quality Manager is given the opportunity to spot check any work at any time, in much the same manner as the Project Manager can do. The end result is a strong collaborative environment within the technical team, and the application of an incredibly broad range of knowledge to specific project issues and deliverables.

OTHER

Remote Sensing. Woolpert has developed custom software solutions that optimize work flows and automates production, resulting in reduced times and cost for any remote sensing project. We utilize COTS tools, such as ERDAS or ENVI, to assist in basic imagery processing and object-based segmentation tools, such as Feature Analyst and eCognition, for advanced in-depth analysis. We routinely provide a variety of mapping products in support of impervious surfaces, forest inventory, land cover, and invasive species. The features are classified according to their spectral and spatial (i.e., shape) characteristics, tailored for the geography of the project area.

The following are examples of commonly requested products:

- **Impervious Surface Mapping.** Impervious surface mapping is a necessary component in conducting qualitative and quantitative storm water analysis relating to establishing storm water billing, identifying point and non-point source pollution sources, watershed characterization, H&H modeling and master planning. In addition to providing impervious surface mapping models, Woolpert performs change detection in conjunction with new and existing impervious surface data to ensure the impervious surface database is current. By providing the capability to perform up-to-date analysis more cost effectively, our clients are equipped with reliable storm water billing and management systems to address NPDES requirements.

- **Land Use/Land Cover.** Woolpert develops land use and land cover mapping using a variety of methods and source materials, from airborne platforms (imagery and LiDAR) to boots on the ground for field reconnaissance depending on the output map scale, the number of classes and the accuracy requirements of each project. Woolpert has developed semi-automated feature extraction routines to help reduce the time and costs associated with the map development process. These routines employ state-of-the-art techniques such as image segmentation, image pyramids, edge extraction, and classification and regression tree analysis. By exploiting the spectral information from imagery and fusing it with elevation information and textural characteristics of LiDAR, Woolpert can extract various land use/ land cover types from remotely sensed data collected by various airborne and satellite platforms.

System integration/network. Woolpert, as most organizations, strives to improve network performance and system integration. In order to succeed, organizations must embrace and quickly adapt to changes in information technology. The Woolpert team had optimized the workflow to meet these challenges by:

- Increasing productivity by delivering quality applications and services that enable implementation of efficient business processes.

- Enabling secure connectivity throughout your organization

- Ensuring secured, but segregated access to authorized network resources
- Delivering quality, real time applications and services
- Protecting your company/organization with end-to-end security
- Reducing operating expenses through application of sophisticated network infrastructures

PROJECT TEAM COORDINATION

As mentioned previously, Woolpert makes every attempt to hire the best technical people possible. This has resulted in a very strong and skillful team that is very diverse, both in terms of knowledge and geography. While a significant portion of our development staff is concentrated in the Ohio and Indiana regions, a large group of developers are spread across multiple offices and regions. In many environments, this could pose a problem. However, Woolpert's development team interacts and works together as if it is one cohesive group within a single office. This is due to the processes and procedures used to develop software applications as described above, but also how the project managers, team leads, programmers and system analysts communicate with one another over the course of a project.

Woolpert has embraced technology to help foster regular and efficient communication as a result. Woolpert project teams utilize technologies such as web conferencing to perform regular peer reviews of each other's work, or to discuss project requirements and design. Video conferencing has also been implemented to invoke a more personal feel to these meetings to help ensure better communication. A centralized source control system for storing application code and project documentation is utilized on every project. Subcontractors, when utilized, are required to use our source control system as well to ensure a single source for application code and reinforce the fact that we are all part of one team. Finally, project managers utilize a secure project website for the storage of project documentation and correspondence, as well as an issue tracking system for scheduling assignments to various staff and tracking application issues/bugs later in the project. All of these systems are tied into email so that people receive the proper notifications.

Through the methods described above, the Woolpert team is able to act as a single entity throughout each project and projects tend to run more efficiently as a result.

TECHNICAL APPROACH SUMMARY

The approach components documented above are examples of the standards and quality-based techniques that the Woolpert Team uses in each of our projects to create success for our clients. As the level of detail shown above indicates, our team has extensive experience in each of the areas of service defined by the City.

SECTION 2

WOOLPERT

DESIGN | GEOSPATIAL | INFRASTRUCTURE

SECTION 2. QUALIFIED PROJECT STAFF

Woolpert's greatest strength is in our project management and production personnel—highly trained professionals who work efficiently as a team on all aspects of a GIS project. Our methods use the talents and creative energy of proven performers who have been involved in every area of geospatial projects for many years. We have assembled a team of professionals who, on both the national and local levels, demonstrate the highest degree of expertise available.

The table below shows the Woolpert Team members, their roles and their respective companies and locations.

Woolpert Team Members			
Name	Role	Company	Location
Mike Merchant	Project Director/Project Manager	Woolpert	Columbus
David Alvarez	Project Coordinator/ GIS Integration/Data Conversion and Development	Woolpert	Columbus
Brian Stevens	Remote Sensing/Photogrammetry	Woolpert	Columbus
Ryan Butler	Staff Augmentation/GIS Integration	Woolpert	Columbus
Mike Morgan	Staff Augmentation/Data Conversion and Development	Woolpert	Columbus
Marianne Cardwell	Application Development	Woolpert	Indianapolis
Steve Newel	Field Data Collection	Woolpert	Columbus
Tim Chrismer	Field Data Collection	Woolpert	Columbus
Jim Heider	Field Data Collection	Woolpert	Columbus
Calvin Johnson	Field Data Collection	Woolpert	Columbus
David Hall	Field Data Collection	Woolpert	Columbus
Rick Webb	Field Data Collection	Woolpert	Columbus
Jeff Meyer	Data Conversion and	Woolpert	Dayton

	Development		
Colleen Donahue	GIS Integration	Donahue IDEAS	Columbus
Kathleen McBride	GIS Integration	Donahue IDEAS	Columbus
Scott McBrayer	GIS Integration	Donahue IDEAS	Columbus
Jason Woodman	Application Development/GIS Integration	DLZ	Columbus
Rayleen Lee	Application Development/ Data Conversion and Development	DLZ	Columbus
James H. Toto	Other	DLZ	Columbus
Tatyana Arsh	Other	DLZ	Columbus
Charles H. Murphy	Other	DLZ	Columbus
Willie Jordan	System Integration/Network	ETI	Columbus

Resumés of our project team members are provided on the following pages to demonstrate the level of expertise and experience we can offer to the City of Columbus.

staff profile

MICHAEL MERCHANT, GISP

PROJECT DIRECTOR / PROJECT MANAGER

As a project director in Woolpert's geospatial services, Mr. Merchant works closely with clients to deliver solutions to their storm water mapping needs. He brings to his position more than 36 years of experience working for the City of Columbus in Columbus, Ohio, one of the largest metropolitan areas in the US. Mr. Merchant possesses a thorough understanding of civil engineering mapping and the challenges faced by municipal public works departments as they attempt to accurately map and manage assets.

Mr. Merchant specializes in geographic information systems (GIS) and the efficiencies and cost savings they can provide state and local governments. He has 15 years of utility department experience with GIS, serving first on the City of Columbus' GIS implementation team and later as the city's GIS Manager for the Department of Public Utilities. As GIS Manager, Mr. Merchant was responsible for all GIS activities—managing budgets and staff, and coordinating GIS activities throughout the city. Mr. Merchant is a nationally-certified GIS Professional (GISP) and is skilled in ESRI GIS software.

Years of Experience

40 years

Professional Registration

Certified GIS Professional, License # 00034034

Professional Membership

Former president and board member of the Geospatial Information & Technology Association (GITA), Indiana, Kentucky and Ohio (IKO) Chapter

URISA Ohio chapter

Presentations and Publications

"Fusing LiDAR and Ortho-Imagery to Determine Impervious Surfaces,"

Co-presenter, Ohio GIS Conference, 2008

Co-presenter, Ohio Stormwater Conference, 2012

Presenter, Erie County, Pa. Watershed Workshop 2013

PROJECT EXPERIENCE

Lake Erie Watershed – LiDAR, Orthoimagery, and Impervious Surface Delineation—Pennsylvania State University (PSU), Erie, Pennsylvania. In 2012, Mr. Webb served as the Project Director responsible for overall project delivery and performance of the project manager. Using GPS technology, Woolpert established new photo identifiable ground control points in support of PSU's goal to develop basin-wide 1"=100' scale 4-band, 8-bit orthoimagery with a 0.5-foot pixel resolution, and 1-meter LiDAR (average point density). A survey report was provided containing all pertinent information to include control diagrams, point descriptions and diagrams, and log sheets. As necessary, new control points were established in order to meet second order horizontal and third order vertical control.

Orthophotography, LiDAR, and Automated Feature Extraction, Franklin County—Columbus, Ohio. In 2011, Mr. Webb served as the Project Director responsible for overall project delivery and performance of the project manager. Woolpert acquired new, color aerial imagery of the entire 544-square-mile county. The imagery was combined with LiDAR data from the 2007 Ohio Statewide Imagery Project to create a digital terrain model with two foot contours. Digital orthophotos were produced at a 1"=100' scale with a half-foot pixel resolution.

Construction Drawing Imaging and Management System (CDIMS), City of Columbus, Ohio—Columbus, Ohio. Mr. Merchant served as project manager for this effort, successfully leading staff in the development and implementation of a drawing and imaging system to house 73,000 sewer drawings and 300,000 sewer permits. As the project manager, Mr. Merchant procured a consultant and worked with the consultant to ensure that all necessary documents were properly scanned. The project team also documented department workflows and linked the CDIMS to the

city's GIS. As a result, all city employees now have access to the documents and records from their desktops, using FalconSVP web-enabled software. Work crews with computers now have the capability to search for and find drawings and permit information in the field, rather than having to travel back to city offices to retrieve documents. Sewer permits are now created using E-Permits, or electronic forms. A city staff member can create an E-Permit in three minutes, while under the old paper system it took 20 minutes to complete the task. The creation of CDIMS and its integration with the city's GIS have increased productivity, saving the city time and money. CDIMS now serves as the repository for approximately one million documents. New documents and drawings are added daily. This unique project has earned recognition at both the national and state levels. URISA—The Association for GIS Professionals—awarded it a Best Practice Runner-Up honor in 2001. The Ohio Geographically Referenced Information Program (OGRIP) gave the project a Best Practice Award in 2002.

Geographic Information System (GIS) Implementation, City of Columbus, Ohio—Columbus, Ohio. Mr. Merchant served as the data conversion manager during the city's GIS implementation process. He served as a member of the city's GIS team and was responsible for the conversion of legacy sewer and water line data into the GIS format. ESRI's ArcIMS is the city's solution for delivering dynamic maps and utility GIS data via the Web. It provides a highly-scalable framework for GIS Web publishing, and users can access the information using only Microsoft Internet Explorer; additional software is not needed. GIS data can be viewed from any personal computer on the city Intranet.

Prior to joining Woolpert:

City of Columbus, Ohio, Department of Public Utilities. From 2005 to 2009, Mr. Merchant served as GIS Manager for the Department of Public Utilities. In that role he managed the GIS, imaging, and damage prevention sections. He also was responsible for management of 23 GIS analysts, technicians, and line locators. Mr. Merchant's duties included: GIS budgetary and department management; coordination of all GIS activities citywide; and procurement of imagery for remote sensing needs for the storm water mapping utility.

City of Columbus, Department of Public Utilities, Division of Sewerage and Drainage. Mr. Merchant was the Map Room Manager from 1996 to 2005. His responsibilities included: managing the Sewerage and Drainage Map Room; managing 10 engineering associates and drafters; and preparing and managing the map room budget. He also developed CAD standards for drawings submittals, and procured and managed a drawing imaging management system. Additionally, Mr. Merchant served in the following positions: as city liaison to the Franklin County Auditor's GIS Committee; as department representative on the city-wide GIS implementation project; as department representative on the city-wide GIS CDIMS project; and as department of Publics Utilities Conversion Manager.

1973-1996 City of Columbus, Department of Public Service, Division of Engineering and Construction. Mr. Merchant worked as an engineering associate from 1973 to 1996. He was involved in all levels of civil engineering mapping, annexations, right-of-way dedication, and easements.

staff profile

DAVID ALVAREZ

PROJECT COORDINATOR/GIS INTEGRATION/DATA CONVERSION AND DEVELOPMENT

Mr. Alvarez is a GIS Specialist/Environmental Scientist with more than ten years of experience in data management, quality control (QC), data collection, geospatial analysis, cartography, and LiDAR. His experience presents a specific emphasis in hydrology, environmental management plans, and urban infrastructure.

Mr. Alvarez has provided analysis, design, and development of numerous geodatabases for federal, state and county governments. He has led the development and management of data conversion procedures, and developed QA/QC procedures to ensure the quality of geodatabase material. He has managed team efforts to conduct survey, and GIS-CAD integration work. He also performs ground trothing, 3D visualizations, and LiDAR data analysis for projects.

