YOUR GOALS. OUR MISSION.

June 6, 2014

Mr. Todd Pulsifer, GIS Manager
City of Columbus, Department of Public Utilities
910 Dublin Road
Columbus, OH 43215

RE: SOLICITATION NUMBER SA005365
PROFESSIONAL SERVICES FOR GIS TECHNICAL CONSULTING SERVICES RELATED TO PUBLIC UTILITIES

Dear Mr. Pulsifer:

T&M Associates (T&M) is pleased to submit this proposal for Professional Services for GIS Technical Consulting Services Related to Public Utilities. The T&M staff has worked together for over 10 years on GIS related projects, including several within the City of Columbus. Our GIS professionals have worked with the City for many years integrating GIS throughout multiple departments, including the Department of Public Utilities (DPU). We are an experienced, qualified team utilizing the latest GIS technology and tools for utility operations.

Our Team consists of professionals with proven ability to serve Columbus DPU and other utilities through staff expertise and project experience. PRIME AE Group, Inc. (PRIME) is a Certified Asian Minority Business and ms consultants, inc. (ms) will assist T&M in providing GIS services to DPU. PRIME has assisted with various engineering projects for DPU that required integration with your GIS. They also have experience with various other utility agencies. ms also has experience performing field work and integrating GIS for DPU projects such as Cherry& Fourth and Marion Road. Their staff utilizes GIS applications both internally and externally to streamline engineering analysis and field data collection activities.

All firms are Columbus based with DPU, utility and applicable GIS experience as highlighted throughout the sections of this proposal. As the Project Manager, I have the knowledge and familiarity with managing task orders for consulting services such as this. I have worked with The City of Columbus for the past 10 years and have successfully incorporated GIS technology throughout the many departments, including DPU. I will bring both my own and our Team's understanding of the latest GIS technology to serve you as your GIS consultant.

Sincerely,

T&M ASSOCIATES

Darlene Magold Scott, GISP
GIS Director
614.408.9234

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SECTION 1 | FIRM INTRODUCTION

T&M Associates (T&M) is pleased to provide The City of Columbus, Department of Public Utilities (DPU) a team of professionals that understand utilities. Using our past project experience and skilled staff, our Team will serve DPU with the following:

- **Strong and knowledgeable project managers.** Darlene Magold Scott and Erick Lobao have been serving the City of Columbus for over the past 10 years through numerous utility and other GIS-related projects. They understand how to successfully develop, deploy and maintain GIS applications across all City of Columbus departments.
- **Latest GIS technology.** Our team consists of skilled GIS professionals and application developers that are continually updating and migrating to new GIS technology, as shown with our long-term client relationships and projects.
- **Local team that understands GIS for Utilities.** Our local team has worked together for the past several years for DPU as well as many other utility entities. We are comprised of both GIS, engineering and survey professionals to bring a well-rounded level of expertise to the Team.

T&M Associates serves as an industry leader with a diverse client base that includes major private, County, State and Federal entities involving a comprehensive range of projects, such as GIS design, conversion and application development; water/wastewater engineering; land use planning, master planning and urban planning; solid waste management; hazardous waste clean-up; environmental impact assessment and analysis; renewable energy analysis and design; stormwater management; site planning and design; transportation planning and design including highway, roadway, bridge and traffic engineering; park and recreational facility planning and design; waterfront development; landscape architecture; land surveying; and construction administration and inspection. No matter the challenge, our dedicated staff of professional engineers, planners, and GIS professionals possesses a unique capacity and demonstrated knowledge to get the job done.

ESRI Technology
AUTHORIZED BUSINESS PARTNER

T&M offers several core services that follow a lifecycle GIS approach. We have the knowledge and expertise to assist our clients through all stages of GIS; including needs assessment and planning, data conversion, analysis, systems integration, web and mobile application development and maintenance. Our staff has the capability to work with clients at any stage of GIS providing a full solution for an enterprise implementation.

Our team is comprised of Geographic Information Systems Professionals (GISP); professional civil, structural, site, transportation, traffic, electrical and environmental engineers; planners; environmental scientists; professional geologists/hydrogeologists; Licensed Site Remediation Professionals (LSRPs); Ohio Voluntary Action Program Certified Professionals (CPs) and All Appropriate Inquiry (AAI) environmental professionals; LEED Certified professionals; landscape architects; grant writers; land surveyors; construction inspectors; and support staff. From the design and maintenance of major structures, bridges and roadways, to environmental and public works projects, to assisting in the preservation of open space, T&M's multi-disciplined staff has played an integral role in creating and maintaining local and regional infrastructure.

With nearly half a century of award winning engineering and planning expertise, T&M provides an extensive spectrum of services to public and private clients in the following markets:

- **Energy & Utilities**
- **Environmental Services**
- **Geographic Information Systems**
- **Public Works**
- **Real Estate Development**
- **Transportation**
- **Water Resources**

T&M has long been recognized as one of the East Coast's leading firms offering a broad range of consulting engineering and planning services, and recently has expanded this reputation into the Midwest with offices in Ohio, Pennsylvania, and Kentucky. Working with public and private clients, we have built a solid reputation for getting the job done, no matter the size or scope of the challenge. With 350 employees, holding more than 150 licenses, T&M has an extraordinary talent base from which to choose when assembling a team to meet our clients' individual needs.

The T&M GIS Practice Area is based in Columbus, Ohio. The core team members proposed to work on this project have worked together for 10 years and have developed a reputation for producing quality deliverables. We have successfully completed municipal GIS projects for repeated clients in Central Ohio such as the City of Columbus Department of Public Service, City of Columbus Department of Public Utilities, City of Newark Ohio, City of New Albany Ohio, and City of Powell Ohio. Additionally our geodatabase expertise and application development experience have enabled us to deploy multiple successful web applications for clients such as the City of Columbus Department of Public Service, City of Columbus Department of Public Utilities, City of Newark Ohio, City of New Albany Ohio, City of Powell Ohio, Ohio Department of Transportation, and the Ohio Kentucky Indiana Regional Council of Governments (OKI). T&M's local presence and highly qualified staff will provide best in class utility GIS applications that meet and exceed your expectations.

ADDRESS: 4675 LAKEHURST CT, SUITE 250, COLUMBUS, OHIO 43016
PHONE: 614.339.3380 | **CCCN:** 221806708

PRIME AE™

PRIME AE Group, Inc. is a ***Certified Asian Minority Business*** that has been in operation in the City of Columbus since 1992. The firm provides a full range of services in engineering, GIS, construction management and inspection, technology, transportation, water resources, and architecture. PRIME's staff includes 54 Professional Engineers, 10 Registered Architects, and 41 Construction Inspectors. PRIME also has 14 LEED Accredited Professionals on staff. PRIME's office in Columbus has a staff of more than 60 people and the firm also has an additional office within Franklin County, located in Dublin. The firm's knowledge and experience with the City of Columbus Department of Public Utilities is extensive. PRIME has completed over 75 projects for the City of Columbus, many of these for the Department of Public Utilities.

Water Services Engineering | PRIME offers public and private sector clients a variety of services in virtually every aspect of water, wastewater systems & flood control engineering. Our services include hydraulic/hydrology studies and analysis, wastewater collection, pumping & treatment, sanitary sewer systems, CSO separation analyses, I/I analyses, SSES, floodplain management &

mapping/GIS, MS4 NPDES permit compliance, TMDL implementation, water distribution, pumping & treatment, drainage and flood control design, detention ponds stormwater BMP design; and bio-filtration (rain gardens).

Technology | PRIME provides a wide range of services to provide our public and private sector clients with a broader scope of solutions for their daily operational challenges. Our services include Enterprise Content Management, Geographic Information Systems (GIS), data entry & analyses, project management services, network and system architecture and virtualization, document conversion, and data migration.

ADDRESS: 3000 CORPORATE EXCHANGE DR., STE. 600, COLUMBUS, OH 43231
PHONE: 614.839.0250 | **CCCN:** 260546656

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ms consultants, inc. was founded in 1963 and has been in business for 50 years currently employing more than 300 professionals. ms consultants is ranked 10 in the most recent "Top 25 Engineering Firms" survey published annually by Business First of Columbus, and the 261st largest engineering/architectural firm in the United States, according to the most recent ranking (2013) of Engineering News Record.

ms consultants, inc.
engineers, architects, planners

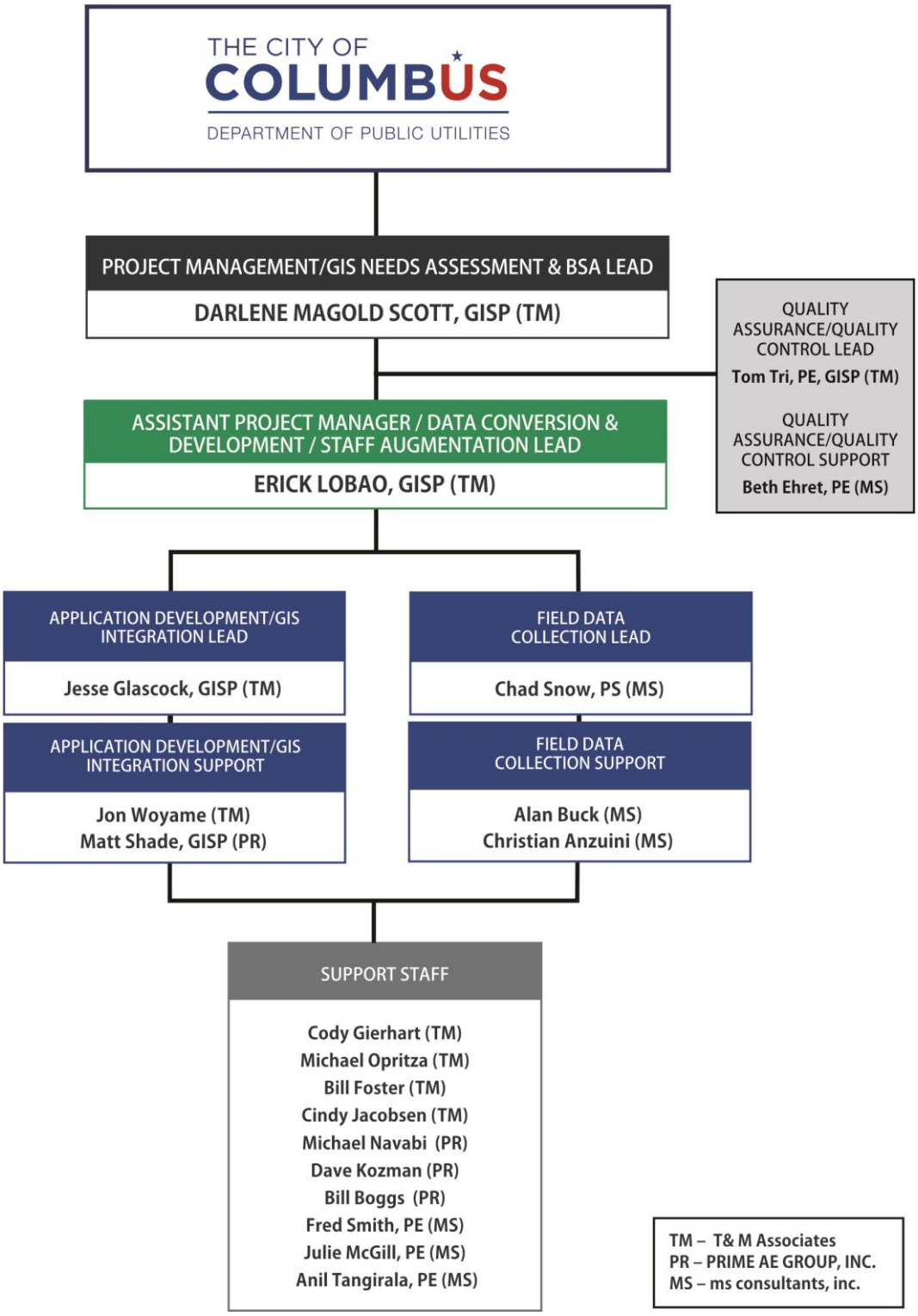
A broad range of professionals are available to assist clients at ms consultants. Civil, structural, traffic and geotechnical engineers knowledgeable in highways, roads, dams and bridges have addressed transportation needs across the region. Environmental engineers, biologists, chemists, scientists and planners are available to evaluate the impact of proposed projects or secure permitting. ms consultants environmental services include planning, permitting, design and operations of facilities as well as environmental assessments, restoration and clean-up.

GIS |The newest offering from ms consultants is GIS, Geographic Information Systems. ms consultants can assist you with integration of GIS in any number of ways. ms analysts apply GIS technology to utility projects in order to streamline data collection, engineering analysis (I/I studies) and water resources.

Surveying| These services include GPS equipment working in concert with conventional surveying techniques. Surveyors provide services on exclusively surveying commissions as well as serving the other ms consultants technical service divisions in construction plan development and services such as centerline surveys, property analysis, and construction stakeout.