Years of Experience

10 years

Education

Masters of Geodetic Science and Surveying, The Ohio State University

Bachelor of Science, Environmental Engineering, School of Engineering of Antioquia (Colombia)

Professional Registration

ASPRS Intern Certified Mapping Scientist (GIS/LIS), GS198P

Geographic Information System Professional (GISP), 37170

Professional Membership

American Society of Photogrammetry and Remote Sensing (ASPRS), GIS Division Director (2011 – 2015)

PROJECT EXPERIENCE

The Ohio State University (OSU) Base Mapping initiative. Mr. Alvarez serves as a project manager for the data acquisition (Imagery and LiDAR) for five OSU branch campuses and the data compilation of the five branches and golf course. The data compilation is designed to fit the custom Local Government Model (LGM) 10.2.

The Ohio State University (OSU) Data Conversion. Mr. Alvarez serves as a project manager and technical lead for the data conversion and workflow design all main campus 3D Architectural models (Revit) in to a 2D and 3D format (ESRI) using FME to fit the custom Local Government Model (LGM) 10.2.

2014 Digital Orthoimagery Projects—Various Counties in Ohio. Team member for various projects to provide statewide imagery and LiDAR to develop and/or update certain geospatial data sets for use by state government agencies, other levels of government, academia, and the general public,that includes new countywide 1"=100' scale 8-bit, 4-band (R, G, B, and NIR) stacked digital orthoimagery with a 0.5-foot pixel resolution.

Indiana Statewide Imagery and LiDAR Program, Indiana Office of Information Technology—Indianapolis, Indiana. Team member for project to provide statewide imagery and LiDAR to develop and/or update certain geospatial data sets for use by state government agencies, other levels of government, academia, and the general public, and to provide these data sets for inclusion to the IndianaMap.

Prior to joining Woolpert:

The Portsmouth Gaseous Diffusion Plant (PORTS) - Fluor-B&W Portsmouth. From 2011to 2013 Mr. Alvarez led the design, development and maintenance of the enterprise geospatial database

developed to support the Department of Energy (DOE) mission at the PORTS site. He was also responsible for the management of the survey subcontractors that support the Environmental Remediation (ER) group. He also developed standards (geospatial component) for the data collection of environmental samples and worked with the Engineering group to develop standards and workflows to integrate engineering grade data into the enterprise geospatial database.

Halcrow Inc. From 2010 to 2011 Mr. Alvarez led the design, development and maintenance of the enterprise geospatial database developed to support Hydraulic and Hydrological studies that Halcrow was doing for the Southwest Florida Water Management District (SWFWMD). He also developed standards for the data collection and support of the geospatial group worldwide in diverse environmental and engineering projects. Review of database designs developed by prior consultant(s) for data integrity issues for several clients around Floria.

CDMSmith Inc. From 2006 to 2010. Mr. Alvarez coordinated the geospatial and cartographic support for the Tampa, Orlando and Ft. Myers offices and provided support to more than 100 CDMSmith offices nation-wide.

Orange County Utilities, Florida. Mr. Alvarez led the development of the geometric network rules and cardinality for Wastewater, Water and Reuse networks for Orange County Florida. The overall goal of this project was to develop a methodology using the Geometric Network capabilities to maintain/improve the data integrity and speed up their QC of new data coming into the Enterprise Database and also facilitated tracing/isolation analysis for the maintenance team.

Stormwater Billing and Watershed Delineation for Hamilton County, Ohio. Updated the stormwater billing file database to reflect the new impervious areas and new fees that each of the stakeholders set up for the year in order to more accurately generate the monthly bill for County residents. Performed quality assurance/quality control (QA/QC) on the data.

Data Conversion and Database Design, City of Miami Beach Florida. Led the development of a geospatial database for the water, sewer, storm and reuse systems. Performed and coordinated QA/QC on the data submitted by the subcontractor.

East Point Capital Improvement Program (CIP), Fulton County, Georgia. Assisted in the development and implementation of a geospatial database for the Public Works division. Served as data steward for the project, responsible for gathering supporting sources, QC, and storing master files before the files were uploaded into the database. Provided cartographic support to the capital improvement projects and assisted in training the work personnel in the GIS and GPS technology.

St. Cloud Stormwater Billing, Osceola County, Florida. Led the QA/QC of the digitized impervious areas for the commercial parcels. Linked the impervious area to the Orlando Utilities Commission billing records to generate monthly bills for each of the residents in St. Cloud.

Implementation of the DRASTIC and Risk Model, Nationwide. Guided and assisted in the implementation of a Risk Model and developed a DRASTIC model for bottling plants nationwide. Also responsible for gathering and storing all the data necessary for the input of the two models. Provided a cartographic portrayal of the results.

FEMA, (DHS) Co-authored a new technical Procedure Memorandum (PM) for FEMA's Risk Mapping Assessment and Planning Program. This PM was a collaborative effort between FEMA and the STARR JV partners to develop standards for lidar and other high quality digital topography.

staff profile

BRIAN STEVENS, CP, SP

REMOTE SENSING/PHOTOGRAMMETRY

Mr. Stevens is an experienced project manager who regularly facilitates state and county-wide projects as well as projects for large industrial clients. He identifies resource needs, develops data acquisition QA/QC standards and provides technical assistance while ensuring quality client services.

Mr. Stevens is especially adept at complex projects such as the Ohio Statewide Imagery Project and its byproducts. Despite the size of the project, he ensures that client specifications, scheduling and budgets are met. He is skilled in ESRI products, AutoCAD and MicroStation; he also has supervisory experience.

Years of Experience

18 years

Education

Bachelor of Science, Geography, The Ohio State University

Continuing Education

PM Essentials: Building the Best Project Managers; Unit Three: Project Planning, Woolpert, Inc., August 23, 2010

PM Essentials: Building the Best Project Managers; Unit Four: Project Execution, Woolpert, Inc., October 27, 2010

PM Essentials: Facilitation - How to Run a Meeting; Woolpert, Inc; July 18, 2011

PM Essentials: Building the Best Project Managers; Unit Two: Contracting, Woolpert, Inc., May 4, 2010

Professional Registration

Certified Photogrammetrist, 1293

Surveyor Photogrammetrist, Virginia, 0408000121

Professional Membership

American Society for Photogrammetry and Remote Sensing (ASPRS)

Presentations and Publications

A Foundation to Build On Point of Beginning, 2005

PROJECT EXPERIENCE

GeoBase Common Installation Picture (Columbus, Springfield, and Toledo), Ohio Air National Guard—Columbus, Ohio. The purpose of the project was to provide necessary professional services to each Base to establish its foundation GIS digital base map layers that meet all Headquarters Air Force (HAF) GeoBase requirements and functionality. Project activities also included collecting new aerial photography and subsequent imagery analysis to perform planimetric feature extraction and generate GIS data files for each Air National Guard base.

Pilot GIS, Erie Water Works—Erie, Pennsylvania. As recommended in its implementation strategy, Woolpert began Erie Water Works' GIS development with a one-square-mile pilot area. The goal of the pilot project was to create a GIS water network using newly created landbase data, GPS data and source documents. The pilot implementation provided Erie Water Works with the opportunity to validate assumptions, test procedures, develop data and make any necessary adjustments prior to systemwide implementation.

Aerial Mapping and Survey for GeoBase Common Installation Picture (CIP), Selfridge Air National Guard Base—Selfridge ANG Base, Michigan. Project activities included providing the necessary professional services to the base to establish its foundation GIS digital base map layers that meet all Headquarters Air Force (HAF) GeoBase requirements and functionality. The populated database required to accomplish this consisted of imagery, topographic and planimetric feature data.

staff profile

RYAN BUTLER

STAFF AUGMENTATION/GIS INTEGRATION

Mr. Butler's experience includes performing all aspects of digital input, both graphic and non-graphic, in multiple operating system environments. He also edits and corrects graphic design files to meet project specifications; processes and prepares data to be delivered to clients; and recognizes technical problem areas within a project and works with supervisors to determine effective solutions.

Additionally, Mr. Butler designs and develops production, quality control and assurance-based utilities using software development tools; provides project specific training as needed; and assists in the development of technical and application user manuals. He is skilled in ESRI's ArcMap and ArcCatalog software. His expertise includes analyzing aerial photographs and geo-referencing data.

Years of Experience

9 years

Education

Bachelor of Science, GIS, Ohio State University

Bachelor of Arts, International Studies, Ohio State University

GIS Post-Baccalaureate Certificate, Pennsylvania State University

PROJECT EXPERIENCE

GIS System Upgrade, City of Hamilton—Hamilton, Ohio. The City of Hamilton contracted with Woolpert to assist with upgrading their GIS-related systems to better serve the users' core business functions. Tasks include the following: develop a detailed system upgrade work plan; define, install, and configure system architecture; evaluate existing master address validation system and explore integration options; document data management standard operating procedures; upgrade software packages to the newest release; deploy web-based Cityworks Server AMS; implement ESRI templates; create FacilityID generator for ArcGIS Desktop v10; formalize GIS data server backup and recovery procedures; and design and provide training.

Architect of the Capitol GIS Implementation, TMA Systems—Washington, Washington, DC. The Architect of the Capitol (AOC) manages the facilities comprising the nation's Capitol complex. A tremendous amount of information regarding the facilities is maintained by multiple organizations, but there are few common IT systems used in consistent ways to allow for data capture and analysis. AOC has contracted with Woolpert to assist with a GIS solution to simplify the collection, visualization, and analysis of facilities management data. Services include hardware, software, and data evaluation; data conversion; data integration; and application planning and TMA GIS integration.

GIS and Cityworks Support, City of Topeka—Topeka, Kansas. Woolpert is providing Cityworks server training to City staff, troubleshooting user problems, and performing Cityworks server and GIS server configuration adjustments.

RequestIndy Android, City of Indianapolis ISA—Indianapolis, Indiana. As part of the IndyGIS project, Woolpert developed RequestIndy for Android. RequestIndy for Android is an application specifically developed for the Android that allows users to report problems and request city services from the Mayor's Action Center.

staff profile

MICHAEL MORGAN

STAFF AUGMENTATION/DATA CONVERSION AND DEVELOPMENT

Years of Experience

11 years

Education

Bachelor of Science, Geography-GIS, The Ohio State University

As a GIS analyst in Woolpert's Geospatial services, Mr. Morgan analyzes satellite imagery and performs feature extraction using ESRI's ArcMap software. He serves customers in the federal, state and local markets. Mr. Morgan also performs all aspects of digital input, both graphic and non-graphic, in multiple operating system environments, and edits and corrects graphic design files to meet project specifications. Other duties include: processing and preparing data to be delivered to clients; providing project scheduling, pricing and budgeting recommendations; coordinating project priorities, monitoring schedules and budgets for project managers; addressing technical digital conversion questions; and designing and developing production, quality control and assurance-based utilities using software development tools. Mr. Morgan's software expertise includes: ArcMap, ArcCatalog, ArcSDE, ArcView, ArcInfo, PLTS, GAIT, Microstation, IRAS/C, AutoCad, OrthoPro, OrthoVista, SAS/Graph, 3-D SURFER, SPSS, Photoshop, Windows 2000/XP, and Microsoft Office.

PROJECT EXPERIENCE

Orthophotography, LiDAR, and Automated Feature Extraction, Franklin County—Columbus, Ohio. Woolpert acquired new, color aerial imagery of the entire 544-square-mile county. The imagery was combined with LiDAR data from the 2007 Ohio Statewide Imagery Project to create a digital terrain model with two foot contours. Digital orthophotos were produced at a 1"=100' scale with a half-foot pixel resolution. The cost of this project was shared equally between the City of Columbus and Franklin County.

Electronic Airport Layout Plan (eALP) - AGIS, Tulsa International Airport (TUL)—Tulsa, Oklahoma. Woolpert has been awarded a contract to create and submit a complete and useable FAA approved e-ALP for Tulsa International Airport. Utilizing FAA-developed tools, Woolpert will create a "reusable process" to allow the Airport to maintain the data deliverables beyond the initial e-ALP from the data that has been loaded into and resides within the Airport GIS database in order to make future e-ALP submissions.