ADDRESS: 2221 SCHROCK ROAD, COLUMBUS, OH 43229
PHONE: 614.898.7100 | **CCCN:** 346546916

TEAM ORGANIZATIONAL CHART



Darlene Magold Scott, GISP, has worked as a Project Manager with the City of Columbus for the past 7 years. Specifically, she has successfully managed GIS Professional Services contracts from DPU and DoT. She will serve as the overall **Project Manager/GIS Needs Assessment & BSA Lead**. Over the past several years, she has assisted many clients, including several utility clients similar to DPU with integrating GIS applications into utility operation workflows. She has worked with members of this Team for over 10 years and understands how to organize the appropriate staff members together to get tasks accomplished – including within the City of Columbus. She understands the team dynamics for managing sub-consultants as well. She will work closely with Mr. Lobao and the other staff to produce quality deliverables that are on time and within budget. She will assist with user testing (as appropriate) and as a part of the quality control process for all deliverables. Ms. Scott will work with Mr. Glascock (and his team) to clearly communicate your needs so that the tools are functional and meet the scope of services for all application development tasks. Ms. Scott will provide status reports (duration determined during the kickoff of individual tasks) as well as invoices and any other administrative duties required. Her broad range of experience managing and deploying GIS utility projects will make her a valuable asset to your team.

Erick Lobao, GISP will serve multiple roles as the **Assistant Project Manager/Data Conversion & Development/Staff Augmentation Lead.** Mr. Lobao has managed projects for several years for the City of Columbus throughout multiple departments. He understands utility operations and will assist Ms. Magold Scott with managing task orders as appropriate. He has expertise with data conversion as well as developing desktop and server based GIS solutions for projects of all scales using Esri products. Mr. Lobao has implemented project management and QA/QC methodologies and has led several conversion projects for utilities such as water, sewer, storm, electric and fiber. Mr. Lobao has worked with the key staff members proposed for this project for over 5 years, developing team dynamics and experience that is well suited for utility projects.

Tom Tri, PE, GISP will lead the Team's **Quality Assurance and Quality Control (QA/QC).** Mr. Tri has worked with many utility entities, including the City of Columbus, to integrate water/wastewater engineering analysis with GIS applications. He has worked with this team for over a decade providing quality control measures to assure that all valid application requirements are fulfilled throughout the project lifecycle. Tom will assist the Team with an agile and iterative approach to all tasks and will provide DPU staff with specific quality control standards. Since this general services agreement is task based, he will work with Darlene and Erick to determine the level of QA/QC documentation and processes necessary. Tom's unique combination of technical skills and proven experience managing and delivering projects with a similar size and scope as your project make him an ideal QA/QC lead for your team**. Ms. Elizabeth Ehret, PE** will assist Mr. Tri with the overall **QA/QC** for DPU tasks. She also understands the dynamics of infrastructure and utilizes as it pertains to GIS applications. Her specific project experience with DPU and her experience with other utilities will enable her to assist Mr. Tri and Ms. Magold Scott with the overall project management process.

Jesse Glascock, GISP will lead our **Application Development and GIS Integration.** Mr. Glascock will work very closely with Darlene and Erick to design and implement desktop, web and mobile applications. Skilled in a wide variety of applications including ArcGIS desktop, ArcGIS Model Builder, ArcSDE, ArcGIS Server, and open source GIS tools, Mr. Glascock has developed projects using many software languages and platforms including Flex, JavaScript, Action Script, C#, Visual Basic, XML, Python, Avenue, Java, HTML and ASP.NET. He has designed databases in Microsoft SQL

Server, Microsoft Access, and MySQL to interact with desktop and web-based applications. He has worked closely with the proposed key staff members for this project over the past five (5) years to develop web mapping applications for the City of Columbus OH, Newark OH, Mason OH, Licking County, OH, Ohio Department of Transportation (ODOT), and the Ohio Emergency Management Agency (Ohio EMA). He will also work with the QA/QC team with functional requirements and testing. Jesse has worked with many departments within the City. He understands how to work with DoT to successfully deliver GIS applications. He also understands the importance of training, maintenance and proper documentation for Team members as well as City staff. He will deliver applications so that DoT and DPU can properly configure and maintain them. Jon Woyame and Matt Shade, GISP will take direction from Mr. Glascock, as Application Development and GIS Integration support staff. Both have extensive application development experience with utilities and other GIS projects. Their direct project experience developing and delivering GIS based web applications which provide a common operating picture for both desktop and mobile browser users makes him a valuable asset.

Chad Snow, PS, will lead all Field Data Collection tasks related to this project. Mr. Snow has experience with utility location, specifically with the City of Columbus, DPU. He understands how to collect data in a way that GIS analysts can easily integrate information with the City's GIS. He will be assisted by Alan Buck and Christian Anzuini as Field Data Collection Support. All survey staff proposed has experience with survey and GPS technology for GIS integration and utility operations.

There are several qualified support staff available to serve on projects pertaining to this general services contract. Our Team highlights ten (10) other local staff with GIS and utility qualifications that can provide value to DPU. Our combination of GIS, engineering and survey expertise allow us to create teams with qualified staff to serve the variety of tasks assigned by DPU.

PROJECT MANAGEMENT METHODOLOGY

Our project managers are consistently working to improve project management skills through continued education and training, and have built a record of proven success working with real world clients and projects that are similar in size and complexity as yours. For example, the project managers designated to lead this contract for GIS technical consulting have successfully managed tasks specified in your RFP. More specifically, as seen in Section 2, T&M staff led the original general services contract for both The City of Columbus DPU and Department of Technology (DoT). Our team's project management methodology consists of identifying and utilizing the appropriate tools to plan, execute, and measure the quality of our work performed throughout a project in order to produce high quality deliverables.

T&M's successful project management and project delivery methodology requires a deep focus on the entire lifecycle of a project. This is reflected in every task we perform with our clients and particularly in our high quality project service delivery plans. We have experience developing highly formal project work plans as well as more flexible / agile project service delivery plans based on the needs of the client / project. With each of these approaches we are continually planning, monitoring, and evaluating the success of projects.

Our project managers are also experienced using web based project management tools such as asana.com and trello.com in addition to traditional management tools such as Microsoft project. These modern tools allow for

rapid, real-time communication, document sharing, and collaboration between project team members and clients. These tools essentially provide a web-based project work plan that is dynamic and simple to modify, which in turn makes the project plan much more powerful as it is easy to update throughout the project's lifecycle and provides every project member with access to the latest information.

Depending on the complexity of the tasks assigned for this contract, the T&M Team may use certain elements of a Service Delivery Plan. We have used this methodology for other projects, specifically for GIS projects within the City of Columbus. This plan includes project timelines, milestones, deliverables, and identifies the resources needed to complete each task. The amount of City staff labor (including DPU and DoT) will also be summarized for each task within the service delivery plan.

Service Delivery Plan Components
The primary components of our project plan include the following:

- **Project Team Contact List**
- **Client Team Contact List**
- **Formal Client Authorization**
- **Project Goal Statement**
- **Budget Overview**
- **Detailed Project Scope**
- **T&M Roles**
- **Client Roles**
- **QA / QC Methodology & Process**
- **Deliverable Summary**
- **Client Review & Communication Plan**
- **Invoice Requirement**
- **Project Schedule**

Each of these components combine together to provide a proven framework for a successful project service delivery that is unique to each and every project.

PURPOSE & ROLE OF SERVICE DELIVERY PLAN

The purpose of the service delivery plan is to serve as a general guide and communication tool for both internal team members and our clients regarding key project components. All of the logistics associated with servicing our client are included in this document to help build a common understanding of the project requirements. T&M Team project staff and project managers routinely review the service delivery plan as part of weekly internal project meetings to ensure each team member understands their roles and responsibilities throughout the project as well as the current status of each task and any upcoming deliverables. It is important to note that while the service plan is a formal document it is also a "living" document that is subject to change during a project lifecycle. T&M will coordinate closely with project team members and the client when and why changes are necessary as well as what the changes involve.

EFFECTIVE SERVICE DELIVERY

The T&M Team will also utilize web-based project management tools such as asana.com and trello.com to provide real-time communication, task management, and project management capabilities that can be shared with clients as necessary. Having effective tools that move project service plans beyond a shared document is important for complex, long-term projects such as yours which involve lots of resources and project staff.

These methodologies have helped the T&M Team to develop a reputation for closely integrating with clients and serving as an extension of client staff. Building these relationships makes for a smooth transition of project deliverables as we empower our clients to take control throughout

the project and ensure that there are no surprises. The number of projects we complete with repeated clients is a primary example of our ability to manage projects and work with our clients to achieve success.

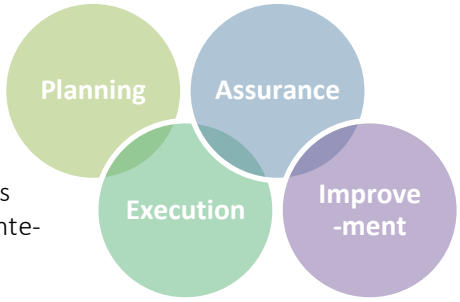
QUALITY ASSURANCE/QUALITY CONTROL PROCESSES

The Project Team will utilize T&M's Quality Management System. This is focused on providing long-term success for our staff and Clients while meeting our corporate goals for risk management, growth, stock appreciation and employee satisfaction. The pursuit of Quality is integral to T&M's success. T&M's reputation depends on the delivery of quality products and services in all aspects of the Company's business. The Quality Management System (QMS) described herein was developed to foster a continuous focus on Quality by providing the overall procedures, processes and responsibilities to be used at T&M to successfully deliver quality products and services.

T&M's QMS applies to all activities related to T&M's products and services. The QMS has been designed to be easily understood, continuously implemented, appropriately documented and maintained, with the emphasis placed on continuous planning, execution, assurance and improvement, so T&M's products and services meet or surpass our Clients' expectations.

QMS STRUCTURE

The QMS consists of four phases which are part of a continuous process of Planning, Execution, Assurance and Improvement. The QMS provides the process overview for each of the four phases and also describes the roles and responsibilities of the participants. This document serves as a permanent framework for the implementation and maintenance of the QMS.



Focus on Planning

T&M has a systematic approach to understanding our Client's expectations and for establishing appropriate quality standards for product delivery. The Planning Phase of the QMS system involves all activities relevant to the planning for the final work product and for the services to be delivered to the Client. Fully understanding our client's needs and the preparation of a quality proposal are T&M's first steps in establishing a commitment to the Client regarding scope and quality of services to be performed. The Proposal Development Plan should be utilized to establish the key participants in the proposal development, project understanding and schedule. The preparation of the Project Work Plan further delineates the required tasks, resources needed, budget and schedule, and defines the applicable project specific standards. Proposal and project planning must include the allocation of appropriate time and resources for the QMS activities described herein.

Focus on Execution

This is the process by which we comply with Client, T&M, regulatory and industry standards in order to meet or exceed our Client's expectations and deliver quality products and services. In the Execution Phase, T&M staff provides professional services and creates the work-product which will be delivered to the client. Each project must be executed in accordance with the proposal and Project Work Plan. The Project Work Plan and tasks shall be communicated to the staff with project deliverables clearly identified and specific concerns or special conditions highlight-

ed. All work performed shall be checked and documented. Cost, schedule, work scope, technical compliance and proper documentation will be monitored and corrective action taken as necessary.

Focus on Assurance

Assurance includes monitoring and evaluation of the work process to verify that the Work Plan, quality standards and client expectations are being achieved. The Assurance Phase is part of every T&M Project. For small projects, the Assurance Phase may be performed as the project is nearing completion, but before any work product is released. For large Projects, multiple Quality Assurance Reviews should be completed at appropriate stages of the project as defined in the Work Plan. It is essential for every project to include "Quality Assurance" time in the project budget and timeline.

The Quality Assurance Review process will be implemented at least once on each and every project performed by the company. Depending on project specific factors (e.g., scope, value, risk, etc.), the frequency of Quality Assurance review to be performed will be specified in the Work Plan.

Focus on Improvement

Improvement is the enhancement of our products and services based on continuous communication and implementation of lessons learned in the QMS cycle. Every project will have Quality Assurance Reviews during the project execution. The findings and conclusions from the Quality Assurance Review will be used to implement improvements to our work process and standards in the Improvement Phase. The Quality Assurance Reviews will reveal opportunities for improving project execution and will identify shortcomings in implementation of the QMS during a Project. The Improvement Phase is used to analyze the findings/data and take corrective action, which may be as simple as supplemental training for an individual or as substantial as specification amendment or company procedure amendment. The Improvement Phase may occur at any time during the project cycle, and will always follow a Quality Assurance Review.