Ohio Statewide 2007, Ohio Department of Administrative Services (DAS)—Columbus, Ohio. Woolpert provided collection of digital aerial imagery and LiDAR for the entire land area of the State of Ohio. Woolpert delivered color digital orthophotography, color infrared digital orthophotography and a LiDAR DEM for the approximately 41,276 square miles. Exclusively using Leica ADS40 digital camera systems, Woolpert collected one-foot color imagery. Using Leica ALS50 LiDAR systems, the LiDAR data was collected at a seven-foot post spacing and used for image rectification during orthophoto production. The full color orthophotography was delivered at one-foot pixel resolution in 5,000' by 5,000' grid tiles as 88 individual county coverages in uncompressed TIFF file format with World files. Woolpert also delivered DEMs in ArcGRID, ESRI Raster and LAS formats. The DEM is capable of supporting the generation of two-foot contours statewide meeting National Map Accuracy Standards. Woolpert also provided ground control, project and flight planning, triangulation, quality assurance and project management for this comprehensive mapping effort.

staff profile

MARIANNE CARDWELL

APPLICATION DEVELOPMENT

As a senior developer and group manager in Woolpert's Information Management service line, Mrs. Cardwell creates customized geospatial software solutions for federal, state, and local clients. Mrs. Cardwell is proficient with C#, VB.NET and Javascript, as well as older languages such as VB, VBA and Avenue. Her expertise centers on Esri software customization and development, particularly ArcGIS Desktop using ArcObjects and web applications using Esri's web APIs. In the past, she has developed web applications using technologies such as ArcIMS and ArcGIS Server's WebADF. More recently, Mrs. Cardwell has developed solutions to integrate multiple systems together, especially Accela's permitting solution and GIS.

Years of Experience

14 years

Education

Bachelor of Science, Geography, Michigan State University

Master of Science, Geography & Cartographic Sciences, George Mason University

Professional Registration

Certified GIS Professional, National, 00045516

ArcGIS Desktop Developer Associate 10.0 (#MB1FRDECK1B41KPQ)

Certified ScrumMaster

PROJECT EXPERIENCE

Impervious Areas Viewer, City of Columbus, Ohio. Senior developer and phase manager responsible for the design and development of an internal Impervious Areas viewer for the City of Columbus. This website provides customer service representatives with the ability to view information about impervious areas on a customer's property and is accessible from the City's customer management software.

Enterprise GIS Support, Port of Portland, Portland, Oregon. GIS architect responsible for supporting the Port of Portland in its enterprise GIS decision-making process, requirements gathering, system design, and application development.

GIS Consulting Services, City of Indianapolis, Indiana. Senior developer and phase manager for a multitude of GIS-centric projects. Projects included the development of various public-facing and internal websites, integration with the city's permitting system, and the development of custom tools. Responsibilities included requirements gathering, application design, development, application documentation, and project management.

GIS Platform and Land Use Evaluation, South Carolina Aeronautics Commission, Columbia, South Carolina. GIS architect responsible for requirements gathering, design and architecture of a public-facing website allowing the general public and local planning organizations to determine whether new building permits impact activities at SC airports and two mobile applications targeted for obstruction analysis and airport inspections.

GIS Consulting Services, City of Cleveland, Ohio. System Designer responsible for the design of the computer system. Woolpert assisted in the design and implementation of an enterprise-wide GIS with a highly integrated suite of applications. This project included creating workflow models, developing database models and application designs, developing GIS standards and manuals, defining maintenance procedures, and providing training. Before citywide implementation, Woolpert conducted pilot projects to test base mapping, applications and data conversion processes. The full citywide implementation included 19 initial GIS applications that were fielded

across the city to support the GIS implementation. In 2009, Woolpert was hired under a separate contract to continue developing GIS software applications for the City's Enterprise GIS.

Enterprise GIS Services, Miami-Dade Water and Sewer Department (MDWASD)—Miami, Florida. Woolpert assisted MDWASD in improving their legacy GIS System by taking advantage of the newer and improved GIS technologies to establish a robust enterprise GIS that supports the County's 430,000 customers spread throughout 460 square miles. However, MDWASD's needs go well beyond upgrading to newer technology. MDWASD requires a data maintenance solution to support their extensive data maintenance workflow. As a result, a set of tools were developed to allow desktop users to automate data maintenance such as editing, quality assurance/quality control, map production, version control, and annotation management. Efficient data maintenance leads to tremendous opportunities for data distribution, and MDWASD took advantage of this fact by developing a web browser in ArcGIS Server 9.3 supported by Oracle 9i and ArcSDE.

Develop Custom Synchronization Tools, Southwest Florida Water Management District (SWFWMD)—Orlando, Florida. SWFWMD currently uses an ArcGIS Server application referred to as LARIS as well as basic out-of-the-box editing tools in ArcGIS ArcMap to create and maintain both burn prescriptions and burn evaluations for the water management district. This project included developing a set of web-based and desktop tools to manage the relationships between the Oracle database and ESRI geodatabase.

SAIC NIMS, Science Applications International Corporation (SAIC)—McLean, Virginia. SAIC was tasked by Eastern Kentucky University/Justice and Safety Center (EKU/JSC) to create a Model Community Document and a Virtual Model Community (VMC) to support training and exercise activities for emergency response personnel. These tools are used to train FEMA personnel by adding realism and thereby strengthening the training experience. Woolpert supported SAIC with continued development of the VMC by providing experts in ArcGIS to help analyze, document and maintain the web-based system. Woolpert provided GIS data development, application support, training and project management.

staff profile

STEVEN NEWELL, PS

FIELD DATA COLLECTION

Mr. Newell is responsible for project management of Surveying and GPS projects at Woolpert. This work includes coordination with clients to manage client needs and expectations, and the daily coordination and supervision of full-time survey crews and office technical staff. These responsibilities include work assignments, schedule compliance, cost compliance, and quality assurance. Mr. Newell is a licensed surveyor with over 20 years of experience in surveying and specializes in surveys that involve large engineering design applications. Survey types that he routinely supervises include American Land Title Surveys (ALTA), right-of-way, property description and resolution, construction staking, topographic, photo control, utility, geodetic control, and global positioning system (GPS) control. Mr. Newell has completed certification of OSHA-Approved Competent Person in Construction and 40-Hour Health and Safety to allow him to work on OSHA-classified hazardous sites.

Years of Experience

32 years

Education

Bachelor of Science, Surveying Engineering, The Ohio State University

Continuing Education

PM Essentials: Building the Best Project Managers; Unit Two: Contracting, Woolpert, Inc., May 6, 2010

Risk Management: The Changing Demands of Risk Management - Preserving Woolpert's Creativity and Innovation, Victor O. Schinnerer & Company, October 23, 2012

ODOT Prequalified Right-of-Way Reviewer, Ohio Department of Transportation, Columbus, Ohio

OSHA, Approved Competent Person in Construction and 40-Hour Health and Safety, Parsons/Fernald, Dayton, Ohio

Professional Registration

Professional Land Surveyor, Ohio, PS.7212

Professional Membership

Professional Land Surveyors of Ohio (PLSO)

PROJECT EXPERIENCE

GIS/GPS Water and Sewer Utility Survey, Miami Dade County Water & Sewer Department—Miami, Florida. Beginning with a 9 square-mile pilot area and continued with full conversion of the 414 square-mile service area, provided services to build a GIS that will support both water and sewer distribution networks by locating surface utility features. Woolpert worked extensively with a Trimble Navigation software programmer in co-developing a pen-based RTK data collection software. This allowed for the quick and efficient data collection of over 180,000 water and sewer utility features to accuracies of 3.5 centimeters. After the successful completion and client acceptance of the pilot area, Woolpert managed the full production of all field aspects of the project, which at times included eight field crews.

GIS/GPS/Dade On-Line Facility Information Network (DOLFIN), Miami-Dade Water & Sewer Department—Miami, Florida. Provided full conversion of the 414-square-mile service area and a GPS inventory to build a water/sewer GIS. Developed an intranet/Internet server-based application interface using custom MapObject/Visual Basic Development tools to facilitate distribution of GIS technology and attribute data analysis throughout the Miami-Dade Water and Sewer Department.

staff profile

TIM CHRISMER

FIELD DATA COLLECTION

Mr. Chrismer is a Certified Survey Technician Level III by ACSM with several years of experience in surveying. He is responsible for preparation of survey plans and documents.

Survey types that he routinely supervises include American Land Title Surveys (ALTA), right-of-way, property description and resolution, construction staking, topographic, photo control, utility, geodetic control, and global positioning system (GPS) control.

Years of Experience

18 years

Continuing Education

ODOT Right of Way Plan Development, 2005

OSHA 30-Hour Construction Safety and Health, 2009

Respirator Fit Test, 2007

PROJECT EXPERIENCE

OSU Infrastructure Master Plan and GIS, The Ohio State University—Columbus. Woolpert developed an infrastructure master plan and a GIS that encompasses the entire OSU Columbus campus, including over 22 million gross square feet of campus buildings and approximately 1,700 acres of land. Fourteen utility infrastructure systems were assessed and evaluated for their ability to meet existing needs. The existing behavior of the water, sewer, storm, steam, and chilled water systems were hydraulically modeled to evaluate their ability to meet current and projected demands. Recommendations included a series of implementation projects, budgetary cost projections, identification of utility corridors, and assessment of the impacts of deferred maintenance. An infrastructure GIS database was developed using AutoCAD Map and Oracle and the Federal Spatial Data Standards for Facilities, Infrastructure and the Environment (SDSFIE). AutoDesk's MapGuide web-GIS technology was used to develop a utility assessment model that will allow university staff to interactively assess the suitability of a potential campus site to support various facility types by assessing the existing and proposed infrastructure.

Karl Road, City of Columbus, Ohio—Columbus, Ohio. Woolpert prepared plans for improvements to a 1.2 mile section of Karl Road, an urban residential arterial. The work included complete replacement of the pavement, curbs and sidewalks, enhancements to storm drainage and the addition of left turn lanes at one intersection. Other work involved the replacement of 35 curb ramps, the addition of street lighting, adjustment of existing utilities, preparation of signing and pavement marking plans, provisions for COTA bus pads, and replacement of a flasher at one intersection.

Airport Survey and GIS Program Validation Project, Federal Aviation Administration, Office of Safety and Standards—Various Locations, U.S. Woolpert was hired by the Federal Aviation Administration (FAA) to collect information to assist in the safe and efficient movement of people or goods through the national airport system. This information is the primary source for dissemination of safety critical aeronautical information to the public. Woolpert classified information in a system consistent with FAA systems, trained state personnel, attended meetings on data inventory inspection, performed data collection in accordance with standards prescribed by the FAA and provided information using FAA's web-based program.

staff profile

JAMES HEIDER

FIELD DATA COLLECTION

Mr. Heider has more than 23 years of experience preparing survey plans and documents for a variety of public and private improvement projects.

Survey types that he routinely supervises include American Land Title Surveys (ALTA), right-of-way, property description and resolution, construction staking, topographic, photo control, utility, geodetic control, and global positioning system (GPS) control.

Years of Experience

23 years

Education

Associates, Architectural Engineering, ITT Technical Institute

Continuing Education

ODOT Pre-Qualified Right-of-Way Designer

PROJECT EXPERIENCE

Henderson Road—City of Columbus, Ohio. Survey Technician responsible for preparing complete right-of-way plans involving approximately 50 properties, field survey, property rectifications and included improvement of the roadway profile, bridge rehab and widening for pedestrian and bicycle traffic, curb and gutter, improvements to make intersections ADA compliant and modified traffic signal equipment. One-way traffic will be maintained at all times. This involved rehabilitation of the major intersection at High Street and Henderson Road.

BUT/WAR-75-10.30/0.00, Ohio Department of Transportation, District 8, Butler County, Warren County Ohio. Survey Technician responsible for preparing complete right-of-way plans along four-lane highway at major SPUI interchange with I-75 involving 35 properties. Roadway improvements included replacement of bridge over railroad Right-of-way involvement included a combination of temporary, aerial and permanent takes on approximately nineteen parcels.

CLI-73-12.03, Ohio Department of Transportation, District 8, Clinton County Ohio. Survey Technician responsible for preparing complete right-of-way plans along relocated SR 73 including a diamond interchange at US 22/3. With twin 107' single span structures over US 22/3 involving 12 properties. Right-of-way involvement included a combination of temporary and permanent takes on approximately twelve parcels.

Leap Road—City of Hilliard, Ohio. Survey Technician responsible for preparing complete right-of-way plans along Leap Road. The project was divided into two sections, north and south of Cemetery Road involving approximately 30 properties. The first section completed was the widening of Leap Road to five lanes, north of Cemetery Road to Reynolds Drive. This involved rehabilitation of the intersection at Leap and Cemetery, adding an additional turn lane, as well as, pedestrian and bicycle facilities. Design, field survey and right-of-way plan development included a closed storm sewer drainage system, curb and gutter, a culvert replacement, pavement markings and modified traffic signal equipment. Two-way traffic will be maintained at all times.

ATH-33-30.980, ODOT District 10—Athens County, Ohio. Survey Technician responsible for preparing complete right-of-way plans involving approximately 100 properties for the extension and realignment of U.S. 33. The field survey included the staking of the new alignment, drainage survey, topographic survey, location of soil borings, utilization of GPS to develop the control network, and the location of existing property monumentation and section corners. Assisted in the right-of-way plans utilizing the new platting procedure to develop property plats and legal descriptions for the acquisition of land parcels.

staff profile

CALVIN JOHNSON

FIELD DATA COLLECTION

Mr. Johnson is a survey technician with 23 years of experience in all aspects of survey plan preparation. He routinely prepares boundary survey, ALTA/ASCM land title surveys and topographical survey plans. Mr. Johnson has extensive experience in AutoCAD, MicroStation and EaglePoint CAD systems.