ENTITIES
LEVEL
TECHNOLOGY
MIGRATING
SERVING
RELATIONSHIPS
DEVELOP
ENGINEERING
SUCCESSFULLY
KNOWLEDGEABLE
SEVERAL
UNDERSTAND
GIS-RELATED
LOCAL
CLIENT
GIS
PAST
YEARS
UTILITY
COLUMBUS
LONG-TERM
WELL-ROUNDED
DEVELOPERS
TEAM
APPLICATIONS
PROFESSIONALS
PROJECT
DEPARTMENTS
NEW
PROJECTS
DPU
UNDERSTANDS
TOGETHER
CITY
LATEST
BRING
MANAGER
MAINTAIN
DEPLOY
ACROSS
WORKED
SURVEY
STRONG
APPLICATION
SKILLED
EXPERTISE

SECTION 2 | QUALIFIED PROJECT STAFF

The T&M Team has experience with all of the elements listed in the RFP. Our staff has performed the required scope of services for many clients with multiple projects. Specifically, technology includes ArcGIS Server, Desktop and Mobile; JavaScript, Flex and Silverlight API; HTML 5 and Microsoft .NET; Business Systems Analyses; Needs Assessment Analysis and Systems Integration Planning. We also have led our clients in developing applications using the latest GIS technology – from desktop to web applications (including mobile). We create data in an intelligent way so that that information is scalable and application development can be done efficiently. As evidenced in the following section, our staff is able to integrate GIS into multiple systems to create enterprise applications for utility operations.

DARLENE MAGOLD-SCOTT, GISP

Project Manager / GIS Needs Assessment & BSA Lead

Ms. Magold Scott has over 15 years of GIS professional experience including managing utility projects of all scales. She has worked with several clients to build consensus as well help with the design of asset management and utility applications including the user interface and overall user experience. Ms. Magold Scott also assisted with the integration of daily workflow into the applications by understanding the needs of the client. In particular, Ms. Magold Scott has successfully led multiple projects for the City of Columbus for the past 7 years. She has also worked with several other utilities such as City of Newark, OH; Southwest Licking Community Water and Sewer District; New Albany, OH; Hilliard, OH; Dublin, OH; Johnstown, OH; and Middlesex County, NJ.

EDUCATION & CERTIFICATIONS

Ohio State University, MA Geography (GIS), 2004

University of Dayton, BS Environmental Geology, 1999

Certified Geographic Information Systems Professional GIS Certification Institute, 2007 (00048539)

TECHNICAL COMPETENCY

Ms. Magold Scott has excellent project management skills that include managing internal staff as well as assisting clients with elements of project management through GIS integration, staff augmentation, needs assessment and business analysis. She has managed several projects that require coordination across offices or departments to create robust applications and GIS processes.

Her software skills include: ArcGIS 9x, ArcGIS 10x, ArcGIS Server, ArcGIS Online, ArcSDE, ModelBuilder, Microsoft Office, Access, Amazon Cloud Technology, Cityworks and Lucity; geodatabase creation (topology, geometric networks and domains), data integration and web based application development.

DESCRIPTION OF ROLE ON RELEVANT PROJECTS

City of Columbus, Department of Public Utilities (DPU) | GIS General Services Contract*

General Project Management. Ms. Magold Scott served as the overall task manager for several GIS task orders for DPU ranging from data collection to custom tool development. This included managing field data collection for the Rickenbacker Air Force Base to produce a sanitary sewer feature classes with detailed attribution. She also facilitated tasks that included emergency management planning using GIS as well as the development of desktop tools to auto-populate attributes within a feature class for sewer infrastructure. Before her departure, Ms. Magold Scott assisted DPU with creating multiple scopes to complete projects for ArcGIS Server web development.

Valve Operations Procedures – Quality Control. Ms. Magold Scott provided quality control and review for the water valve operations procedures task. This included the development of a schema to track valve operations records performed on individual valves. A related valve operation table was created to track routine valve operation work performed by

***Project performed at previous firm**

DARLENE MAGOLD-SCOTT, GISP

DPU field staff. A detailed set of procedures was developed to allow DPU staff to maintain the dataset in the future.
Smart ID Tool – Quality Control. Ms. Magold Scott provided quality control and testing for the Smart ID Tool that was developed using Python to populate a "smart ID" field on sewer mains and sewer manholes. The tool used a combination of geometric network logic and spatial analysis to populate each feature with a logical ID. For sewer mains, the upstream and downstream manhole IDs are combined to populate the sewer main ID.

City of Columbus, Department of Public Utilities (DPU), Division of Power and Water (DOPW) | Electric GIS Conversion Project*
Project Management. Ms. Magold Scott was responsible for the overall project management and client manager for the conversion of the DOPW electric infrastructure into a GIS format, utilizing Telvent Miner & Miner's ArcFM software. While this project has had many challenges including budget cuts, schedule delays and multiple prior attempts at data conversion, Ms. Scott developed an iterative approach that involves the close interaction with the DOPW team.
Data Conversion and Development. Ms. Scott led the integration of ArcSDE and ArcFM technology to mimic the DOPW working environment where the data would be delivered and maintained. To date, the downtown area was successfully converted into a GIS format, including the conduits with great detail; making connectivity complete allowing for tracing of both underground/overhead lines.

City of Columbus, Department of Sewerage and Drainage (DOSD) | GIS Early Ditch Relief Sanitary Sewer System Inflow and Infiltration (I/I) Remediation Project*
GIS Integration. Ms. Magold Scott led the integration of modeling applications and GIS information pertaining to sewer inflow and infiltration flows for the City of Columbus. She utilized ArcGIS software, in conjunction with engineering modeling (PCSWMM) and pipeline inspection (PipeTech) software for field data management, capacity modeling, and defect assessment to develop improvement recommendations. Ms. Scott was also responsible for coordinating with the engineering teams to provide up-to-date GIS information to field crews and modeling staff.

City of Columbus, Department of Public Service (DPS) | Warrior Watch Application
GIS Needs Assessment and GIS Integration. Ms. Magold Scott served as the assistant project manager and worked with the DPS staff to create a web application capable of consuming the City's newly purchased ArcGIS GeoEvent Processor which handles and formats GPS messages and signals coming from City service vehicles. The application allows City dispatchers to locate and track City Snow Plow vehicles as well as query historical locations of the vehicles for specified periods in time. Additionally the application provides users the ability to generate custom reports for Customer Service Requests, Truck Activity, and Outpost and/or Zone Completion reports.

City of Columbus, Department of Technology | Enterprise GIS Integration Universal Term Contract (UTC)*
UTC Task Order Implementation. Ms. Magold Scott was the Project Manager for The City of Columbus Department of Technology (DoT) implementation of enterprise GIS services for all departments throughout the City. In this role, Ms. Scott coordinated GIS activities throughout multiple departments within the City. She facilitated several discussions to prepare new workflow models to integrate GIS into the daily activities of Columbus staff. Ms. Scott acted as a GIS liaison representing the City to enable departments to work together to achieve common GIS goals.

***Project performed at previous firm**

DARLENE MAGOLD-SCOTT, GISP

GIS Needs Assessment and Business Process Analysis. Ms. Scott worked with City staff to analyze business processes and technology integration of several departments and how they worked together in order to develop customize solutions to fit certain Citywide and public initiatives. She worked with technical teams to establish system architecture plans and then convert existing data to standard formats. Websites and several other desktop applications to support the data dissemination throughout the City were created as a result of this architecture plan. Most importantly, Ms. Scott managed and coordinated training activities, some with Esri, and provided thorough maintenance plans for the DoT staff to keep applications and data current without depending on a consultant.

Project Management and Staff Augmentation. Ms. Scott provided project management for DoT, as well as for all other City departments. She was responsible for documentation that included status reports and meeting minutes, coordination of action items and outstanding issues. Project summaries and monthly invoices were also managed successfully by Ms. Scott which provided the client with on-time deliverables that did not exceed the proposed budget. Ms. Scott also acted as the primary Project Manager for all other departments throughout the City. In addition to managing the overall contract, other management tasks included allocating and monitoring budget information from DoT to multiple departments, conducting stakeholder meetings and translating user needs into GIS applications for DoT. Ms. Scott created a team environment that allowed her employees to be an extension of the Department of Technology staff, including her own staff member which was located at DoT for 40 hours a week. She provided regular documentation that included status reports and meeting minutes and was responsible for the coordination of action items and outstanding issues. Project summaries and monthly invoices were also managed successfully by Ms. Scott which provided the client with on-time deliverables that did not exceed the proposed budget.

City of Columbus, Department of Public Service, Department of Public Utilities | Capital Improvement Project (CIP) Web Based Application*

GIS Integration and Application Development (ArcGIS Server/Flex). Ms. Scott served as the Project Manager for the City of Columbus Department of Public Service (DPS) and Department of Public Utilities (DPU) Capital Improvement Project (CIP) web-based monitoring and financial tracking system. This project entailed the creation of a Flex website that relates CIP spatial locations to CIP project records within the existing project management software.

GIS Needs Assessment. As the Project Manager, Ms. Scott conducted several stakeholder meetings with multiple City departments in order to design a user-friendly interface for the web-based system. This Needs Assessment Analysis was successfully documented and subsequently transformed into a set of system architecture recommendations meeting stakeholder needs. One of the main requirements of this project was to create a web-based mapping application that can retrieve project information using several criteria including spatial (i.e. neighborhoods) and non-spatial (i.e. departments) parameters. Ms. Scott carefully reviewed workflows and project management activities for multiple departments in order to determine the best way to search for CIP information. One of the final components of this project was the training and maintenance for the application. Ms. Scott worked with other entities, such as Esri, to organize training for City staff to develop and maintain Flex applications.

***Project performed at previous firm**

DARLENE MAGOLD-SCOTT, GISP

City of Newark, OH | Enterprise Utility GIS Services

Project Management, Staff Augmentation, Needs Assessment and Business Analysis. For all components of this project, Ms. Scott managed the day to day operations of the team including several analysts, application developers, and IT analysts who worked onsite and remotely to deploy web mapping applications using Esri ArcGIS server technology. She met directly with the client who consisted of Engineering Department and Water/Wastewater staff in order to provide quality results and deliverables. To do this, she provided quality control reports as well as project summaries and presented her results. Ms. Scott handled monthly invoicing and detailed reports to the client for an on-time within budget project. Her effective communication skills ensured the client goals were understood by all staff involved producing a successfully deployed and highly integrated GIS solution.

GIS Integration and Application Development. In order to disseminate information efficiently, Ms. Scott managed the development of a web-based, Enterprise Utility Management System consisting of transportation, water, sanitary and storm infrastructure information named geoAsset. geoAsset utilizes ArcSDE, ArcGIS Server web-based technology to integrate information stored and maintained in an existing work order management software and an existing utility billing system. This internal application provides City staff distributed throughout the City and across departments with a common operating picture by allowing them to efficiently and accurately analyze current utility infrastructure information through web mapping application built using the ArcGIS API for Flex. Key components of this application are the customized widgets which rely on ArcGIS Server geoprocessing services developed using model builder to provide complex geoprocessing capabilities to non-desktop GIS users. Additionally Ms. Scott participated in the design, development, and testing phases of an ArcGIS Server routing analysis geoprocessing tool used by the water billing inspection group tasked with visiting multiple locations each and every day.

Currently, this application is being upgraded to utilize the new GIS web technology utilizing the ArcGIS API for JavaScript. Since the application was developed with a scalable approach, the tools can be easily transferred to the new technology.

Middlesex County, NJ | Enterprise GIS Services

Project Management and Staff Augmentation. Ms. Magold Scott is currently working with Middlesex County, NJ to build and enterprise GIS as well as to establish a GIS Governance model for the county. She is currently working with the infrastructure management group on several tasks.

GIS Integration and Data Conversion and Development. Ms. Magold Scott managed the creation of a versioned, SDE geodatabase for roads, traffic signals, signs, parcels, and other environmental information. She created a sophisticated schema utilizing Esri Local Government model as well as the Lucity work order management model. Data was extracted from CAD, Excel and multiple shapefiles.

Application Development. Ms. Magold Scott is in the process of leading the development of a sophisticated Parks application that allows users to utilize the characteristics of the parks (e.g. basketball court, restroom, soccer field) to select and filter to determine the most applicable park for the user. Another application is a robust capital improvement project (CIP) application that allows the user to directly see information linked to the county financial system. It also provides dashboards with sophisticated reporting and analysis of CIP dollars spent throughout the county.

City of New Albany, OH | Utility Geodatabase Creation and Cityworks Implementation

Needs Assessment and Data Conversion. Ms. Scott served as the Project Manager for the design and creation of a utility (storm, sanitary, water and fiber) and parcel geodatabase that is the foundation for the citywide enterprise GIS. She led the evaluation and assessment phase as well as the geodatabase schema creation to design a new utility and parcel geodatabase that fits the needs of the City of New Albany GIS users as well as

DARLENE MAGOLD-SCOTT, GISP

integrates with their existing asset management software, Cityworks. The fiber conversion was implemented utilizing Esri data model to create a network with fiber, poles, ducts and manholes. She also implemented an ArcGIS Online project to embed into the main website.

City of Hilliard, OH | Enterprise GIS Services
Needs Assessment, Data Conversion and Application Development. Ms. Scott served at the Project Manager for implementing Esri's Local Government Data Model (LGDM) to satisfy the requirements of all the departments within the City. This phase included populating the database with the existing spatial and tabular data from the existing CAD and GIS. This information included linkages to documents as specified in the existing attribution. She also assisted with the creation of map services that can be viewed through a website that includes base map information. She also led the application development team in creating an online parcel and utility viewer using the local government template. http://maps.hilliardohio.gov/gisviewer/

Southwest Licking Community Water and Sewer District (SWLCWSD) | GIS Utility Conversion
Project Management and Data Conversion. Ms. Magold Scott served as the project manager for the SWLCWSD's asset inventory and document management project. Her responsibilities included the integration of scanned as-builts, inspection and workorder information and a GPS inventory of assets. Ms. Magold Scott created a custom geodatabase design using ArcGIS to integrate with workorder management software in the future.

Village of Johnstown, Ohio | GIS Utility Conversion
Project Management, Data Conversion and Development and Field Data Collection. Ms. Magold Scott was both the project manager and lead GIS analyst for the creation of a utility geodatabase for the Village of Johnstown. She designed the geodatabase for storm, sanitary and water infrastructure then populated it with as-built information using heads-up digitizing. She also implemented an ArcGIS Online project allowing the field technicians to collect data using iPads to modify, update and add information the existing geodatabase.

The Ohio Department of Transportation (ODOT) | Transportation Information Management System (TIMS).
Needs Assessment and Business Analysis. One of the biggest challenges with transportation data is organizing, analyzing and disseminating spatial information both internally and externally. T&M developed an ArcGIS Server, web based, Flex application, TIMS, that acts as a data repository and contains sophisticated spatial analysis tools. Ms. Scott was the project manager for this project as well as the lead designer. She worked closely with ODOT staff across many departments to design a custom but scalable application for sophisticated transportation analysis.
GIS Integration and Application Development. Ms. Scott led a team from ODOT and consultants to produce a powerful, interactive website with the ArcGIS Server Flex API. The three (3) month design phase included migrating ODOT from GeoMedia technology to Esri SDE and ArcGIS Server. She led a geodatabase design and deployment as the basis for all of the query and geoprocessing tools available in the application. Ms. Scott worked with ODOT staff to determine workflow and detailed specifications for each tool, including the GUI. She built consensus among ODOT staff to create a successful, easy-to-use website.
Project Management. Ms. Scott provided insight based on her several years of asset and application management to implement many required tools in one web-based application. She managed the application developers that created tools for TIMS that provided many export, graphic and interactive data options that allowed for user flexibility. The result is an easily accessible, scalable application for both internal and external users for access to dynamic traffic, crash, pavement, infrastructure and facility information.

DARLENE MAGOLD-SCOTT, GISP

State Hazard Analysis Resource Planning Portal (SHARPP) | State of Ohio Emergency Management Agency (Ohio EMA)
The Ohio EMA, a Division of the Ohio Department of Public Safety (ODPS), coordinates activities to mitigate, prepare for, respond to, and recover from disasters. The Ohio EMA Mitigation Branch maintains the State of Ohio Natural Hazard Mitigation Plan, assists local communities in their planning efforts, and administers the FEMA Hazard Mitigation Assistance (HMA) programs for Ohio.
Project Management. Ms. Scott was the project manager responsible for the creation of an internet based web portal that is integral to Ohio EMA's strategy for achieving an "Enhanced" Hazard Mitigation Plan status. Ms. Scott led a team that developed a comprehensive hazard mitigation management system portal called SHARPP, State Hazard Analysis Resource and Planning Portal, for effectively organizing mitigation planning, project information, risk assessment and mitigation actions.

Ohio-Kentucky-Indiana Regional Council of Governments (OKI) / Hamilton County, OH | Regional Asset Verification & Emergency Network (RAVEN 911), Desktop and Mobile Web Application Development
Project Management and Application Development. Ms. Scott was the project manager for this project which spanned over 12 counties and three states. She assisted with the user design phase as well as application testing. She met with several stakeholders, including emergency personnel, to expand a Flex website as well as build a mobile application to mimic the Flex site for use in the field. The Regional Asset Verification & Emergency Network (RAVEN911) application is actively used by over 50 public safety organizations throughout Ohio, Indiana, and Kentucky to identify critical infrastructure during an emergency and perform powerful spatial analysis to improve the communication and situational awareness of emergency management staff responding to an incident. Ms. Scott managed the T&M application development team that built enhancements to the Flex based geoprocessing tools accessible from desktop browsers and commonly used by dispatchers and field staff from laptop computers. She also managed the development of over twenty custom geoprocessing tools that were originally desktop based then transferred to the mobile interface. This enabled the field staff to utilize the full capabilities of the desktop browser using tablets such as iPads, Google Nexus Tablets, and Microsoft Surface tablets.

TOM TRI, GISP, PE

Quality Assurance / Quality Control Lead

Mr. Tri is a civil engineer whose background is in water resources engineering, site design and construction. He has spent the last 20 years designing and implementing technology solutions including geodatabase design, customization of GIS software, developing optimized geoprocessing techniques and integration of GIS technology in civil engineering, environmental and water resource projects.

TECHNICAL COMPETENCY

Mr. Tri has served on many projects with this team as an advisor and for QA/QC tasks. He has created QA/QC methods to provide clients with quality deliverables. He has experience in a variety of GIS software including ArcGIS desktop, ArcGIS Server, ArcSDE, ArcInfo workstation, and ArcView 3. Software development experience includes Visual Basic, Python, C#, HTML, XML, web services, Avenue, AML, 'C', C++, Fortran, Pascal and others.

DESCRIPTION OF ROLE ON RELEVANT PROJECTS

City of Columbus, Department of Sewerage and Drainage (DOSD) | GIS Early Ditch Relief Sanitary Sewer System Inflow and Infiltration (I/I) Remediation Project*

The Early Ditch Infiltration and Inflow Remediation (SSES) project targeted over 100 miles of sewer in a primarily residential neighborhood built in the 1930s and 1940s where street, yard, and basement flooding, and sanitary sewer and manhole surcharges were prevalent. Mr. Tri's involvement focused on implementing a 3rd party Decision Tree Software which automated the identification, prioritization, and provided preliminary cost estimates of recommended remediation. This software integration required writing or modifying over 250 SQL expressions to analyze the raw PACP data and SWMM model output and automate the development of recommended remediation on sub-standard pipe segments. Mr. Tri also coordinated population of certain attributes using GIS techniques as well as data-scrubbing exercises to validate the raw data provided.

City of Newark, OH | Enterprise Utility GIS Services

Mr. Tri has been involved in this on-going, multi-year project as the city has implemented its GIS-based asset management program. His primary role has been in providing training & troubleshooting support regarding issues with the city's ArcSDE geodatabase. Tasks have included migration of data into the asset management data model, performance tuning, automation of data maintenance tasks, training on proper care and maintenance of an ArcSDE database, and working with developers to interface with the asset management geodatabase.

EDUCATION & CERTIFICATIONS

University of Louisville, MEng Civil Engineering, 1983

University of Louisville, BS Civil Engineering, 1982

Professional Engineer, KY

Land Surveyor in Training. KY

Certified Geographic Information Systems Professional GIS Certification Institute, 2007 (#00057344)

***Project performed at previous firm**

TOM TRI, GISP

City of Hilliard, OH | Enterprise GIS Services
Mr. Tri acted as the lead Database Designer for the migration from an AutoDesk Mapguide platform to Esri ArcGIS Server. This migration included customizing and implementing the Local Government Data Model (LGDM) to satisfy the requirements of all the departments within the City. Each dataset, internal and external was analyzed in terms of which fields should be migrated and what transformations were necessary to fit within the LGDM and which portions of the LGDM should be modified to fulfill the City's needs.

Louisville Metropolitan Sewer District | Countywide Flooding Mitigation Plan and GIS Analysis for Jefferson County, KY
Mr. Tri is serving as the principal engineer on a project to develop a countywide strategy for prioritization of mitigation opportunities for over 12,000 flood prone structures. Neighborhoods will be prioritized for mitigation opportunities based on multiple parameters including estimated annual damages, social/economic justice factors, number of repetitive and severe repetitive loss structures, available vacant properties. For the most highly prioritized neighborhoods, multiple mitigation options will be investigated and a preferred alternative recommended. Multiple automation procedures and tools were developed for the project that can be duplicated in communities across the nation. These mitigation projects will become part of future capital improvement projects for the client. Mr. Tri designed the geodatabase that housed all the data for the duration of the project and will be implemented by the client for ongoing flood mitigation activities. This project also categorized and populated key attributes for over 600 prior flood mitigation projects by reviewing and digitizing record drawings from the client's document management system.

Mr. Tri is also the lead in a project for MSD to populate certain attributes of property service connections (PSCs) based on the sewer main segment they were attached to. Louisville MSD staff was manually populating these values over a several year period. Mr. Tri designed an application to enable technicians to reduce the time spent in the process by a factor of five. Mr. Tri further supervised production staff and the quality control process in populating these attributes for over 85,000 PSCs.

FEMA Flood Risk Database (FRD), Nationwide
Mr. Tri was the technical lead on a database design that provides the schema by which all Risk MAP projects for FEMA will be delivered. The geodatabase schema integrates data from various engineering and economic analyses including HEC-HMS, HEC-RAS, and Hazus. The schema also provides the foundation of a future National Flood Risk Layer by FEMA. The database provides the data storage mechanism for all the products delivered for a flood risk project, including the Flood Risk Report (FRR) and Flood Risk Map (FRM). Mr. Tri was the primary author of Appendix O of the Guidelines and Standards for Flood Hazard Mapping Partners, which provides the specifications for the non-regulatory products delivered to FEMA for a flood risk project. His involvement as technical lead has also lead to him developing material and providing training for the non-Regulatory Products for FEMA. He has conducted webinars for the FEMA Regional Offices, developed and presented video-based training for Mapping Partner production teams, a webinar for FEMA's Cooperating Technical Partners (CTPs), and conducted a 4-day workshop for CTPs at FEMA's National Emergency Management Institute and developed and produced a series of webinars to distribute via FEMA's Risk Map University web site. Additions to the initial database and products design were made to accommodate flooding risks associated with dams, levees and coastal storms.

ELIZABETH EHRET, PE

Quality Assurance / Quality Control Support

Ms. Elizabeth Ehret has developed a strong reputation for providing quality services on public utility projects. She is known for taking ownership in her work and delivering a quality product to her clients. She is NASSCO certified and routinely coordinates and reviews sewer cleaning and assessment programs. For these projects, she works with clients to ensure the data collected is transmitted in a format suitable for smooth integration into the client's asset management software.

EDUCATION & CERTIFICATIONS

Bachelor of Science, Civil Engineering, Ohio State University, 2003
Professional Engineer, OH
NASSCO Pipeline Assessment Certification Program (PACP)

TECHNICAL COMPETENCY

Ms. Ehret's technical skills include Pipetech CCTV Software, ArcGIS and AutoCAD.

DESCRIPTION OF ROLE ON RELEVANT PROJECTS

City of Columbus, Division of Sewerage/Drainage, Columbus, OH | Cherry Street and Fourth Street Inflow Redirection

Ms. Ehret served as senior project engineer for this City of Columbus inflow redirection project. In this role, she assisted the project manager in coordinating the planning and design activities. During the data collection phase, Ms. Ehret coordinated the sewer cleaning and televising activities. She performed quality control review of the video records, and arranged delivery of the data collected to city staff in the PipeTech software. She also performed QA/QC on PAR and MSIUS forms used to update the City's GIS database. During planning and design, she worked with the client, as well as the Project Manager from Brown & Caldwell, who served as consultants for the adjacent project (Town & Fourth Inflow Redirection) to ensure the solutions proposed by both projects were complementary during this phase, she also coordinated with water resources engineers to screen potential green infrastructure practices for implementation on this project. As part of the Business Case Evaluation work, Ms. Ehret provided City staff with a project evaluation report on the existing sewers within the project area that was well received. During the design stage, Ms. Ehret worked with engineers and technicians to develop construction plans to modify the combined sewer regulator on Cherry Street to achieve the project goals. Throughout the project, she supervised public notification activities.

City of Columbus, Division of Sewerage/Drainage, Columbus, OH | Marion Road Area Neighborhood Improvements

Ms. Ehret coordinated subconsultants, reviewed and processed invoices, managed team responsible for creating Preliminary Design Report for an area of Columbus experiencing ponding after wet weather events. Approximately 8,800 LF of 6-12" sewer was cleaned and televised. Reviewed existing unmapped storm sewer data for correctness and inclusion into a GIS database. Made recommendations for area improvements based on CCTV results, field survey, field walks and sound engineering principles. Performed QA/QC on deliverables involving PipeTech database and PipeTech library files.