Years of Experience

28 years

Education

Tyler Jr. College, Associates Degree, Engineering Technology

Texas A&M 2 year undergraduate studies, Mechanical Engineering

Continuing Education

EaglePoint Training 1999 & 2002

AutoCAD University 2000

ODOT Pre-Qualified Right-of-Way Designer

NSPS III Chief Computer Operator Certificate No. 0701-1417

Professional Membership

Professional Land Surveyors of Ohio (PLSO)

PROJECT EXPERIENCE

French Market/Continent, National Realty Services—Columbus, Ohio. Preparation of topographic surveys, ALTA surveys plans for property conveyance and land subdivisions for redesign of the 120 acres site for proposed new land use

Concord Road Bridge Replacement—Delaware County, Ohio. Managed survey base mapping and right-of-way plan preparation for culvert replacement and roadway improvement project involving three parcels.

North Central Sewer Separation—Columbus, Ohio. Managed map compilation services to prepare base mapping of 2-mile 15-city block area. Survey data was collected and compiled into a base map for engineering design of the proposed sewer improvements.

Krumm Park Storm Sewer and Detention Improvements—City of Columbus, Ohio. Managed map compilation services to prepare base mapping of 4,500 feet of existing 2-lane residential and commercial roadway and 100-acre area for improvement to storm sewer systems, and design of detention area to reduce flooding to adjacent properties and structures. Survey data was collected and compiled into a base map for engineering design of the proposed improvements.

Tuttle Crossing Boulevard—Franklin County Engineer, Ohio. Managed the preparation of base mapping and right-of-way plans of 3700 feet of 2-land urban arterial roadway for improvement to a 4 to 5 lane boulevard roadway. Survey data was collected and compiled into a base map for engineering design of the proposed improvements.

Sunbury Road—City of Columbus, Ohio. Prepared base mapping and right-of-way plans of a 1.1-mile section of existing 2-lane roadway for improvement to a 3 to 4-lane boulevard urban roadway. Survey data was collected and compiled into a base map for engineering design of the proposed roadway improvements.

General Services Contract—Ohio Department of Transportation District 9. Prepared base mapping and right-of-plans for various design projects in southern areas of Ohio. Survey data was collected and compiled into a base map for engineering design of the proposed improvements.

staff profile

DAVID HALL

FIELD DATA COLLECTION

Mr. Hall is a Certified Survey Technician Level IV by ACSM. As a party-chief he routinely supervises field personnel to collect field survey data with robotic total stations, RTK-GPS and digital leveling for development of boundary, topographic and ALTA survey plans. Mr. Hall is also responsible for data collection of Ground Penetrating Radar and terrestrial laser scanning data.

Years of Experience

19 years

Continuing Education

Respirator Fit Test, 2007

PROJECT EXPERIENCE

Port Columbus Employee Lot Surveys CRAA-Columbus, Ohio. Field collection of survey data to prepare base mapping of the existing 50 acre parking lot area for proposed improvements to curbs, handicap ramps and storm sewer systems. Survey data was collected and compiled into a CAD base map for engineering design of the proposed improvements. The project included boundary and right-of-way surveys, annexation plats and legal descriptions zoning plats and legal descriptions.

Karl Road Roadway Improvements—City of Columbus, Ohio. Field collection of survey data to prepare base mapping of 7,000 feet of existing 2-lane for improvements to curbs, handicap ramps and storm sewer systems. Survey services included GPS control for State Plane Coordinate reference, differential leveling to establish benchmarks for construction, ground run surveys of x-sections and utility surveys, existing right-of-way and property surveys for 150 parcels. Survey data was collected and compiled into a base map for engineering design of the proposed improvements.

Wal-Mart Stores, Inc.— ALTA and Topographic Surveys. Field collection of survey data for 8 sites of 20-30 acres each to prepare ALTA and topographic survey plans. Base maps were used for the engineering design of the proposed building, parking lots, miscellaneous utility extensions and public road improvements. Survey services also includes preparation of legal descriptions of vacated and proposed easements, subdivision plats, consolidation plats, annexation legal descriptions and plats.

Renier Construction/Ritchie Brothers Auctions — ALTA and Topographic Surveys. Field collection of survey data for 8 sites of 200 site to prepare ALTA and topographic survey plans. Base maps were used for the engineering design of the proposed building, parking lots, miscellaneous utility extensions and public road improvements. Survey services also includes preparation of legal descriptions of vacated and proposed easements, subdivision plats, consolidation plats, annexation legal descriptions and plats.

Port Columbus Employee Lot Surveys CRAA-Columbus, Ohio. Field collection of survey data to prepare base mapping of the existing 50 acre parking lot area for proposed improvements to curbs, handicap ramps and storm sewer systems. Survey services included GPS control for State Plane Coordinate reference, differential leveling to establish benchmarks for construction, ground run surveys of x-sections and utility surveys, existing right-of-way and property surveys. Survey data was collected and compiled into a CAD base map for engineering design of the proposed improvements. The project included boundary and right-of-way surveys, annexation plats and legal descriptions zoning plats and legal descriptions.

staff profile

RICK WEBB

FIELD DATA COLLECTION

Rick Webb is a survey technician, primarily responsible for data collection using electronic total stations, Global Positioning System receivers digital levels, and ground-based laser scanners in the field. In this role, Mr. Webb reads and interprets construction drawings, sewer system maps, and water systems maps. He also performs necessary field calculations to perform construction staking and documents field work to effectively communicate project information electronically and on hard copy.

Years of Experience

15 years

Education

Associate of Applied Science - Nursing Technology, Central Ohio Technical College

GIS Certificate of Completion, Hocking College

PROJECT EXPERIENCE

Athens County, Ohio 2014 Digital Orthoimagery/LiDAR/Contours/Building Outline, Athens County, Ohio. Performed in conjunction with the Ohio State Imagery Program, Woolpert is developing and updating certain geospatial datasets for use by county agencies and the general public, and is providing these datasets for inclusion within OGRIP (Ohio Geographically Referenced Information Program). The Athens County, OH Orthoimagery/LiDAR/Building Outlines Project consists of the following: new countywide 1"=100' scale color digital orthoimagery (with a 6-inch pixel resolution; 508.4 square miles), new 3-inch 1"=100' scale color digital orthoimagery (covering 51.71 square miles – shown in yellow to the right), new countywide 1-meter LiDAR (average point density), new countywide 4-foot contours, and new countywide change detection/building outlines.

Mound Street Improvements, City of Columbus Department of Public Service—Columbus, Ohio. For the City of Columbus, Woolpert is constructing sidewalks within the existing right of way footprint by removing a lane of traffic on Mound Street. The existing pavement will be sawcut on both sides and a mill and fill performed on the remaining pavement. Catch basins will need to be relocated and a new curb constructed. This task will produce preliminary engineering report and drawings consisting of cross-sections and plan and profiles of the sidewalk (roll plots, at a minimum). The report will also include an updated traffic study.

District 7 - SUE Services, ODOT-D7—State of Ohio. Woolpert is providing subsurface utility engineering for the Ohio Department of Transportation, District 7. The services provided under this contract have included field investigation, office research and engineering consulting.

Springfield, ANG Utilities, SSOE, Inc.—Springfield, Ohio. As a subcontractor on this project for the Springfield Air National Guard, Woolpert provided utility designation markings.

V**ISN 10 VA Medical Centers, RDC/John Poe Architects Joint Venture—Ohio and Kentucky.** Woolpert Inc. has been asked to help develop preliminary record drawings by collecting field data to complete the Civil Drawings and Site Plan Drawings for a project to update master record drawings at six Medical Center Campus facilities under five administrative campuses throughout Ohio and Kentucky. The five sites are Chillicothe, Cincinnati, Cleveland, Columbus, and Dayton. As a part of this contract, Woolpert is providing civil drawings, site utilities, site surveys, site plan drawings, and campus plans.

staff profile

JEFF MEYER

DATA CONVERSION AND DEVELOPMENT

As a Quality Assurance/Quality Control Specialist, Mr. Meyer is responsible for data translations, conversions, editing, processing and QA/QC of spatial information. He designs and implements custom QA/QC processes for each individual project using Woolpert's ISO procedures. He verifies that requirements for accuracy, completeness, consistency and aesthetics of mapping and GIS products are met.

Years of Experience

12 years

Education

Certificate, GIS Technician, Lansing Community College, Lansing, Michigan

Continuing Education

CAiCE Technician, Certified Autodesk, Avatech Solutions

He is experienced with ArcGIS, ArcMap, AutoCAD, AXIOM, MicroStation, GeoGraphics, GEOPAK, Feature Manipulation Engine, DATEM, InRoads, CAiCE, TerraScan and TerraModeler. Mr. Meyer also creates macroscripts to automate procedures. Additionally, he is an experienced field surveyor familiar with a variety of mapping standards such as: American Society of Photogrammetry and Remote Sensing, National Map Accuracy Standards and National Standards for Spatial Data Accuracy.

PROJECT EXPERIENCE

Countywide GIS Management Services, Hamilton County—Hamilton County, Indiana. Woolpert assisted Hamilton County in creating a geographic information system (GIS) and digital orthophotos for property appraisal, public works, emergency management, economic development, and other countywide applications. In 1998, Woolpert developed a multipurpose countywide GIS. This included new digital orthophoto mapping, planimetrics, and 2-foot contours. In 2001, Woolpert updated the GIS with new digital orthophoto mapping and updated planimetrics and DTM/contours. In 2003, Woolpert performed additional updates to the GIS, including new color digital orthophotos, updated planimetrics and countywide LiDAR data to support the generation of 1-foot contours.

GIS Basemap Update, Gwinnett County—Gwinnett County, Georgia. Woolpert updated the County's basemap by providing new color digital orthophotos, a new LiDAR terrain surface, and updated planimetric and topographic mapping covering the entire 437-square-mile county – expediting County-wide delivery of the updated impervious surfaces data set. Vector data was delivered in Arc geodatabase format and imagery in GeoTIFF and MrSID formats.

Electronic Airport Layout Plan (eALP) - AGIS, Tulsa International Airport (TUL)—Tulsa, Oklahoma. Woolpert has been awarded a contract to create and submit a complete and useable FAA approved e-ALP for Tulsa International Airport. Utilizing FAA-developed tools, Woolpert will create a "reusable process" to allow the Airport to maintain the data deliverables beyond the initial e-ALP from the data that has been loaded into and resides within the Airport GIS database in order to make future e-ALP submissions.

Ground Control, Aerial Imagery, and LiDAR Acquisition, Erie Water Works—Erie, Pennsylvania. Woolpert and Erie Water Works worked together on a systemwide implementation of a full GIS for the entire Water Works' service area. After completion of a needs assessment, implementation strategy and a pilot project, Woolpert provided professional mapping and surveying services, geodatabase design, Real-Time Differential GPS field data collection and creation of a systemwide water network.

staff profile

COLLEEN M. DONAHUE, PE

GIS INTEGRATION

Donahue IDEAS, LLC

Ms. Donahue has over 21 years of experience in civil and environmental engineering including:

- wastewater treatment plant process analysis and modeling,
- wastewater treatment facility master planning,
- information management planning,
- construction data management,
- regulatory review and support,
- public relations support,
- air emissions analysis and permitting,
- hydrologic/hydraulic modeling,
- storm water master planning,
- wetland design, and
- geophysical fluid dynamics and modeling.

Years of Experience

21 years

Education

Bachelor of Science in Civil Engineering, The Ohio State University

Master of Science Civil Engineering, The Ohio State University

Licenses and Certifications

Professional Engineer, Ohio

CSI Certified Construction Document Technologist (CDT)

NASSCO Pipeline Assessment Certification Program (PACP)

NASSCO Manhole Assessment Certification Program (MACP)

Professional Membership

American Society of Civil Engineers

American Water Works Association

Water Environment Federation

Construction Specifications Institute

PROJECT EXPERIENCE

Environmental Management and Analysis System (EMAS) / City of Columbus, Ohio. Managed the development of a GIS-based graphical user interface and associated database and modeling tools for organization, review, and utilization of three years of river sampling and modeling data. Final product was designed to allow ready access to all water quality information as well as tools for data analysis.

Record Drawings Database / City of Columbus, Ohio. Developed a searchable database of the wastewater treatment facilities construction record drawings for the General Engineering Section. Work included: tracking down hard copy drawings for construction projects at the wastewater facilities since the early 1900's; scanning the documents into electronic format; and organization of the documents into a searchable database. Database was designed with search parameters including date, contract, facility, process area, and discipline. Final database was then converted for inclusion in the City's TSA/Advent Falcon database.

Water Professional Construction Management (PCM) Project / City of Columbus, Ohio. Managed the review of BID and/or CTC specifications for three projects and the development of spreadsheets to track submittal requirements for Operation & Maintenance manuals (O&Ms), Spare Parts, Operator Training, and Witnessed Testing. Worked with Commissioning task leader to develop SOP training documents. Coordinate with Commissioning task leader to facilitate development of commissioning flow charts and equipment training & documentation checklists. Manage the coordination between PCM and DP with respect to the O&M Ready process and the City's Work Asset Management (WAM) system.

staff profile

KATHLEEN K. MCBRIDE, PE

GIS INTEGRATION

Donahue IDEAS, LLC

Ms. McBride has over twenty years of experience in civil and environmental engineering including:

- regulatory review and support,
- specifications management,
- health and safety planning,
- collection system master planning,
- information management planning,
- construction data management,
- wastewater treatment plant hydraulic modeling, &
- storm water planning and treatment design.

Years of Experience

21 years

Education

Bachelor of Science in Civil Engineering, University of Akron

Licenses and Certifications

Professional Engineer, Ohio

CSI Certified Construction Contract Administrator (CCA)

CSI Certified Construction Documents Technologist (CDT)

LEED Green Associate

Professional Membership

Water Environment Federation

Construction Specifications Institute

PROJECT EXPERIENCE

Asset Management Development / City of Columbus, Ohio. Developed forms and performed mock condition assessments of various assets, including pictures to document asset condition, as part of the development of training materials for the City of Columbus Department of Public Utilities' future condition assessments. Working with a team of consultants in evaluating and editing SPL code tables and asset hierarchy structure in an effort to streamline SPL record systems and train staff in asset management tasks as part of the City's long term strategic plan. Participated in a series of facilitated working team meetings during Phase 1 of the Asset Management program development including review of coordination with the CMMS.

Water Professional Construction Management (PCM) Project / City of Columbus, Ohio. Reviewed BID and/or CTC specifications for three projects (Upground Reservoir Site 2 (UR2), UR2 Raw Waterline, & UR2 Raw Water Pump Station). Developed spreadsheets to track submittal requirements for Operation & Maintenance manuals (O&Ms), Spare Parts, Operator Training, and Witnessed Testing. Identified sections where submittal requirements were missing or inadequate for the complexity of the project. Performed constructability review and specification review for 30%, 75%, 95% and BID documents for Hap Cremean Water Plant Improvement project. Identified missing, inconsistent or inadequate information in the specifications. Worked with Commissioning task leader to develop SOP development training documents. Developed and continually maintain commissioning flow charts and equipment training & documentation checklists. Attend, monitor and document equipment training classes provided to water treatment plant staff to provide sufficient documentation to obtain OEPA operator contact hours. Work with O&M Ready team to develop and populate asset lists, spare parts lists and Preventive Maintenance (PM) schedules for assets for upload to and use in the City's Work Asset Management (WAM) system.

Asset Management Project / Northeast Ohio Regional Sewer District, Cleveland, Ohio. Facilitated meetings for the Storm Water Maintenance Report Code project Team in their effort to update storm water closeout codes, lists of asset class and type, failure mode use process, training program for Maintenance Services, and work process flow. Worked with the District's O&M Group in their effort to document workflows and identify staff responsible for adding/replacing, retiring and maintaining Asset information in WAM.

staff profile

SCOTT A. MCBRAYER

GIS INTEGRATION

Donahue IDEAS, LLC

Mr. McBrayer has over fourteen years of experience in civil and environmental engineering including:

- GIS analysis,
- sanitary sewer design and modeling,
- sanitary sewer analysis and rehabilitation,
- pump station and force main design and analysis,
- hydrologic/hydraulic modeling, and
- wastewater treatment plant pump/piping design.

Years of Experience

15 years

Education

Bachelor of Science in Civil Engineering, Rose-Hulman Institute of Technology, 1999

Master of Science Business Administration, Fisher College of Business, The Ohio State University, 2007

Licenses and Certifications

Professional Engineer, Ohio

NASSCO Pipeline Assessment Certification Program (PACP)

NASSCO Manhole Assessment Certification Program (MACP)

NASSCO Lateral Assessment

PROJECT EXPERIENCE

West Hickman Watershed Sanitary Sewer Rehabilitation Project / City of Lexington Kentucky (LFUCG). Project Engineer for a comprehensive sewershed rehabilitation project, including:

- Field investigation of sanitary sewers, manholes and pump stations: CCTV investigations, manhole inspections, flow monitoring, inflow/infiltration analysis, smoke testing, night time flow isolations, and system pump station draw-downs.
- Creation of a detailed hydraulic model of the trunk sewer utilizing SWMM. This model was used to assess the capacity of the system under both dry and wet-weather conditions.
- Creation of an integrated GIS Database (linked with the hydraulic model) resulting in a multi-functional decision support management tool.
- Completion of a comprehensive, multi-volume report including all results, alternatives, and recommendations (suggestions for capital improvement projects).

*This project received the Kentucky Consulting Engineering Council (KCEC) Grand Award for 2001 and was a finalist for the American Consulting Engineering Council (ACEC) 2001 award

QUEST Master Plan/CAGIS On-Site System Data Analysis / City of Cincinnati, Ohio (MSDGC). Analyzed GIS data for sanitary on-site (private home) systems served by the City of Cincinnati. Project included data collection and analysis of parcel and shape file data at the Cincinnati Area GIS offices (CAGIS) and generation of a comprehensive report. The report allowed MSDGC to make critical decisions regarding the future of the QUEST Master Plan to extend gravity sewer service to homes within the MSDGC service area served by on-site systems at that time.

Clermont County Wastewater Master Plan Revision Project / Clermont County, Ohio (CCWSD). Managed GIS analysis, updates and revisions to the Wastewater Master Plan Report. Scope of work included analysis of existing GIS parcel data and associated wastewater collection system shape file features, updates to the existing shape files for sanitary gravity sewers, sanitary on-site (private home) systems, pump stations and force mains, and analysis of CCWSD treatment plant capacity. Report also addressed recommendations for future collection system and treatment plant capacity improvements.

staff profile

JAMES TOTO, PE

OTHER

As a project manager Mr. Toto has 15 years of experience which includes performing infrastructure design and construction oversight. He currently serves as Project Manager and/or Sr. Project Engineer for environmental related projects, including water treatment and distribution, feasibility studies, general plans, sanitary sewer systems, sewer rehabilitation, pump station and force main systems. In this capacity, Mr. Toto oversees the design and consulting services of environmental engineers and technicians and provides overall project coordination with all necessary disciplines.

Years of Experience

15 years

Education

Bachelor of Science in Civil and Environmental Engineering, Youngstown State University

Registration

Professional Engineer - Ohio, 2003, #68296

Certifications

Confined Spaces Entry Training, 2001

Certified Master Water Distribution System Modeler, Haestad Methods, 2003

NASSCO - PACP Certification, 2012

PROJECT EXPERIENCE

Morse Road 36-inch Waterline, CIP 690474, City of Columbus, Dept. of Public Utilities, Columbus, Ohio.* Perform engineering services associated with preliminary engineering, field surveying, detailed design, and bidding assistance associated with the installation of 5,890 feet of 36-inch water main from the Morse Booster Station to the Morse Road and U.S. 62 intersection.

Waggoner Road Water Transmission Main, CIP 690458, City of Columbus, Dept. of Public Utilities, Columbus, Ohio.* As part of the recommended Eastern Growth Corridor Capital Improvements, performed engineering services associated with preliminary engineering, field surveying, detailed design, and bidding assistance associated with the Waggoner Road 30-inch water main project. The Waggoner Road 30-inch main is the fourth of a five-segment transmission main. Once the last segment between the Morse Booster Station and the Morse Road/State Route 62 intersection and the booster station upgrade is completed, this transmission main can also allow Columbus to serve both existing and future development in eastern Franklin County and surrounding areas.

Franklin-Main Interceptor Sewer Rehabilitation, Segments 2 and 3, City of Columbus, Division of Sewerage/Drainage, Columbus, Ohio.* Performed CIPP liner thickness calculations and other design tasks. Completed alignment and profile design work, which entailed updating the record drawings with field survey and field work information. Section 2 consists of approximately 3,500 linear feet of 24-inch VCP (vitrified clay pipe) and 18 manholes and extending through heavily developed residential areas. Section 3 consists of approximately 2,200 linear feet of 24-inch VCP and eight manholes. Recommended technique for pipe and manhole replacement involves CIP (cured-in-place) process.

Sanitary Sewer Flow Monitoring Program for City of Gahanna, Stilson Consulting Group, LLC, Gahanna, Ohio.* Oversaw sanitary flow monitoring for a small tributary sanitary line in the Old Gahanna area to investigate whether the sewer was capable of handling additional flow without surcharging the system.

**Work for previous employer*

staff profile

TATYANA ARSH, PE

OTHER

With more than 20 years of experience, Ms. Arsh has extensive utility management and engineering experience. She is very familiar with all regulatory aspects of the water and sewer utilities. As Director of Columbus Public Utilities, Ms. Arsh was involved in Consent Degree negotiation with EPA. In the engineering field she is experienced in master planning and preliminary engineering, detailed design and construction administration. She also has extensive trenchless technology experience. Ms. Arsh has participated in Value Engineering Studies, Risk Management Workshops, Dispute Resolution Hearings and Mediation during construction of major (over $150 mil construction cost) projects.

Years of Experience

20+ years

Education

Master of Science in Civil Engineering, St. Petersburg State University of Architecture and Civil Engineering, St. Petersburg, Russia

Registration

Professional Engineer – Ohio, 1994, #57900

Award

NACWA National Environmental Achievement Distinguished Service Award, 2012

PROJECT EXPERIENCE

Asset Management, Columbus, Ohio.* Project Director. Asset Management is a business model for managing utilities infrastructure. At the first stage the City performs evaluation of each of the services that the Department provides to its customers, and setting the level of services and appropriate performance measurements. On the cost side of Asset Management, The City implemented the business case evaluation process, achieving saving in excess of $20 million in just two years. The Reliability Centered Maintenance program was initiated for all treatment plants related to maintenance work, resulting in additional savings.

Wet Weather Management Plan, Columbus, Ohio.* Project Leader. The Wet Weather Management Plan for the Division of Sewerage and Drainage is a capital improvement plan that is mandated by Ohio EPA to reduce or effectively eliminate the occurrence of combined and sanitary sewer overflows. The number of projects is in excess of 100 and the estimated price tag is over $2.5 billion for a 40 year timeline to implement. Included in the plan are the largest projects in the city's history. As part of the consent negotiation, System Evaluation and Capacity assurance Plan (SECAP) was implemented to evaluate Sanitary Collection system, identify gaps and close them, resulting in significant reduction in overflows and WIB occurrences.

Water Master Plan, Columbus, Ohio.* Project Leader. The Comprehensive Master Plan is a massive planning effort to assess the entire City of Columbus and suburban customer drinking water system including drinking water supply, water treatment, water quality, and operations looking 30 years into the future. The Distribution Master Plan portion of this effort assess the adequacy of the water piping system, storage tanks, and pump stations for a 15-year period.

OSIS Augmentation and Relief Sewer, Columbus, Ohio.* Project Leader. Preliminary design and value engineering resulted in choosing tunneling method of construction for approximately 23,000' of relief pipe. Detailed design included a 20' foot diameter tunnel sewer. The sewer provides for the elimination of combined sewer overflows in the downtown river front area. The overall project cost is approximately $360 million.

**Work for previous employer*

staff profile

CHARLES H. MURPHY, PS

OTHER

Mr. Murphy has more than 42 years of experience in the field of surveying with 19 years in right-of-way plan development and acquisition. During this time, he has performed boundary surveys (up to 2,500 acres), recreational development surveys (up to 300 acres), and governmental retracement surveys (up to six square miles). Mr. Murphy also has extensive experience with numerous construction projects where he was the Project Surveyor or in charge of all survey operations. Typical construction projects included highway, hazardous waste cleanup, marine, tunnel, pipeline and power plant. In addition to these types of surveys, he has performed complete topographic surveys including boundary determination for highway corridors and various non-recreational sites.

Mr. Murphy has experience in right-of-way plan development for numerous projects and clients including State, County and City agencies. His experience in right-of-way plan development has included projects in excess of 230 parcels and 11 miles in length. Projects included urban, suburban, and rural locations. In addition, Mr. Murphy has experience in utility right-of-way development. His experience in this area includes corridor route selection, preparation of easements and instruments, preparation of right-of-way plans, negotiations and construction staking of projects to 85 miles in length.

PROJECT EXPERIENCE

Alum Creek Sanitary Relief Tunnel (ART), Columbus, Ohio. Survey Manager in charge of survey operations including GPS control, conventional traverse, digital leveling, topographic surveys of shaft sites including utilities, property line determination, basemap preparation, courthouse research, preparation of subterranean legal descriptions and plats for the design of approximately 27,000 lineal feet of 18 foot diameter tunnel.

Brand and Dublin Road Roundabout, Dublin, Ohio. Survey Manager in charge of survey operations including topography with a client emphasis on trees, utilities, horizontal and vertical control, courthouse research, boundary resolve and the development of an ODOT format Right-of-Way plan set.