ERICK LOBAO, GISP

Assistant Project Manager / Data Conversion & Development / Staff Augmentation Lead

Mr. Lobao has over 13 years of experience with GIS projects ranging from data collection to application development for municipal clients, including the City of Columbus. His previous work with the City of Columbus and educational experience provide a background that is well rounded in essential GIS and project management skills. A strong project manager, Mr. Lobao has the technical understanding and communication skills to effectively manage each and every stage of a GIS data conversion project from the initial assessment of existing data sources to the final delivery of GIS features and attributes.

TECHNICAL COMPETENCY

A GIS Professional, Mr. Lobao has developed and focused his GIS skill set on data conversion and data development procedures, GIS quality control automation, general GIS integration, field data collection, and the development of custom desktop tools and mobile responsive web applications. Mr. Lobao's skills in business process analysis, GIS needs assessment, and project management have allowed him to work with clients to successfully apply his excellent technical skills to build solutions that meet a client's current needs and which are flexible to meet a client's future needs.

Mr. Lobao's software skills include: ArcGIS 9x, 10x, ArcGIS Server, ArcGIS Online, ModelBuilder, Python, UML CASE Tools, Microsoft Project, Microsoft SQL Server, Microsoft Azure, Amazon Cloud, database integration, web-based application design and development.

DESCRIPTION OF ROLE ON RELEVANT PROJECTS

City of Columbus, Department of Public Utilities (DPU) | GIS General Services Contract*

Valve Operations Procedures | Project Management, GIS Needs Assessment and Business Process Analysis. Mr. Lobao served as the Project Manager for the City of Columbus DPU Water Valve Operations Database. Mr. Lobao worked with engineering staff to produce a spatial database and associated work order history tables used to track valve operations throughout the City of Columbus. This work involved designing the database schema, developing the procedures to convert existing information and integrate it with the City's asset management system, and provide a draft cost estimate to complete the entire conversion project.
Smart ID Tool | Data Development & GIS Integration. Mr. Lobao served as the project manager and technical design lead for this project and worked closely with DPU staff to develop a python tool to populate a "smart ID" field on sewer mains and sewer manholes. The tool used a combination of geometric network logic and spatial analysis to populate each feature with a logical ID. For sewer manholes, the ID field is based off the atlas sheet where the feature is located, the type of structure

***Project performed at previous firm**

EDUCATION & CERTIFICATIONS

Ohio State University, MA Geography (GIS), 2003

Ohio Wesleyan University, BA Geography & Environmental Studies, 2000

Certified Geographic Information Systems Professional GIS Certification Institute, 2007 (#00050150)

Registered Esri Developer Network User (EDN)

ERICK LOBAO, GISP

(storm, sanitary, combined), and a unique four digit ascending number. For sewer mains, the upstream and downstream manhole IDs are combined to populate the sewer main ID. The tool accounted for main splits and newly created areas and rapidly populates a key piece of information which is time consuming and difficult for users to populate on their own.

Mock Hazard Assessment | Project Management & Business Process Analysis. Mr. Lobao served as the project manager for this project and assisted DPU staff in developing an initial plan to perform a GIS based hazard assessment and develop a set of GIS based hazard response tools. Mr. Lobao performed research and review of existing tools, techniques, and trends of hazard and threat analysis at the National level and developed an outline which documented the various components of a full hazard analysis plan. Additionally, Mr. Lobao worked with GIS analysts to develop a "mock" hazard assessment report which provided a tangible deliverable to DPU staff, allowing them to understand how these tools could be integrated into DPU at a larger scale in the future.

City of Columbus, Department of Public Utilities (DPU), Division of Power and Water (DOPW) | Electric GIS Conversion Project*

Project Management & Data Conversion. As the Assistant Project Manager and Data Support Lead Mr. Lobao facilitated the smooth communication and transfer of data to the City of Columbus to support as the ongoing data conversion effort. Mr. Lobao has served the role of database administrator for the project team, configuring the production database hardware running SQL server 2005 and ArcGIS Server 9.3.1 SP1 as well as implementing and configuring the Schneider Electric, ArcFM data model in a multi-user, versioned ArcSDE environment. Additional responsibilities include developing automated backup and maintenance procedures to deliver optimal database performance and enforce data integrity and data redundancy by implementing a backup plan. Subsequently Mr. Lobao played a strategic role in the development of the custom ArcFM data model for use by the City, as well as providing clear documentation to support transitioning the database to the City of Columbus repository.

City of Columbus, Department of Technology (DoT) | Fiber Optic Network Data Conversion Project

Project Management. As the project manager and Quality Control analyst Mr. Lobao plays an important role in this ongoing project with DoT. He facilitates the daily data conversion activities with T&M's internal team of GIS analysts, manages support and conversion work performed by a sub consultant, and is ultimately responsible for the quality of final deliverables provided to the City.

Data Conversion and Development. Mr. Lobao applied his technical skills to guide DoT staff through an extensive geodatabase design and development phase in prior to the formal data conversion phase. The purpose of this design and development phase is to create a customized geodatabase that extends the existing capabilities of Schneider Electric's ArcFM Fiber Optic data model to meet the needs of DoT fiber optic network staff. Mr. Lobao also led the creation of the data conversion procedures and worked with the Quality Assurance leader to develop an efficient and repeatable process to create highly complex fiber optic GIS features from the City's existing set of digital and non-digital source data. The conversion procedures are written with clear and easy to follow instructions to enable DoT staff to efficiently edit and maintain the ArcFM Fiber Optic geodatabase in the future.

City of Columbus, Department of Public Service (DPS) | Lucity Asset Management / Work Order Management Integration

GIS Integration and Business Process Analysis. Mr. Lobao served as the GIS support staff to DPS during the implementation of Lucity asset / work order management system. He took the lead on developing a street sign geodatabase schema to be integrated with the Lucity system. The data model for street signs was developed

***Project performed at previous firm**

ERICK LOBAO, GISP

by modifying Esri's local government data model to integrate with the City's existing street sign inventory and replacement process. Developing a clear understanding of the departments' operations was important as this knowledge helped inform the modifications to the street sign data model.

City of Columbus, Department of Public Service | Warrior Watch Application

Project Management & GIS Integration. Mr. Lobao served as the project manager, working closely with Department of Public Service operations staff and Department of Technology GIS staff to develop a web application to track snow operations vehicle activity, street sweeping, and mowing. Mr. Lobao performed a detailed review of the existing technology in place at the City to develop a solution which leveraged the City's existing investment in technology and which would be easily maintained in the future.

Application Development. Mr. Lobao also led the application development and design phase to build a web interface that enables DPS staff with little GIS experience to perform complex analysis and review of vehicle activity data. Specifically users can search for activity by street name, street maintenance zone, and via the map. Mr. Lobao worked with T&M application developers and City staff to create mockups and user interaction use cases to develop search and reporting tools that are easy to use.

City of Columbus, Department of Public Service | Bulk Refuse Routing

Business Process Analysis. Erick has managed, deployed, and developed applications that utilize a combination of Flex, ArcGIS Server geoprocessing services, Python, and Esri's ModelBuilder to support the City of Columbus's Department of Public Service Refuse Division in their daily effort of responding to an average of 300 daily bulk refuse pickup requests placed by City of Columbus citizens. Prior to these applications, city staff spent time each morning manually developing routes to pick up the bulk refuse across the city. This was due to network analysis capabilities being unavailable to users without considerable ArcMap training.

Project Management. As the Project Manager, Mr. Lobao was responsible for the overall quality of all deliverables. He worked closely with city staff to develop a robust set of requirements, documentation, and testing procedures for two different applications. The first application delivered utilized ModelBuilder and Python to provide an automated, server-side, routing solution that linked into the city's existing Business Objects reporting service. The results were several .PDF reports for the refuse collection staff with all bulk pickup requests in order of pickup sequence. The second application utilized a Flex-based web application and an Esri geoprocessing service to provide desktop quality network analysis tools to any user within the Columbus enterprise.

Middlesex County, New Jersey | Enterprise GIS

Business Process Analysis & GIS Integration. Mr. Lobao worked closely with the Middlesex County Parks Department to review their existing GIS layers and business processes used to maintain them. In their existing system, the tree inventory and tree inspection data were stored and maintained in different systems using different data formats. Mr. Lobao introduced an enterprise geodatabase schema which integrated the tree inventory and related tree inspection data. This integration also led to increased efficiency in the field as County staff is now able to build their tree inventory and perform field inspections using the same geodatabase schema in a single mobile device (Trimble Geo-XH).

City of Toledo, Public Service Dept., Information & Communications Department | Cityworks Mobile Service Request Application

Project Management, GIS Integration, and Business Process Analysis. As the project manager, Mr. Lobao reviewed the City's existing Cityworks Configuration and led a team of application developers to develop a mobile web application that allows public citizens to create a service request from their smart phones and tablets. The application takes advantage of the City's existing Cityworks configuration and presents a pick list of service request types for the public to select. Citizens can use their location to specify where the request is needed and they are able to upload a picture to include with the service request. Mr. Lobao played an im-

ERICK LOBAO, GISP

portant role in documenting the existing Cityworks configuration and working with City GIS staff to develop the application requirements.

City of New Albany, OH | Utility Geodatabase Creation and Cityworks Implementation
GIS Integration & Business Process Analysis. Mr. Lobao worked with the City Public Service staff to implement and maintain a spatial data infrastructure (SDI) which supports the enterprise needs of the organization field crews and utility managers. By performing interviews with staff from multiple City departments, Mr. Lobao was able to create an enterprise GIS "from the ground up" involving data conversion from multiple sources to support the needs of multiple departments throughout the enterprise. This involved data conversion as well as extensive software and hardware configuration on desktop and server hardware. He assessed the daily workflow of the City staff in order to develop an internal maintenance plan for the City's Utility GIS. Mr. Lobao also integrated the City utility database to support their asset management system.

City of Powell, OH | Enterprise Utility GIS Services
Project Management and Application Development. Mr. Lobao worked closely with City Engineering staff and the IT manager to develop an enterprise GIS to manage stormwater utility information and support future implementation of an asset management system. An extensive business analysis and systems integration phase was performed to identify existing hardware, software, and datasets which could be utilized or enhanced by integrating them with the enterprise GIS and other database applications. Existing CAD files, scanned as-built drawings, field survey, and mobile GIS video data capture were used to populate a Geodatabase with City maintained utilities and infrastructure.

City of Newark, OH | Combined Sewer Overflow Site
Project Management. Mr. Lobao served as the project manager for T&M responsible for the overall design, quality and performance of a Flex-based web application. He designed the application to organize and display pertinent documentation required for EPA Phase II requirements. This single application reduces the time spent by Newark staff providing information to the EPA as the required information is continually available and up-to-date.
Application Development. Mr. Lobao led the development of customized search tools that were developed based on input from the client. These tools enable users to quickly organize large amounts of data in a data table and export the information for further processing and analysis offline. He developed a ModelBuilder tool to perform a quality check on CSO event data before submission to the enterprise geodatabase, increasing the overall accuracy and quality of the data published to the public.

Ohio-Kentucky-Indiana Regional Council of Governments (OKI)/Hamilton County, OH | Regional Asset Verification & Emergency Network (RAVEN 911), Desktop and Mobile Web Application Development
Project Management and Application Development. Mr. Lobao led the mobile application design phase of the project and successfully transferred the user interface and user experience of over twenty custom geoprocessing tasks to the mobile interface. The design phase consisted of an extensive review of other existing mobile GIS applications and a review of the existing Flex-based application. With such a large number of geoprocessing tools and data layers to visualize it was important to develop a common user experience to keep the application simple and easy to use for people with limited experience with GIS and tablets. The mobile version of the application provides field staff to utilize the full capabilities of the existing desktop application using a variety of tablets such as iPads, Android Tablets, and Microsoft Surface / Windows tablets.

JESSE GLASCOCK, GISP

Application Development Lead

Mr. Glascock has 12 years of experience developing applications both for desktop and web-based analysis. This includes developing automated GIS processes using model builder as well as sophisticated web tools using various programming languages. Mr. Glascock specializes in web application development as well as creating relational and spatial database systems which support mapping projects, capital improvement projects, and asset management. He has worked and led in a team environment developing research methods to determine the accuracy and precision of data developed in the public record and with the firm.

TECHNICAL COMPETENCY

Mr. Glascock has excellent application development and leadership skills that include directing internal staff on projects as well as assisting clients with incorporating workflows, user interfaces, and developing configurable applications with future interests and technologies in mind.
His software skills include: ArcGIS 9x, ArcGIS 10x, ArcGIS Server, ArcSDE, ArcGIS Server Flex API, ArcGIS Server JavaScript API, HTML5, ASP.NET, C#, Visual Basic, jQuery, JavaScript, ModelBuilder, Python, Oracle, SQL Server 2005, Microsoft Office, Access, Amazon Cloud Technology, VMware.