Years of Experience

42+ years

Education

Columbus State Community College, Civil Engineering

Registration

Professional Surveyor - Ohio, 1983, #6950

ODOT Certifications

ROW Acquisition
- Title Research
- Value Analysis

ROW Plan Reviewer

Special Training

PDP Training, ODOT, 2007

Right-of-Way Plan Development, ODOT, 1998, 2006, and 2012

Project Management-101, ODOT, 2007

Project Management-230 (R/W Cost Estimating and the PDP), ODOT, 2007

Acquisition 101 (Title Procedures), ODOT, 2007

Appraisal 101 (Ohio Acquisition Laws and ODOT Appraisal Policy and Procedure), ODOT, 2007

Appraisal 102 (Valuation of Simplistic Acquisitions), ODOT, 2008

Appraisal 122 (Sales Data Book), ODOT, 2008

Mapping Specifications ODOT, 2010

Affiliations

National Society of Professional Surveyors

Professional Land Surveyors of Ohio

American Congress on Surveying and Mapping

staff profile

JASON WOODMAN

APPLICATION DEVELOPMENT/ GIS INTEGRATION

Mr. Woodman has 17 years experience in software development that focuses on the evaluation, recommendation, and implementation of software to meet project requirements. He is responsible for developing customized solutions using 'off the shelf' commercial software and for creating new applications to meet project requirements. Mr. Woodman is able to determine the software needed to best meet project specifications and develop implementation plans to transform them into functional applications.

Mr. Woodman is integral in the process of collecting and managing GIS and non-GIS data. This includes the development of data warehousing models to store information, optimizing complex data relationships while insuring data integrity, and maintaining high availability of data to project team members.

System automation is essential for large and/or complex projects and allows complex procedures to be quick and confidently managed by project staff. Mr. Woodman has extensive experience at optimizing project productivity. Through careful observation of business operations he is able to determine practices that can be improved through automation and develop procedures to automate them; this ability to automate business processes results in increased productivity of project staff, the elimination common errors, and increased savings.

Developing software requires an understanding of the requirements that the software has to meet and having the experience to turn those requirements into reality. Mr. Woodman has worked extensively with clients to determine their software requirements, develop software implementation plans, and establish industry standard development practices. Using these steps as a foundation he has developed and implemented desktop, web, and mobile applications to meet and exceed client expectations.

Years of Experience

17 years

Education

Bachelor of Science in Technology Management, DeVry Institute of Technology

Associate of Applied Science in Drafting and Design/Architectural, Central Ohio Technical College

Technical Expertise

Languages:

ASP/ASP.NET
VB6/VB.NET
VBA/VBA Office
C#/C#.NET
PHP
SQL
HTML
CSS
JavaScript
JQuery

Databases:

Microsoft SQL Server
Microsoft Access
MySQL

GIS Technologies:

ESRI ArcGIS Server 9.x/10
ESRI ArcSDE Server 9.x/10
ESRI ArcGIS Desktop 9.x/10
ESRI ArcPad 9.x/10
ESRI ArcObjects 9.x/10
ESRI ArcView 3.x
ESRI MapObjects LT 2.0
Autodesk Mapguide 6.5/Enterprise
Autodesk AutoCAD Civil 3D/Mapping 2011
Feature Data Objects (FDO)
MapWindow

PROJECT EXPERIENCE

GIS Implementation, City of Wooster, Ohio.* Project Manager/Lead Software Engineer. An enterprise Geographical Information System (GIS) for the City of Wooster. Responsible for developing a migration plan to move the City's existing GIS information from an unmanaged collection of AutoCAD drawings into an enterprise GIS system bases on ESRI's ArcGIS/ArcSDE software. The new GIS system was designed to support internal users across all city departments,

external users through web services, and allow the city to share information with other local government institutions. Maintenance of the GIS information is done in real time through the use of Autodesk's AutoCAD software use Feature Data Object (FDO) technology to communicate between the ESRI ArcSDE Server and the Autodesk AutoCAD software.

Water Tap Location Mapping, City of Columbus, Ohio.* Lead Software Engineer. Responsible for the overall design of a system that included custom Microsoft Access forms written in Visual Basic, ODBC interfacing to a Microsoft SQL Server 2008 database, stored procedure development, a web based problem tracking program written in ASP, an Enterprise ESRI ArcSDE server, and a custom Autodesk AutoCAD interface to the SQL database in VBA. The Microsoft Access forms allowed users to review and compile multiple versions of water tap information into a 'best information available' version. The compiled information was then dynamically pulled into AutoCAD and used to create accurate location mapping of each tap location using a user managed automated functions.

Location Aware Utility GIS, City of Wooster, Ohio.* Responsible for implementing a real time location aware mobile GIS system for the City of Wooster. The system was designed to provide the City's existing field crews with access to utility information based on their current location within the city. Using Global Positioning Systems (GPS) to provide real time location information of the field crew, the system showed the crews position within the city and the location and attributes of all utility features in their vicinity.

Service Request Center (SRC), City of Hilliard, Ohio.* Project Manager/Lead Software Engineer. The SRC website was designed to provide an easy to use website to allow municipal residents to request and track services from the city. The site allows the city to manage all requests for services and ensure they are completed in a timely manner. The site allows the city to track investigations and work orders performed by city maintenance crews and tracks all expenses incurred with a request. The system supports usage and expense reporting for budgeting purposes.

Stormwater Utility Management System (SUMS), City of Columbus, Ohio.* Developed a custom ESRI ArcGIS Desktop extension for the City of Columbus, Division of Sewerage and Drains. The extension manages storm water impervious areas and billing assignments within the city. Users can manage impervious area boundaries and assignment of impervious areas to parcels. Parcels can then be assigned to billing groups to calculate estimated runoff units (ERU) that are billed to residents. Management of groups within the extension allow the city to track complex business agreements for billing purposes, this includes arrangements for commercial partnership where the ERU billing is divided amount multiple parties, single entities are responsible for multiple billing groups, and multiple parties are responsible for multiple billing groups. The extension also tracks credits granted to groups, including information about the credit type, amount, and duration.

Capital Improvement Program Management, City of Grove City, Ohio* Developed an integrated ArcGIS/Database application for the City Engineer of the City of Grove City. The application allows the City Engineer to record and track Capital Improvement Program (CIP) projects within the City. Information such as who requested the program, the program's estimated cost, anticipated grant funding for a program, current program status, and where the program is located. The application supports integrated mapping and reporting allowing the City Engineer to produce documents showing planned programs by location, costs, department, or program year.

**Work for previous employer*

staff profile

RAYLEEN LEE, GISP

APPLICATION DEVELOPMENT/ DATA CONVERSION AND DEVELOPMENT

With more than 16 years (11 years with DLZ) in the industry, Ms. Lee has extensive experience in GIS. Currently, she is using Microstation V8i, AutoCAD 2010, GEOPAK, ESRI ArcGIS ArcInfo 9.3, in her work with DLZ's Survey Department.

Ms. Lee's background includes programming in ESRI Arc/Info and serving as Project Leader for a wide variety of GIS projects. She has set up databases, created menu interfaces, and done extensive programming and troubleshooting using ArcGIS. She also has a great deal of experience using ERDAS Imagine software to rectify historic digital orthophotos to recent or new color infrared digital orthophotos.

Prior to joining DLZ, Ms. Lee worked for Greenhorne & O'mara, Inc, a GIS organization with headquarters in Maryland where she designed Arc/Info graphical interfaces and programs using AML programming language. She was also responsible for setup, management, quality control and delivery of projects for clients.

She also has experience in the Utilities industry as a Utilities Conversion Technician for Byers Engineering in Atlanta, Georgia, where her responsibilities included automated mapping/facilities management, telephony using Microstation-based programs, project breakout and database cleanup. She also worked as a Department Manager for AGRA Baymont in Clearwater Florida where she was responsible for telephony utilities utilizing Microstation, document control, data entry, and manual drafting.

Years of Experience

16 years

Education

Associate of Science, 2nd Year, Columbus State

St. Petersburg Junior College, St Petersburg, Florida

Certification

Certified Geographic Information Systems (GIS) Professional (GISP), 2009, #00038072

Technical Expertise

Certifications include:

Advanced Unix
C programming, Visual Basic 6.0
ESRI Arc/Info Macro Language Programming
ESRI Arcedit, Arc, ArcView
Windows NT 4.0
ERDAS Imagine
Microstation 95/SE/J
Adobe Photoshop 5.5
AutoCAD 2000

PROJECT EXPERIENCE

Lake County, GIS Work Plan, Lake County, Indiana. Enhanced development of a county-wide GIS system. Including geocoding the Lake County parcel database to verify and update addresses to provide an accurate and reliable parcel database.

City of Columbus, Ohio Department of Trade & Development. Prepared a customized application for ESRI's ArcView GIS for the Riverfront Acquisition Plan. Database was built utilizing ArcInfo 8 along with AutoCAD drawings, allowing the user to easily call up and identify parcel and easement information along the 7-mile section of the Scioto and Olentangy Rivers. Several documents were linked to the parcel information including jpeg and tiff images.

National Imagery and Mapping Agency, Vector Smart Map Program. Team leader responsible for providing digital map data to support robust GIS applications. Data was primarily derived from Joint Operations Graphics at 1:250,000-scale and 1:50,000-scale Topographic Line Maps. Each VMAP consisted of 10 coverages, including boundaries, elevation, Hydrography, industry, physiography, population, transportation, utilities, vegetation, and data quality.

U.S. Geological Survey, Professional Mapping Services. Team Leader responsible for programming, tracking, and quality assurance for this professional mapping and GIS services contract. Services included thematic mapping (land characterization); generation of new or revised USGS standard, graphic, and digital products, such as DOQ, DLG, DRG, NAPP, DGN, and 1:24,000-scale quadrangle maps; GIS data capture; photo interpretation; and feature extraction.

staff profile

WILLIE JORDAN

SYSTEM INTEGRATION/NETWORK

Willie Jordan is the owner and president of Emergin Technology Intergrators, Ltd. In this role, Mr. Jordan is responsible for all company operations including Business Development and Account Management. He also performs hands-on Network Engineering duties and works with clients and vendors to establish strategic business partnerships to fulfill their business needs.

Years of Experience

33 years

Education

Computer Programming, PSI Institute

PROJECT EXPERIENCE

Ohio Attorney General Office. Designed, configured, implemented Network Upgrade with Cisco Switches (3750's), Extreme Switches (PoE); Installed Switches on nine floors and two buildings with Fiber connectivity back to the AG's Core (6500); implemented new VLAN's for better segmentation of department traffic

Ohio EPA (Environmental Protection Agency). Designed, configured, implemented Network Upgrade with Cisco Switches (2 Core 6509's, 35 3560's), setup Cisco Works Server; Implemented new IP Addressing Scheme with multiple VLANs and VTP Domain. Ran new Infrastructure in parallel with existing network to provide testing and resolved any issues prior to cut-over. Performed numerous Voice over IP (VoIP) assessments for Avaya VoIP Installations.

New Albany Plain Local Schools: Network Upgrade High School. Technical Engagement Manager for High School CORE Upgrade; provided network design, configuration, implementation, and support for Core Switch (6509), Access Switches (3500's, 2900's), Pix 515E, Wireless LAN, and Fiber backbone with Gigabit Modules (SX and LX); Multiple VLAN's, setup VTP, RSTP, SNMP and Cisco Works Server.

New Albany Plain Local Schools: K-8 Network Upgrade. Technical Engagement Manager for Middle School network upgrade. Provided network design, configuration, implementation, and support for Cisco Switches (3500's, 2900's); connected back to Core via Long Haul Fiber modules (LX)

New Albany Plain Local Schools: Engineering Support Contract. Negotiated yearly Technical support contract for New Albany Plain Local Schools entire Network Infrastructure. Acted as Subject Matter Expert to provided technical recommendations and reviews. Acted as Business Analyst Liaison to gather requirements by attending technical meetings with New Albany Tech team and other vendors.

Camp Dresser & McKee: City of Columbus Waste Water Plant Project. Secured a five year Network Support Contract with the City of Columbus Waste Water Project. Provided network design, implementation, support as the Technical Project Manager. Installed more than 50 Cisco Switches (4500's, 2900's) and Routers (1700) throughout two plants. Provided on-call support and attended technical review meetings with CDM and City of Columbus Staff.

RTS: Network Support Partner; Cisco Engineering Liaison/Technical Sales. Negotiated Engineering Partnership with National Cisco/Avaya Reseller to provide Data Networking Services for major projects: Technical Manager for Data Networking

SECTION 3

WOOLPERT

DESIGN | GEOSPATIAL | INFRASTRUCTURE

SECTION 3. RELEVANT PROJECT EXPERIENCE

OVERVIEW

Woolpert entered the GIS market in 1980, when GIS was in its infancy, by providing relatively primitive mapping services on a Synercom graphics system. Since then, we have been expanding and enhancing our GIS services through a depth of experience. Today, our GIS offerings include a wide range of services designed to provide an enterprisewide GIS that distributes and shares data through organizations, with other applications and systems, and directly to the public. We are industry leaders in providing geography-based solutions, integrating GIS with business systems such as Asset Management, Permitting, Financial, CRM, and Document Management systems, developing and distributing GIS data and applications via web technologies, and in implementing mobile and wireless computing solutions.

Following are the typical services we offer our clients:

- Data conversion and migration
- Project planning
- GIS map development
- Data maintenance
- Business process consulting
- Training
- Geographic database design
- Integration of GIS with business systems
- Application design/development
- Development of data standards
- Project documentation
- Utility network design
- System modeling
- System architecture design

The Woolpert team has a proven track record of completing projects on-time and within-budget. If there is a single reason for our success, it is our uncompromising commitment to working as partners in every project to achieve our clients' organizational goals. This commitment translates into relationships that transcend the guarantee of project deliverables to add value to the trust our clients give us for the performance of the project and beyond.

VENDOR, PLATFORM AND PRODUCT EXPERIENCE

Within the GIS industry Woolpert is well known for our expertise as strategic planners, systems implementers, data creators, application developers, and systems integrators; able to support GIS implementation and deployment in any commercial software environment.

Specifically, Woolpert has extensive knowledge of off-the-shelf geospatial applications created by ESRI and Autodesk. We have worked with ESRI's entire suites of products since their infancy as the

ArcINFO workstation line of products, and throughout their continued evolution to desktop (ArcView & ArcMap) and web mapping software (ArcIMS, ArcGIS Server). Woolpert has knowledge of the ESRI products that are second to none among geospatial consultants. In addition to the ESRI line of products, Woolpert has been working with Autodesk's AutoCAD Map and Map Guide product lines since their inception as well. In fact, we have numerous successful GIS deployments on both systems and will bring that knowledge to your project.

In addition to our knowledge of off-the-shelf data editing packages, Woolpert has developed extensive knowledge of both the Microsoft SQL Server and Oracle RDBMS products. As GIS technology has evolved and demands for performance of tabular, spatial, and raster data has increased, so has the need to store, index, and retrieve the data in more advanced ways. To accomplish this, Woolpert typically leverages an enterprise RDBMS system as our geospatial data repository. Whether through third party spatial extensions (ESRI ArcSDE) or through direct support for spatial data, Woolpert not only understands how to manage geospatial data within a traditional RDBMS environment, we understand how to tune the RDBMS for maximum performance.

PRODUCTS SUPPORTED BY WOOLPERT

Woolpert, Inc. currently supports software from ESRI and AutoDesk, as well as a myriad of other open source GIS offerings, running on the Microsoft Windows platform. Specific packages are listed below:

a) Microsoft Windows Server 2003 & 2008, Windows XP, Windows 7 and Windows 8, SQL Server 2005, 2008 and 2012, IIS, and other ancillary operating system components.

b) ESRI ArcGIS Server (including ArcSDE, ArcIMS, Image Server, and server extensions), ArcGIS Desktop (Basic, Standard, Advance), ArcGIS for Mobile (ArcPad, Collector for ArcGIS) , ArcGIS Online, ArcEngine and ArcGIS Explorer (Support 10.0 version forward)

c) AutoDesk AutoCAD Map (all versions)

d) Oracle (all database versions including spatial extension), and Map Viewer

e) Open source software including MapServer, Quantum GIS, and OpenLayers

f) NeoGIS packages including Virtual Earth, Google Earth, and NASA WorldWind

LARGE SCALE WEB APPLICATION EXPERIENCE

Woolpert has a rich history of rolling out web applications of varying sizes. Most notable are Phoenix Sky Harbor International Airport, the Honolulu Board of Water Supply, and the City of Indianapolis/Marion County. Each of these sites routinely has more than 300 concurrent users using one of more geospatial web applications. The architecture created by Woolpert allows not only for the use of highly specialized geospatial web services by many applications, it allows for dividing the workload among all available servers to ensure that the constant load is handled in the most timely fashion.

SERVICE ORIENTED ARCHITECTURES EXPERIENCE

As mentioned before, Woolpert has implemented numerous systems that leverage the concepts of a Service Oriented Architecture. Typical geospatial functionality that finds its way on to the enterprise services bus include, but are not limited to the following:

- Address Validation
- Geocoding
- Point in Polygon Analysis
- Geoprocessing and Data Manipulation
- Plotting
- Data Distribution
- Real-time Systems Integration

At Woolpert we believe that the true power of geospatial technology can only be realized when the technology can be incorporated into our day to day activities without the end user ever realizing it is there. As a way to realize that vision we have embraced the SOA approach and are actively guiding our clients, as appropriate, toward it.

PROJECT EXPERIENCE

The Woolpert Team has extensive, in-depth experience on a variety of projects of a similar nature to the City's. This section presents our and our subcontractors' relevant project descriptions that highlight past and present projects in the last five years. References are included with each project description.

project profile

IMPERVIOUS AREAS VIEWER
CITY OF COLUMBUS, OHIO

NATURE OF WORK

The Impervious Areas Viewer (IAV) is an internal web-based application that allows customer service representatives (CSR) to answer customers' questions related to impervious areas on their properties. CSRs are able to link directly to the application using a button in the customer information system (CIS). The CSR is also able to save to PDF a map and summary sheet about that customer's property.

Client

City of Columbus, Ohio

Contact

Todd Pulsifer, GIS Manager

Division of Sewerage & Drainage

910 Dublin Road

Columbus, Ohio 43215

614.645.7805

TFPulsifer@columbus.gov

Fee

$44,390

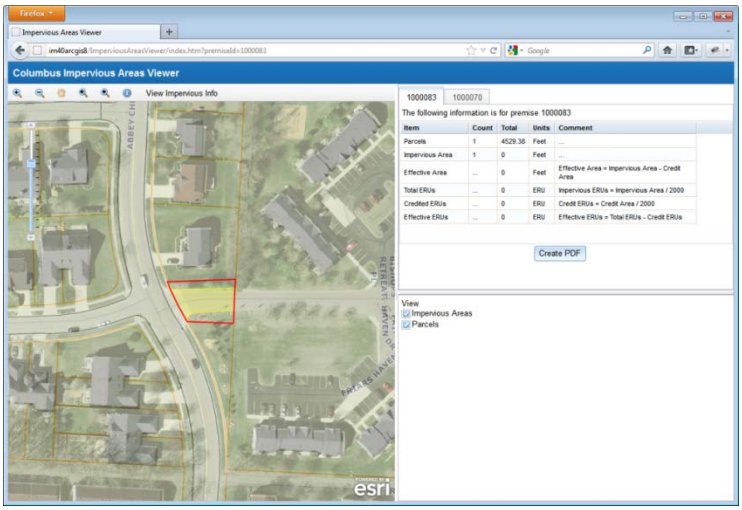
Date

2012-2013

PROCESS

The IAV was developed using Esri's ArcGIS for JavaScript API, version 2.8, in conjunction with Esri ArcGIS Server geoprocessing services. Initially, the print functionality was going to be a geoprocessing service, while the functionality that obtained the impervious area information was going to be developed as a WCF service. However, the latter was developed as a geoprocessing service for the following reasons:

- All of the server-side functionality can be included in a single toolbox, instead of one toolbox for the print functionality and a separate WCF service for obtaining the impervious area information.
- The geoprocessing services do not require an installer.
- The Python scripts that make up the geoprocessing services can be easily opened in a text editor and modified as necessary without requiring uninstallation, compilation, and installation.
- It removes the requirement for a specific version of the .NET framework.
- It is easier to maintain.



project profile

NEEDS ASSESSMENT
CITY OF COLUMBUS, OHIO

NATURE OF WORK

The City of Columbus's Department of Public Utilities (DPU) provides Water, Power, Sewerage and Drainage services to the citizens of Columbus and surrounding communities. To do so, DPU's field crews perform a myriad of tasks in the field, inspecting and documenting new construction, protecting the environment, maintaining existing infrastructure, and reading meters. These field workers use a number of different computing systems to manage the work they perform in the field, ranging from dedicated hand-held systems to laptop PCs running specific Windows applications.

Client

City of Columbus, Ohio

Contact

Todd Pulsifer, GIS Manager

Division of Sewerage & Drainage

910 Dublin Road

Columbus, Ohio 43215

614.645.7805

TFPulsifer@columbus.gov

Fee

$36,815

Date

2012-2013

REASONS

The most notable reasons for looking into new software products are as follow:

- Business Continuity / Risk Reduction – Even though wireless carriers are increasing their coverage and speeds, DPU needs to have a disconnected solution in the field. This is paramount when dealing with emergency situations. For example, during the devastating May 2013 Oklahoma tornado, the major news channels were reporting that cell coverage/availability was virtually non-existent.
- Data Currency – One of the major drawbacks to the existing disconnected solution is the reliance upon the end user to run a script to update the data.
- Data Issue/Error Reporting and Sharing – The city seeks a streamlined and consistent method for the field staff to quickly report and track issues/errors with the data
- Flexibility – DPU seeks software that has more flexibility. Such examples are the ability to add in GPS, Inspection Forms, and connect to the WAM asset management system.

DPU desires a solution (or combination of solutions) that would equip its field staff with the technology and tools to simplify, and to the degree possible, automate the process of notification and data update from the field staff to the GIS staff.

project profile

AUTOCAD DATA SUBMISSION STANDARDS

CITY OF CLEVELAND, DIVISION OF WATER

NATURE OF WORK

The Cleveland Water Division (CWD) requested DLZ to create a guideline of AutoCAD Data Submission Standards to be implemented on all new waterline project drawings. The intent of this standard is to integrate existing, proposed, and new (as-built) data from submitted AutoCAD drawings into CWD's Geographic Information System (GIS) with a minimal amount of effort from CWD's staff.

DLZ worked with the CWD staff to determine the best procedure for the integration that would not only function as required in the GIS, but would also require very little training or modification of a designer's typical CAD procedure. Throughout the process, design requirements were collected and test drawings were created and modified. In the end, a manual and AutoCAD template were created that will be readily available for design consultants to download from the CWD website.

Client

City of Cleveland, Division of Water

Contact

Mr. Guy Singer

1201 Lakeside Avenue

Cleveland, Ohio 44114

216.664.2444, Ext. 5555

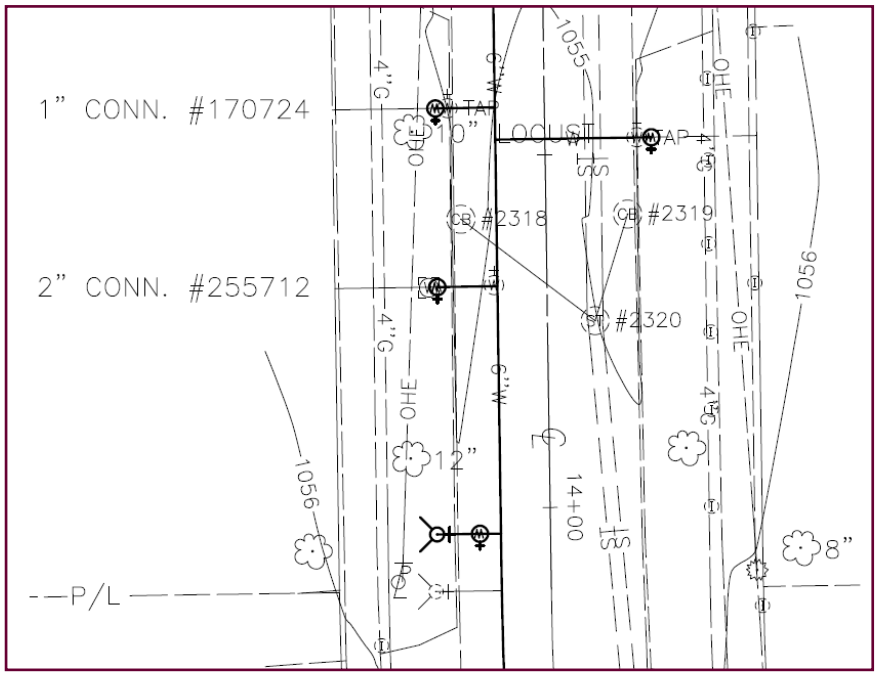
guy_singer@clevelandwater.com

Fee

$30,000

Date

2009



project profile

COLLECTION SYSTEM GIS EXPERIENCE

CITY OF COLUMBUS, OHIO

Donahue IDEAS, LLC

NATURE OF WORK

The City of Columbus, Ohio, Division of Sewerage and Drainage studied several areas where large amounts of infiltration and inflow (I/I) were known to be entering the sanitary sewers, resulting in multiple Sanitary Sewer Overflows (SSOs) and Water-in-Basement (WIB) complaints. The work performed on each project varied, but generally included the following study areas:

- Early Ditch – 520,000 LF
- Northwest Alum Creek– 468,000 LF
- Livingston James – 675,000 LF
- Miller/Kelton – 60,000 LF

As a part of the I/I Study project teams, Donahue IDEAS assisted in studying the entire sanitary sewer system to identify deficiencies or defects, including areas where I/I enters the system, blockages in the system, structural defects, and locations where the system is undersized. Donahue IDEAS provided field inspection services during CCTV operations to ensure work was completed in accordance with contract documents. Donahue IDEAS was in charge of quality control of all of the data collected, including organizing, storing, and reviewing all of the data submitted by the CCTV contractors. Data was also collected on locations where heavy roots, debris, or other blockages occurred in the system so the Sewer Maintenance Operations Center could perform preventive maintenance. The CCTV records were compared to the existing GIS records to ensure that the sanitary sewer system was being accurately depicted for modeling purposes.