DESCRIPTION OF ROLE ON RELEVANT PROJECTS

City of Columbus, OH, Department of Public Utilities (DPU), Department of Public Service (DPS) – Capital Improvement Project (CIP) Web Based Application*

GIS Needs Assessment and Business Process Analysis. Mr. Glascock's responsibilities for this project included coordination between client and other consultants to provide the intranet mapping component of an existing web-based project management portal. The website consumes web services from the portal and combines the attributes with GIS polygons of projects. This application provides City project managers with a common operating picture of all current, planned, and funded capital improvement projects. The integration of Flex web mapping with the existing JavaScript project management portal required a deep understanding and knowledge of Esri web APIs (JavaScript and Flex).
Application Development. Mr. Glascock developed various tools which allow users to search by project manager, department, division, or by a geographical area such as planning commissions or neighborhoods. Additionally, those tools provide the ability to filter results by various attributes as well as providing a robust conflict detection tool which utilizes a geoprocessing service to identify overlapping project polygons with different project managers. Prior to this application, project managers within the City did not have common access to a map of capital improvement projects. This lack of information led to inefficient planning cycles where multiple projects from different organizations would be planned for the same location in consecutive years.

***Project performed at previous firm**

EDUCATION & CERTIFICATIONS

University of Cincinnati, IT Certificate in Software Development and Database Management, 2009
Ohio State University, MS Civil and Environmental Engineering and Geodetic Science and Surveying, 2005
Ohio University, BS Geography, 2003
Certified Geographic Information Systems Professional GIS Certification Institute, 2008 (#59468)

JESSE GLASCOCK, GISP

Mr. Glascock also developed, published, and configured a feature data service to store and manage the project polygons displayed by the application. An accompanying model builder tool was developed to assist desktop users responsible for creating complex project polygons related to the capital improvement projects.

City of Columbus, OH, Department of Public Service (DPS) | Warrior Watch

Project Management and Application Development. Mr. Glascock led the development team in the creation of a web application capable of consuming the City's newly purchased ArcGIS GeoEvent Processor which handles and formats GPS messages and signals coming from City service vehicles. The application allows City dispatchers to locate and track City snow plow vehicles as well as query historical locations of the vehicles for specified periods in time. Additionally the application provides users the ability to generate custom reports for Customer Service Requests, Truck Activity, and Outpost and/or Zone Completion reports.
Upon completion of the project Mr. Glascock and the development team added in additional functionality that monitors and reports on the City's street sweeper and mower vehicles.

City of Columbus, Department of Public Service | Bulk Refuse Routing

Project Management and Application Development. Mr. Glascock led the development of an application to provide the City with address validation and for routing a variable number of trucks for bulk trash pickup. The application allows users to upload a Microsoft Excel template with addresses, time windows, service times, quantities, and route names. The application then organizes the pickup locations by route. The user is then prompted to set start and end depots and renewal locations for each route. The application then utilizes ArcGIS Server's Network Analyst to generate the most cost-effective routes. The resulting data provides the user with a spreadsheet with a breakdown by route and the order the pickups should be run. Users also have the option to download the directions of the routes for additional guidance.

Ohio-Kentucky-Indiana Regional Council of Governments (OKI)/Hamilton County, OH | Regional Asset Verification & Emergency Network (RAVEN 911), Desktop and Mobile Web Application Development

Project Management and Application Development. Mr. Glascock served as the lead for the development team tasked with upgrading existing tools and creation of new tools for the existing Raven911 application for Hamilton County Emergency Management Application, Raven911. Upgrades included revising the Twitter Widget to allow for more dynamic hyper linking, updating for new Twitter authentication procedures, and user interface upgrades as well as upgrading the existing Emergency Response Guide (ERG) widget with updated ERG 2014 guidebook standards. Mr. Glascock also led the development of a widget to estimate walk and run distances based on elevation, slope, tree cover, existence of water bodies, and landuse, age of person, and time lapsed. The underlying service was designed using ArcGIS Model Builder and Spatial and Raster Analysis. Users can estimate walk and run distance polygons by inputting the last known location a missing person/criminal as well as the time elapsed since the last known location and age of the person.
GIS Integration. Mr. Glascock led the development of a sophisticated geoproccessing tool to estimate walk and run distance polygons by inputting the last known location a missing person/criminal as well as the time elapsed since the last known location and age of the person. He led the development of a mobile website that incorporated the current, updated and new functionality of the desktop Flex Raven911 site. The site includes all the functionality of the Flex Desktop site as well as enhancements and updates including the ability to email tools results to other users and located the user's location on the map.

City of Hilliard, OH | Enterprise GIS Services

GIS Integration and Application Development. Mr. Glascock assisted with the development of the City's migration from CAD to Esri's Local Government Data Model (LGDM) as well as led the development of an online parcel and utility viewer using the local government template. http://maps.hilliardohio.gov/gisviewer/

JESSE GLASCOCK, GISP

Currently Mr. Glascock is leading the development of enhancements to the parcel utility viewer with the addition of an aerial basemap blender, right-of-way editing tool, and City-hosted aerial and basemap cached services. Mr. Glascock and the development team are also creating a landing page and configuring the application to display different data based on a user's choice from the landing page.

City of Dublin, OH | Dubscovery and Story Map Web Application Development
Project Management and Application Development. Mr. Glascock served as the lead programmer responsible for the development of several tools for the city's upgrade to Esri's Sample Flex Viewer called Dubscovery. Mr. Glascock programmed these tools using Adobe's Flex environment and delivered widgets for querying and filtering layers and addresses, report generation for addresses and proximity, printing to PDF, URL parameter generation for graphics and emailing, RSS feeds, and exporting results to Excel. The Sample Flex Viewer was also modified and styled to the city's specification in order to uniquely brand the site.
Serving as the lead programmer, Mr. Glascock developed a web mapping application using the JavaScript API enabling City staff to access enterprise GIS information from mobile browsers (iOS & Android). Accessing this application via mobile devices truly expanded the use of GIS web mapping applications throughout the City of Dublin as users were able to review and share this application with others while away from their desktop browsers.

Middlesex County, NJ | Enterprise GIS Services
GIS Integration and Data Conversion and Development. Mr. Glascock and team led the transition of the county's disparate datasets into a standardized and enhanced database stored in SDE to allow the different departments in the County access to up-to-date information. The database was designed with Lucity's schema but enhanced to better fit the County's needs. This provides the County with a roadmap for asset management utilities in the future while addressing immediate needs of data access and dissemination. Data was originally stored in a variety of sources including GPS, Excel, CAD, shapefile, and text files. Mr. Glascock and team worked diligently to create, generate, update, and compile the data in the County's new SDE server.
GIS Integration and Application Development. Mr. Glascock has also developed several applications to assist City staff with tree inspections, utility viewing, and park information.

The Ohio Department of Transportation (ODOT) | Transportation Information Management System (TIMS)
GIS Integration and Application Development.
One of the biggest challenges with transportation data is organizing, analyzing and disseminating spatial information both internally and externally. T&M developed an ArcGIS Server, web-based, Flex application, TIMS, that acts as a data repository and contains sophisticated spatial analysis tools. Mr. Glascock was the lead application developer for this project. He worked with the Project Manager and the ODOT staff to design custom tools for sophisticated transportation analysis. Mr. Glascock led the development of sophisticated geoproccessing tools such dynamic segmentation (on-the-fly) and log point reverse geocoding. This functionality enabled users to view data through user uploads and map services to perform analysis using ODOT's linear referencing system.

State of Ohio Emergency Management Agency (Ohio EMA) | State Hazard Analysis Resource Planning Portal (SHARPP)*
GIS Integration and Application Development. Mr. Glascock served as the lead application developer for the internet-based State Hazard Analysis Resource Planning Portal (SHARPP). This portal includes a comprehensive hazard mitigation management system that effectively organizes mitigation planning documents, project information, and risk assessment and mitigation actions. Mr. Glascock created an interactive Google mapping component which allows users to geospatially assign projects, mitigation action items and document locations by address, lat/long or manually placing location point(s) upon a Google map utilizing the spatial components

JESSE GLASCOCK, GISP

of SQL Server 2008 R2.

GIS Needs Assessment and Business Process Analysis. Mr. Glascock worked closely with the project team in a variety of development meetings with the Ohio EMA staff. He designed and developed the web portal application in Microsoft Visual Studio 2008 (ASP.NET) with C# code-behind utilizing the .NET Framework 3.5. The website was developed utilizing IIS 7.0 with SQL Server 2008 R2 utilized on a database server. Mr. Glascock developed the web portal application in a three-tiered environment to ensure that performance and security standards are met. This included a public facing and internal site. The user interface was programmed utilizing ASP.NET's design editor. The business logic occurred in the database's scripted stored procedures. Data access also occurred through stored procedures scripted in the SQL Server database.

City of Newark, OH | Enterprise Utility GIS Services

GIS Integration and Application Development. Mr. Glascock served as the lead application developer for geoAsset, a GIS web application linking ArcGIS Server to the city's workorder management software (Lucity). He has led the development throughout multiple platforms so that the city can perform asset management functions with the latest GIS technology, including mobile. His understanding of water, sanitary and storm infrastructure allowed him to efficiently develop the application. Currently, the geoAsset application is being upgraded to utilize the new GIS web technology utilizing the ArcGIS API for JavaScript. Since the application was developed with a scalable approach, the tools can be easily transferred to the new technology.

City of Newark, OH | Service Request Routing Application

GIS Integration and Application Development. Mr. Glascock served as the lead programmer to develop a custom routing application using Esri Network Analyst (ArcGIS Server) that automatically retrieves the addresses from the customer service billing database and dynamically routes the service requests. He created the routes to be automatically divided into 2 service areas so that the field crews can easily divide the services requests for more efficiency. Mr. Glascock created custom scripts to pull specific information from the database to create custom directions with details of the service request, an efficient route map, and estimated time frames so that customer service representatives can give an approximate time to citizens. He also developed a desktop application using Esri Network Analyst that allows the Newark staff to add multiple services areas to account for multiple workers. This application allows the City to generate route information through automatic SQL server procedures retrieving address information from the customer billing database.

***Project performed at previous firm**

JON WOYAME

Application Development Support

Mr. Woyame is a skilled application developer with several years of professional experience while attending college as well as interning at the Ohio Department of Transportation (ODOT). Mr. Woyame has a broad set of skills in data collection and conversion for transportation infrastructure as well as geodatabase creation and application development. He has worked at T&M for over a year developing robust GIS applications for numerous municipal and state clients.

EDUCATION & CERTIFICATIONS

University of Toledo, BS Electrical Engineering & Computer Science, 2010

Member, Ohio Chapter of URISA

TECHNICAL COMPETENCY

Mr. Woyame's software skills include: ArcGIS 9x, ArcGIS 10x, ArcGIS Server, ArcSDE, ArcGIS Server JavaScript, AJAX patterns, Mobile Web, Esri platform + API, C, C++, x86 Assembly ,Coordinate systems, spatial databases, Amazon Cloud (VMware).

DESCRIPTION OF ROLE ON RELEVANT PROJECTS

City of Columbus, OH, Department of Public Service (DPS) | Warrior Watch

Application Development. Mr. Woyame supported the development of the creation of a web application capable of consuming the City's ArcGIS GeoEvent Processor which handles and formats GPS messages and signals coming from City service vehicles. The application allows City dispatchers to locate and track City snow plow vehicles as well as query historical locations of the vehicles for specified periods in time. Additionally the application provides users the ability to generate custom reports for Customer Service Requests, Truck Activity, and Outpost and/or Zone Completion reports.

City of Toledo, Public Service Department, Information and Communications Department | Cityworks Mobile Service Request Application

Application Development. Mr. Woyame led the development of a web application for the City to allow the public to submit and view service requests. The application integrates with the City's Cityworks API to display and add service requests as well as attach photos and search on current and past service request. Additionally Mr. Woyame assisted the City with server and security configuration as well as providing them with onsite training and maintenance.

City of Hilliard, OH | Enterprise GIS Services

GIS Integration and Application Development. Mr. Woyame assisted with the development of an online parcel and utility viewer using the local government template. http://maps.hilliardohio.gov/gisviewer/ Currently Mr. Woyame is developing enhancements to the parcel utility viewer with the addition of an aerial basemap blender, right-of-way editing tool, and City-hosted aerial and basemap cached services. Mr. Woyame is also creating a landing page and configuring the application to display different data based on a user's choice from the landing page.

JON WOYAME

Ohio-Kentucky-Indiana Regional Council of Governments (OKI)/Hamilton County, OH | Regional Asset Verification & Emergency Network (RAVEN 911), Desktop and Mobile Web Application Development

Application Development. Mr. Woyame served as the assistant application developer for the migration of an existing Flex web application to a JavaScript mobile website. The site includes all the functionality of the Flex Desktop site as well as enhancements and updates including the ability to email tools results to other users and located the user's location on the map. Tools included a Twitter Widget to allow for more dynamic hyper linking, updating for new Twitter authentication procedures, and user interface upgrades as well as upgrading the existing Emergency Response Guide (ERG) widget with updated ERG 2014 guidebook standards. Several geoprocessing tools were included such as a tool that estimates walk and run distances based on elevation, slope, tree cover, existence of water bodies, landuse, age of person, and time lapsed. The underlying service was designed using ArcGIS Model Builder and Spatial and Raster Analysis. Users can estimate walk and run distance polygons by inputting the last known location a missing person/criminal as well as the time elapsed since the last known location and age of the person.