Client

City of Columbus, Ohio

Contact

Todd Pulsifer, GIS Manager

Division of Sewerage & Drainage

910 Dublin Road

Columbus, Ohio 43215

614.645.7805

TFPulsifer@columbus.gov

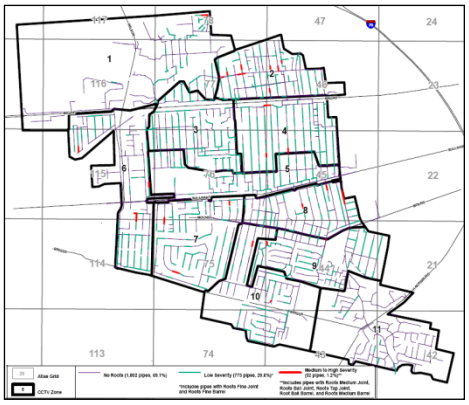
Fees

Early Ditch	$476,715.13
NW Alum Creek	$261,433.00
Miller/Kelton	$91,060.00
Livingston/James	$135,901.21
Sullivant	$191,000.00

Date

Early Ditch	2012
NW Alum Creek	2010
Miller/Kelton	2010
Livingston/James	2010
Sullivant	2012

Donahue IDEAS assisted in the private and public source I/I testing, windshield surveys, and dye testing and then developed flow charts that took all CCTV, windshield survey, residential questionnaire, and GIS data into account to apply the testing results to all project areas.



Following all field investigations, Donahue IDEAS assisted in the development and review of Alternatives Analysis Reports. Utilizing GIS software, these reports combined all information gathered throughout the projects and developed several alternatives for minimizing the number of SSOs and WIB complaints. These alternatives included reducing the amount of I/I entering the system, upsizing the sanitary sewer and adding storage tanks to handle the increased flow during wet weather events.

project profile

WASTE WATER PLANT PROJECT
CITY OF COLUMBUS, OHIO

NATURE OF WORK

ETI is providing Network Design, Implementation, and Support Services for The City of Columbus Waster Water Plants (Southerly and Jackson Pike) through the prime contractor Camp Dresser, McKee, and Smith. ETI has worked on this contract for the past six years. Over this period they have re-designed the Fiber Ring Infrastructure from three rings to two. ETI's project scope includes technical recommendations, as well as reviews and opinions. They are currently on their second four or five year contract (renewable yearly).

Client

City of Columbus, Ohio via Camp Dresser & McKee-Smith

Contact

Ed Heyob, P.E., MCSE, Senior Automation Engineer

Camp Dresser & McKee-Smith

8800 Lyra Dr., Suite 500

Columbus, OH 43240

Phone: 614.847.8340

Fax: 614.847.1699

heyobes@cdmsmith.com

Fees

Willie Jordan: $175.00/hour; Engineers: $145.00/hour

Date

2008-Present

SECTION 4

WOOLPERT

DESIGN | GEOSPATIAL | INFRASTRUCTURE

SECTION 4. PROPOSED RATES

The table below identifies personnel categories and their associated role description and rates.

Proposed Rates				
Personnel Category	**Description**	**Loaded Rate (2014)**	**Loaded Rate (2015)**	**Loaded Rate (2016)**
Project Director	BA/S with 12 years' experience, MA/S with 10 years' experience, or 16 years' experience. Management promotion track. Project responsibilities include maintaining client relationships and ensuring services are performed in a manner compatible with being an industry leader.	$195.00	$200.85	$206.88
Project Manager	BA/S with 4 years' experience, MA/S with 2 years' experience or 8 years' experience. Management promotion track. Project responsibilities include serving as primary point of contact with client, and managing project team, scope, schedule, and budget.	$170.00	$175.10	$180.35
Subject Matter Specialists (T-6)	BA/S with 12 years' experience, MA/S with 10 years' experience, or 16 years' experience. Technical promotion track. Project responsibilities include providing technical expertise and leadership in project definition and planning phases; coordinating the technical execution of complex, diversified projects; communicating new scientific methods, developments and practices through appropriate firm channels; developing and documenting standard practices; coaching and mentoring other team members in skill development areas; and performing project QA/QC.	$180.00	$185.40	$190.96

Proposed Rates				
Personnel Category	**Description**	**Loaded Rate (2014)**	**Loaded Rate (2015)**	**Loaded Rate (2016)**
Principal Member/ Technical Staff (T-5)	BA/S with 8 years' experience, MA/S with 6 years' experience, or 12 years' experience. Technical promotion track. Project responsibilities include providing technical expertise and leadership in project definition and planning phases; coordinating the technical execution of complex, diversified projects; communicating new scientific methods, developments and practices through appropriate firm channels; developing and documenting standard practices; coaching and mentoring other team members in skill development areas; and performing project QA/QC.	$150.00	$154.50	$159.14
Senior Member/ Technical Staff (T-4)	BA/S with 4 years' experience, MA/S with 2 years' experience or 8 years' experience. Technical promotion track. Depending upon the specific project role, responsibilities may include application development for enterprise information management, geospatial data development and maintenance, surveying, and leadership of the technical team.	$125.00	$128.75	$132.61
Member/Technical Staff (T-3)	BA/S or 4 years' experience. Technical promotion track. Depending upon the specific project role, responsibilities may include application development, mapping, data development and maintenance, and surveying.	$90.00	$92.70	$95.48
Junior Member/ Technical Staff (T-2)	Associates degree or 2 years' experience. Technical promotion track. Depending upon the specific project role, responsibilities may include data development and maintenance, surveying, and QA/QC.	$68.00	$70.04	$72.14

Proposed Rates				
Personnel Category	**Description**	**Loaded Rate (2014)**	**Loaded Rate (2015)**	**Loaded Rate (2016)**
Entry Level/Technical Staff (T-1)	High school diploma or GED. Technical promotion track. Project responsibilities include surveying/data acquisition.	$48.00	$49.44	$50.92
Senior Member/ Administrative Staff (S-4)	BA/S with 4 years' experience, MA/S with 2 years' experience or 8 years' experience. Administrative promotion track. Depending upon the specific project role, responsibilities may include accounting and business administration.	$95.00	$97.85	$100.79
Member/Administrative Staff (S-3)	BA/S or 4 years' experience. Administrative promotion track. Depending upon the specific project role, responsibilities may include accounting, billing, business administration, human resources, purchasing, record keeping, and IT support.	$80.00	$82.40	$84.87
Junior Member/ Administrative Staff (S-2)	Associates degree or 2 years' experience. Administrative promotion track. Depending upon the specific project role, responsibilities may include accounting, billing, business administration, human resources, purchasing, record keeping, and IT support.	$60.00	$61.80	$63.65

The Hourly Cost Multiplier (HCM) used to calculate the rates is 3.25%.

SECTION 5

WOOLPERT

DESIGN | GEOSPATIAL | INFRASTRUCTURE

SECTION 5. LOCATIONS OF ALL OFFICES PERFORMING WORK / ASSIGNED PERSONNEL

LOCAL PRESENCE

The Woolpert Team understands the City's desire to support the local workforce by keeping tax dollars within Columbus. To support that directive, this proposal has been staffed with a majority of personnel working from a Columbus office and paying City of Columbus taxes. In fact, **90.9% of the labor costs associated with this project will be attributable to staff located in Columbus who pay City of Columbus Income Tax**. The tables below show the locations of offices where key project personnel are normally located and the corresponding percentages.

Name	Company	Tax Location
Brian Stevens	Woolpert	Columbus
Mike Merchant	Woolpert	Columbus
David Alvarez	Woolpert	Columbus
Ryan Butler	Woolpert	Columbus
Mike Morgan	Woolpert	Columbus
Marianne Cardwell	Woolpert	Indianapolis
Steve Newel	Woolpert	Columbus
Tim Chrismer	Woolpert	Columbus
Jim Heider	Woolpert	Columbus
Calvin Johnson	Woolpert	Columbus
David Hall	Woolpert	Columbus
Rick Webb	Woolpert	Columbus
Jeff Meyer	Woolpert	Dayton
Colleen Donahue	Donahue IDEAS	Columbus
Kathleen McBride	Donahue IDEAS	Columbus
Scott McBrayer	Donahue IDEAS	Columbus
Jason Woodman	DLZ	Columbus

Rayleen Lee	DLZ	Columbus
James Toto	DLZ	Columbus
Tatyana Arsh	DLZ	Columbus
Charles Murphy	DLZ	Columbus
Willie Jordan	ETI	Columbus

Team (Count members Total)	22
Team (Count members Columbus)	20
Percentage Workforce in Columbus	90.9%

WORKING AMONG MULTIPLE GEOGRAPHIES

As mentioned previously, Woolpert makes every attempt to hire the best technical people possible. This has resulted in a very strong and skillful team that is very diverse, both in terms of knowledge and geography. While a significant portion of our development staff is concentrated in the Columbus, Ohio Region, two of our team members are located in other offices. In many environments, this could pose a problem. However, Woolpert's development team interacts and works together as if it is one cohesive group within a single office. This is due to the processes and procedures used to develop software applications as described above, but also how the project managers, team leads, application developers and system analysts communicate with one another over the course of a project.

Woolpert has embraced technology to help foster regular and efficient communication as a result. Woolpert project teams utilize technologies such as web conferencing to perform regular peer reviews of each other's work, or to discuss project requirements and design. Video conferencing has also been implemented to invoke a more personal feel to these meetings to help ensure better communication. A centralized source control system for storing application code and project documentation is utilized on every project. Subcontractors, when utilized, are required to use our source control system as well to ensure a single source for application code and reinforce the fact that we are all part of one team. Finally, project managers utilize a secure project website for the storage of project documentation and correspondence, as well as an issue tracking system for scheduling assignments to various staff and tracking application issues/bugs later in the project. All of these systems are tied into email so that people receive the proper notifications. Through the methods described above, the Woolpert team is able to act as a single entity throughout each project and projects tend to run more efficiently as a result.

OFFICE ADDRESSES

In this section, we've provided the addresses of Woolpert's offices and the offices of our subconsultants.

Woolpert's Columbus office was established in 1982 and is located at the address below. The Woolpert Columbus office is the only office from our Team's locations that is located in Franklin

County and was established prior to 1995. Fifty percent of our team will be working out of this office.

One Easton Oval, Suite 310
Columbus, OH 43219

Woolpert's corporate office is located at the following address:

4454 Idea Center Blvd
Dayton, OH 45430

DLZ's corporate/local office was established in 2003 and is located at the following address:

6121 Huntley Rd.
Columbus, OH 43229

Donahue IDEAS, LLC's corporate/local office was established in 2004 and is located at the following address:

2780 Airport Drive
Columbus, OH 43219

Emerging Technology Integrators, Ltd.'s corporate/local office was established in 2003 and is located at the following address:

172 E. State Street
Suite 550
Columbus, OH 43215

SECTION 6

WOOLPERT

DESIGN | GEOSPATIAL | INFRASTRUCTURE

CLARIFICATIONS AND MODIFICATIONS

Woolpert has reviewed the terms of the RFP and generally finds the terms to be acceptable although Woolpert would like to have the opportunity to request the following clarifications and modifications if fortunate enough to be awarded the Project. **Please note that the City and Woolpert have entered into numerous contracts** and Woolpert is confident the parties will once again be able to agree on mutually acceptable terms.

- **Section 4, page 12** – Please replace the words "consider…increased costs" with the words "equitably adjust the Consultant's cost of performance".

- **Section 6(A), page 13** – Liability for indemnification should be tailored to a party's ability to control the risk. Woolpert can agree to indemnify and hold the City, and its officers, and employees harmless from claims, damages, liabilities, and costs, (including reasonable defense attorney's fees), to the extent caused by the negligence of Woolpert. Please revise the provision accordingly.

- **Section 7, page 13** – With respect to subsection (A), please add a cure period (e.g. 7 days) prior to termination for cause. Such a provision may be beneficial in helping to resolve any misunderstandings and minimize potential unnecessary costs related to a termination. With respect to subsection (B), please include language that clarifies that any reuse or modification by the City of the documents prepared by the Consultant shall be at the City's sole risk.

WOOLPERT

DESIGN | GEOSPATIAL | INFRASTRUCTURE

CELEBRATING 100 YEARS

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800.414.1045

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