Middlesex County, NJ | Enterprise GIS Services

Application Development. Mr. Woyame developed several applications to assist City staff with tree inspections, utility viewing, and park information. Mr. Woyame enhanced the applications to provide a better user experience, interface, and mobile responsive framework.

City of Newark, OH – Enterprise Utility GIS Services

GIS Integration and Application Development. Currently, Mr. Woyame is developing the next version of the geoAsset application to incorporate new GIS web technology utilizing the ArcGIS API for JavaScript. He will incorporate existing functionality such as Lucity asset management integration, water quality complaint and email automation, service order routing, querying, and printing.

The Ohio Department of Transportation (ODOT) | eBook Conversion and Mobile Website

Application Development. Mr. Woyame assisted with the conversion process of ODOT's Construction and Material Specifications and Manual of Procedures into eBook formats consumable by mobile devices. Additionally he developed a responsive website for ODOT's Construction Reference Resource Center that is readable in desktop, tablet, and mobile friendly devices. Mr. Woyame developed the site in such a way that menus and actions are rendered specifically for each size device.

Various Projects | The Ohio Department of Transportation (ODOT)*

Application Development. As the lead GIS analyst, Mr. Woyame developed a web-based application using Esri's SliverLight API which provides the ability to virtually drive roads and collect information on street assets such as signs, guardrails, bridges, lights, pavement markings, etc.. This application connects to multiple ArcGIS server web services and uses complex, original mathematical projections allowing users to click on an individual image and capture highly accurate x,y information from image. This application received national recognition as a Federal Highway Administration best practice and the code has been requested for use by other State transportation agencies.

***Project performed when Jon was employed at ODOT**

MATT SHADE, GISP

Application Development

Mr. Shade has over 12 years of professional experience in GIS including utility asset management projects of all scales. He has implemented geodatabase data models including the Esri Local Government Model and SDSFIE. He has led application development, GIS integration and staff augmentation efforts with much success by understanding the needs of utilities and working seamlessly with the client. He has extensive experience developing enterprise geodatabases, populating attributes, and creating maps using Esri products.

EDUCATION & CERTIFICATIONS

BS, Ohio State University, Geography (GIS), 2004

Certified Geographic Information Systems Professional #64661, GIS Certification Institute, 2011

Esri Certified ArcGIS Desktop Professional 10.1 #D9KRVX41KN41Y22S, Esri, 2012

TECHNICAL COMPETENCY

Mr. Shade has an excellent record in developing enterprise geodatabases through the implementation of data models. Mr. Shade is committed to ensuring quality through developing processes and verification procedures for attribute accuracy. He is an expert in creating map visualizations and publishing them in any format from paper to interactive web applications.

His software skills include: ArcGIS 9.x, ArcGIS 10.x, ArcGIS Server, ArcSDE, ModelBuilder, 3D Analyst, Spatial Analyst, Network Analyst, geodatabase creation (topology, geometric networks, domains, relationship classes, parcel fabric), Google Earth Enterprise, MapGuide Open Source, Manifold, AutoCAD, Microsoft Office including Access, data integration, and web development.

DESCRIPTION OF ROLE ON RELEVANT PROJECTS

Vectren ECM-Esri Integration

Mobile Solution Deployment. The purpose of this project is to provide the users with the ability to retrieve the most current information from OnBase Enterprise Content Management software and improve the operational efficiencies by leveraging existing Esri GIS Environment. Mr. Shade is responsible for deploying a disconnected solution for accessing records stored in OnBase in the field through ArcFM on the ArcGIS platform.

Seminole County Florida Environmental Services Department (SCES) | Capital Improvement Program

Staff Augmentation and Data Conversion. Mr. Shade was the on-site lead for GIS staff augmentation for SCES. Challenges included an undocumented transformation in geographic projection that had been implemented along with imprecise modifications over time to existing GIS data. As part of the program, a reclaimed wastewater distribution system was installed in an existing residential area and was included in the GIS. Mr. Shade and his team worked seamlessly with departmental engineers, GIS staff, and utility inspectors who provided institutional knowledge and GPS data to successfully update and transform the GIS data.

MATT SHADE, GISP

Ohio EPA | Closed Landfill Remediation Projects*

Website and SharePoint Administration. Using the DotNetNuke CMS, Mr. Shade maintained and designed websites for public use for the Division of Materials and Waste Management (DMWM). He standardized fonts and design elements to Agency standards on existing pages, and created pages adhering to design standards. He developed a clickable image map using HTML for the public to find more information on pharmaceutical waste collection locations and solid waste management district contacts. Mr. Shade also designed and implemented collaboration sites on SharePoint for internal and external use according to Agency and Division governance standards. Using user requirements he had gathered, he designed libraries, lists, calendars, web parts, permission groups, and other framework for each teams' needs. Mr. Shade was a key team member in the planning and implementation of SharePoint site reorganization with in DMWM requiring the migration and consolidation of dozens of previously implemented sites.

City of Dublin, OH | GIS SDE Services*

ArcSDE Migration and GIS Data Development. Mr. Shade assisted City GIS staff by redesigning a geodatabase before migrating to a new ArcSDE geodatabase. He also digitized City maintained parking lots. Additionally he performed QC and converted City GIS data to Ohio's LBRS standards to be hosted on a regional level.

Franklin County | Ohio Board of Elections*

GIS Data Modernization and Map Series Development. Mr. Shade used historical paper-based precinct maps, Franklin County Auditor's MetaMap real estate mapping software, and an out-of-date Esri ArcView 3.1-based elections mapping toolkit that utilized US Census Bureau TIGER data to migrate to a state-of-the-art GIS running ArcGIS 10. He corrected topology errors in precinct data and edge matched it to the best available county parcel, roadway, and imagery and updated attributes for each district assignment. He generated polygons for legislative, school, and other districts for public records requests.

Technician Route Planning. Mr. Shade developed a Python script to perform analysis using the ArcGIS Network Analyst extension to determine routes for over twenty voting machine support technician teams and approximately seventy precinct supply roving support staff. The goal of this project was to allocate support staff evenly across the county by balancing workload and drive times. The script output a map series that could be distributed to technicians and an overview map used by office staff to dispatch calls that were placed to the troubleshooting telephone hotline.

Ohio Chapter of URISA | Website Creation

Website Migration and Design. Migrated website content and data stored in the Joomla CMS to Drupal CMS to take advantage of more module development activity and a larger support community. He redesigned how website content was organized and created new content. He customized the site to the organization's needs including support for RSS feeds, web enabled forms, member surveys and integration with Google Calendar.

Web-Based CRM Implementation. Mr. Shade installed CiviCRM, which is an open source package for non-profit organizations, onto the Chapter's web hosting system. He implemented the system so Chapter officers and other authorized persons can log into the website using their Drupal credentials to retrieve and manage member information. Email campaigns, membership payments, and registration for workshops and conferences, which were either hosted on separate systems in the past, are now integrated with membership records thanks to Mr. Shade's successful implementation and integration.

***Project performed at previous firm**

CHAD SNOW, PS

Field Data Collection Lead

Mr. Snow's surveying experience is diverse, including construction layout, topographical surveys, residential and rural boundary surveys, easements and right of way.

TECHNICAL COMPETENCY

Mr. Snow is skilled in a variety of field survey types, including topographic, boundary, and ALTA/ASCM property surveys. He is also trained and experienced in the use of GPS surveying technology.

DESCRIPTION OF ROLE ON RELEVANT PROJECTS

Franklin-Main Interceptor Sewer Rehabilitation, Segments 2 and 3, City of Columbus, Division of Sewerage/Drainage, Columbus, OH

Mr. Snow established project control, topographic and boundary surveys, and set permanent monuments for project the rehabilitation of the Franklin-Main Interceptor Sewer, Segments 2 and 3. Section 2 consisted of approximately 3,500 linear feet of 24-inch VCP (vitrified clay pipe) and 18 manholes. Section 3 consisted of approximately 2,200 linear feet of 24-inch VCP and eight manholes.

Downtown Small Diameter Sanitary Sewer Improvements, City of Columbus, Division of Sewerage/Drainage, Columbus, OH

The project sewers consisted of approximately 85 linear feet of 8-inch, 735 linear feet of 12 and 15-inch sewer, 350 linear feet of 18-inch sewer, and 90 linear feet of 48-inch gravity sewer. Mr. Snow used GPS to set various baselines throughout Columbus for purpose of establishing state plane coordinates and NAVD 88 DATUM on sanitary system, as well as getting elevation of flow lines of sanitary system.

Cherry Street and Fourth Street Inflow Redirection, City of Columbus, Division of Sewerage/Drainage, Columbus, OH

As part of a Wet Weather Management Plan to redirect the inflow of stormwater into the combined sewers and sanitary sewers in the area around the intersections of Cherry and 4th Street, Mr. Snow performed a utility survey. He also wrote two sections for the Design Report and directed field survey crews.

EDUCATION & CERTIFICATIONS

Bachelor of Science, Surveying and Mapping - Metropolitan State College of Denver, 2009

Professional Land Surveyor, OH

ALAN BUCK AND CHRISTIAN ANZUINI

Field Data Collection Support

Mr. Buck and Mr. Anzuini are experienced in field surveying services, both as survey crew members and as field technicians. They are regularly called upon to perform surveying and mapping tasks, including boundary and topographic surveys, construction layout, and easements.

TECHNICAL COMPETENCY

They are experienced with GPS (Global Positioning System) equipment with Total Station Theodolites and electronic data collection for all in-field activities.

DESCRIPTION OF ROLE ON RELEVANT PROJECTS

Cherry Street and Fourth Street Inflow Redirection, City of Columbus, Division of Sewerage/Drainage, Columbus, OH
As part of a Wet Weather Management Plan to redirect the inflow of stormwater into the combined sewers and sanitary sewers in the area around the intersections of Cherry and 4th Street and Town and 4th Street, Mr. Buck performed topographic, utility and boundary survey to create the project base map. He also served as field inspector for cleaning and televising of sanitary sewer lines within project limits.

Marion Road Area Neighborhood Improvements, City of Columbus, Division of Sewerage/Drainage, Columbus, OH
Utilized Trimble GNSS and Robotic Total Station with Ohio State Plane Coordinates to create a topographic map of the area, including pipe connections and depth of all structures in the area.

Franklin-Main Interceptor Sewer Rehabilitation, Segments 4 and 5, City of Columbus, Division of Sewerage/Drainage, Columbus, OH
As surveyor, performed topographic, utility and boundary survey to createa project base map for the rehabilitation of approximately 3,400 feet of the Franklin-Main Interceptor Sewer, Parts 4 and 5. Served as field inspector for televising and cleaning of sanitary sewer lines within project limits.

Morse Road 36-inch Waterline, City of Columbus, Dept. of Public Utilities, Columbus, OH
As surveyor and survey technician, performed topographic, utility and boundary survey to create project base map for design.

Rehabilitation of Franklin No. 1 Sewer, City of Columbus, Division of Sewerage/Drainage, Columbus, OH
As surveyor and survey technician, performed topographic, utility and boundary survey to create project base map for design. Set site benchmarks and control. Inspector for televising and cleaning of sanitary sewer.

EDUCATION & CERTIFICATIONS (ALAN BUCK)

Bachelor of Science, Environmental Geography, Ohio State University, 1998

EDUCATION & CERTIFICATIONS (CHRISTIAN ANZUINI)

Bachelor of Science, Civil Engineering, Ohio State University, June 2015

CODY GIERHART

GIS Analyst Support

Mr. Gierhart is a detail-oriented GIS analyst with experience performing GIS data conversion, GIS analysis, GIS data collection.

EDUCATION & CERTIFICATIONS

Ohio University, BS Geography, 2012

TECHNICAL COMPETENCY

Mr. Gierhart s' software skills include: ArcGIS 10x, AutoCAD Civil 3D, Microstation, QGIS, Model Builder, Schneider Electric ArcFM, Adobe Illustrator, Microsoft Office (Access, Word, Excel, PowerPoint, etc.).

DESCRIPTION OF ROLE ON RELEVANT PROJECTS

City of Columbus, Department of Technology (DoT) | Fiber Optic Network Data Conversion Project

Data Conversion. Mr. Gierhart is the lead GIS analyst on for this project and has worked closely with the project manager and City of Columbus GIS staff to develop and implement a detailed set of conversion procedures to populate an ArcFM data model for Fiber. Mr. Gierhart's attention to detail is important for this type of data conversion project, where a variety of existing data sources (digital and non-digital) must be reviewed during the data conversion process. Specifically, the City utilizes a combination of an Esri geodatabase, Microsoft Access, Microsoft Excel, AutoCAD, Microsoft Word, and images to track and document the fiber optic network infrastructure maintained by the City. Mr. Gierhart developed and implemented the data conversion procedures and leads T&M staff performing data conversion.

Middlesex County, New Jersey | Capital Improvement Project GIS

GIS Integration and Data Conversion. Mr. Gierhart successfully converted Excel and existing shapefiles into a geodatabase model for capital improvement projects (CIP). This consisted of creating domains and other geodatabase characteristics so that a CIP project portal could be created from the data. His understanding of both geodatabase technology and engineering applications enabled him to perform these tasks very efficiently using ArcGIS Desktop tools.

Louisville Metropolitan Sewer District | Countywide Flooding Mitigation Plan and GIS Analysis for Jefferson County, KY

Data Conversion. Mr. Gierhart supported the development of a flood mitigation inventory which reviewed at risk structures using a combination of FEMA flood hazard information and google street view. Mr. Gierhart reviewed individual address points in ArcMap and updated these points with structure information interpreted from Google street view data. By tracking the structure height (number of stories above ground) and whether or not the structure has a basement, Louisville MSD will be able to model the risk and potential impact of a flooding event that impacts these structures.

MICHAEL OPRITZA, EIT

Engineer / GIS Analyst Support

Mr. Opritza recently joined T&M Associates as an entry level engineer and has 2 years of professional experience. He has experience as an intern for an engineering firm that includes: engineering modeling, AutoCAD design and GIS integration. He applies his combination of Engineering and GIS experience by assisting the T&M team with GIS data conversion of utility infrastructure and performing field data collection for environmental remediation projects.

EDUCATION & CERTIFICATIONS

Ohio State University, BS Civil & Environmental Engineering, 2013

TECHNICAL COMPETENCY

Mr. Opritza's software skills include: ArcGIS 10x, AutoCAD, Autodesk, Microsoft Office (Access, PowerPoint, Excel, Outlook, and Word).

DESCRIPTION OF ROLE ON RELEVANT PROJECTS

City of Columbus, Department of Technology (DoT) | Fiber Optic Network Data Conversion Project

Data Conversion Development. Mr. Opritza performed GIS data conversion tasks generating complex fiber optic GIS datasets using Schneider Electric's ArcFM fiber data model. This process required detailed review of existing digital and non-digital data sources to determine which data sources were suitable for conversion and extraction. After determining the quality of the source data to be converted, Mr. Opritza utilized ArcMap to populate the fiber optic network feature classes (cables, patch locations, device points, etc.). The fiber optic data model relies on extensive use of relationship classes and geometric networks to accurately model the complex network distributed throughout the City of Columbus. Mr. Opritza assisted the general data organization of the project as well by scanning over 450 of the City's existing paper maps which depict fiber optic cable placements and underground conduit configuration.

City of Medina, OH, U.S. EPA | Brownfields Assessment Grant Implementation

Field Data Collection. Mr. Opritza provided assistance with Phase I and II Environmental Property Assessments that included pre-field activities, data entry, sampling and reporting. He used tools such as AutoCAD and Excel to create and merge data for EPA reports.

Grenada, MS, Meritor, Inc. | Environmental Analysis

Field Data Collection. Mr. Opritza worked on data management and analysis for a field investigation at a RCRA site in Grenada, MS. The data were collected using a Waterloo Profiler to identify the vertical and horizontal extant of a chlorinated solvent plume that flows beneath a residential area. He tabulated and organized the data to identify the plume hot spots and better define the source area(s) for the plume. He also participated in the decision process for locations needed to fully define the plume and its source.

BILL FOSTER, EI, SI AND CINDY JACOBSEN

GIS Analyst and Utility Manager Support

TECHNICAL COMPETENCY

Mr. Fosters' software skills include: ArcGIS 10x, AutoCAD Civil 3D. Ms. Jacobsen is a certified professional geologist with municipal experience including complex sewer infrastructure studies and large-scale community interaction programs.

DESCRIPTION OF ROLE ON RELEVANT PROJECTS

City of Elyria, OH | Remedial Design/Remedial Action Project

Field Data Collection and Data Conversion. Mr. Foster acted as the field engineer and CAD specialist for this project. He prepared the bid documents, technical specifications, and construction drawings for the construction of a steep slope soil buttress from the river plain to the crest and installation of a 1976 Ohio EPA-compliant final cover system at a former landfill site. He carefully integrated survey data into AutoCAD Civil 3D in order to create detailed as-built record drawings that were approved by the USEPA.

City of Fremont, OH | Fremont Raw Water Reservoir CQA

Field Data Collection and Data Conversion. Mr. Foster acted as the field engineer and CAD lead for this project that included installation of 94 acres of geo-synthetic clay liner (GCL), 40-mil linear low-density polyethylene (LLDPE) geo-membrane, and geotextile. He also integrated survey data into AutoCAD Civil 3D in order to create as-built record drawings for approval by the Ohio Department of Natural Resources (ODNR).

Infiltration and Inflow (I/I) Remediation Projects, City of Columbus, OH.

Ms. Jacobsen acted as the Community Relations Coordinator responsible for public interaction, press coordination and liaison with area commissioners and other elected officials for the Clintonville and Walhalla sanitary sewer system infiltration/inflow remediation projects in the Columbus area. These projects involved a high degree of client interaction, resident interaction, and task management. Responsibilities included developing a questionnaire that was mailed to all residents and businesses in the project area to aid in identifying potential sources of inflow, compiling the questionnaire responses and drawing conclusions, coordinating a mass mailing to all residents and businesses, answering all calls to the project "hotline" telephone, providing one-on-one assistance, upon request, to elderly and disabled residents, obtaining street occupancy permits and updating a project-specific bulletin board at the community center. Responsibilities also included development of the project data management system utilizing ArcView as the display mechanism.

EDUCATION & CERTIFICATIONS (BILL FOSTER)

Ohio State University, BS Civil & Environmental Engineering, 2001

Engineering Intern (EI), Ohio

Surveying Intern (SI), Ohio

EDUCATION & CERTIFICATIONS (CINDY JACOBSEN)

Bowling Green State University, MS Geology, 1992

Bowling Green State University, BS Comprehensive Science Program, 1990

Certified Professional Geologist #10242

FREDERICK SMITH, PE

Senior Engineer

Mr. Smith's many years of engineering experience focus on the environmental engineering field. He has worked on a wide range of water, wastewater and stormwater projects and has been responsible for the direction of all phases of project planning, design and construction, including the coordination of consultants and project personnel, budget and schedule oversight, and quality control. His expertise also encompasses funding procurement for public works projects, compliance with federal and local environmental regulations, NPDES and antidegradation applications, and all types of permitting.

EDUCATION & CERTIFICATIONS

Bachelor of Science, Civil Engineering, Ohio State University, 1990
Professional Engineer, OH
Certified Construction Document Technologist

TECHNICAL COMPETENCY

Mr. Smith's technical skills include ArcGIS and AutoCAD.

DESCRIPTION OF ROLE ON RELEVANT PROJECTS

Cherry Street and Fourth Street Inflow Redirection, City of Columbus, Division of Sewerage/Drainage, Columbus, OH

Mr. Smith served as project manager for this City of Columbus inflow redirection project. In this role, he coordinated the planning and design activities. During the data collection phase, Mr. Smith ensured that sewer cleaning and televising activities were performed on time and on budget. He assigned staff to perform quality control review of the video records. He ensured correct utilization of the PipeTech software. He assigned staff to perform QA/QC on PAR and MSIUS forms used to update the City's GIS database. During planning and design, he worked with the client, as well as the Project Manager from Brown & Caldwell, who served as consultants for the adjacent project (Town & Fourth Inflow Redirection) to ensure the solutions proposed by both projects were complementary. Mr. Smith also oversaw coordination with water resources engineers to screen potential green infrastructure practices for implementation on this project. As part of the Business Case Evaluation work, Mr. Smith coordinated the effort to provide City staff with a project evaluation report on the existing sewers within the project area that was well received. During the design stage, Mr. Smith worked with engineers and technicians to develop construction plans to modify the combined sewer regulator on Cherry Street to achieve the project goals.

Rehabilitation of Franklin No. 1 Sewer, City of Columbus, Division of Sewerage/Drainage, Columbus, OH

As Project Manager, Mr. Smith directed the inspection of the sewer assessment, including cleaning and televising. Following evaluation of the sewer condition, Mr. Smith directed preparation of the alternatives analysis, design report, and sewer rehabilitation design. Mr. Smith assigned staff to coordinate the field survey and CCTV for project that involved the inspection, evaluation, and rehabilitation of 15,000 feet of sewer ranging from 8- to 42- inches in diameter. Mr. Smith also ensured QA/QC on field data, including MSIUS and PAR forms for inclusion into GIS database was performed.

JULIE MCGILL, PE

Senior Engineer

Ms. McGill brings 18 years of experience in wastewater and stormwater master planning, analysis, and conceptual design projects with exceptional knowledge of the City of Columbus Sewer System Capacity Model (SSCM) and the City's stormwater and wastewater collection systems. She was a member the Columbus SSCM Model Update team and four Columbus I&I Studies. Her technical expertise includes hydrologic/ hydraulic modeling, flow monitoring analysis, inflow/infiltration investigation, green infrastructure, regulatory compliance and the integration of field data collection and modeling data with GIS.

TECHNICAL COMPETENCY

Ms. McGill's technical skills include the following software: ArcGIS, USEPA SWMM 5, PCSWMM, XP-SWMM, HEC RAS.

DESCRIPTION OF ROLE ON RELEVANT PROJECTS

Livingston/James Area Sanitary Sewer Inflow & Infiltration (I/I) Remediation Project | Division of Sewerage and Drainage, Columbus, OH*
Deliverables task leader and lead project engineer for GIS mapping of complaint records and stormwater system capacity evaluation. Evaluated alternative stormwater system improvements, including green infrastructure, to mitigate stormwater impacts of I/I removal. Prepared New Model Report and sections of Alternatives Analysis Report that identified locations and causes of sanitary system surcharging, overflows, and sewage backup into basements and recommended improvements.

Northwest Alum Creek Area Sanitary Sewer Inflow and Infiltration (I/I) Remediation Project | Division of Sewerage and Drainage, City of Columbus, OH*
As Deliverables task leader, oversaw delivery of updated sanitary and storm sewer system GIS data, Piping Ambiguity Records (PARs), and Manhole Structure Inventory Update System (MSIUS). Technical advisor to the sanitary sewer and stormwater modeling teams for a 5.8 square mile study area. Prepared New Model Report and sections of Alternatives Analysis Report that identified locations and causes of sanitary system surcharging, overflows, and sewage backup into basements and recommended improvements.

Sewer System Capacity Model Update 2006| Division of Sewerage and Drainage, City of Columbus, OH* | Deliverables task leader and technical advisor for development and calibration of system-wide sanitary and combined sewer system model. Recommended locations for network of flow monitors and developed flow monitoring review procedures. Prepared sections of Model Development and Calibration Report.

***Experience prior to MS**

EDUCATION & CERTIFICATIONS

Ohio State University, BS Civil Engineering, 1995

PROFESSIONAL REGISTRATIONS AND AFFILIATIONS

Professional Engineer, OH

ANIL TANGIRALA, PE, CFM

Senior Engineer

Mr. Tangirala is a Professional Engineer and Certified Floodplain Manager with more than a decade of experience in Water Resources Engineering with emphasis on hydrologic, hydraulic and water quality modeling and the integration of modeling data with GIS. Mr. Tangirala is proficient in green infrastructure planning, stormwater management and flood mitigation. Prior to joining ms consultants, he served as a project manager and lead engineer for various municipal, state and federal projects where he conducted detailed hydrologic, hydraulic and water quality modeling involving storm flooding, sanitary sewer overflows and combined sewer overflows. Mr. Tangirala is also very proficient with riverine hydraulics and has conducted numerous detailed hydrologic, hydraulic and sediment transport analyses for various studies in the Midwest as part of Federal Emergency Management Agency's Map Modernization and RiskMAP program.

EDUCATION & CERTIFICATIONS

Master of Science, Civil Engineering, University of Kentucky, 2004

Bachelor of Technology, Civil Engineering, S.K. University, AP, India, 2002

Professional Engineer, OH

Certified Floodplain Manager

TECHNICAL COMPETENCY

Mr. Tangirala is proficient in Arc GIS, ArcView and other Hydrologic, Hydraulic and Water Quality Modeling software including EPA SWMM 5, PCSWMM, XP-SWMM, HEC-RAS, HEC-HMS, TR-55, NSS, Arc Hydro, HEC-GeoRAS, HEC-SSP, PeakFQ-Win, Flo-2D, WinSLAMM, WinHSPF, CORMIX and STELLA.

DESCRIPTION OF ROLE ON RELEVANT PROJECTS

Early Ditch Sanitary Sewer System Inflow/Infiltration Remediation Project, Division of Sewerage & Drainage, City of Columbus, Ohio*

Mr. Tangirala served as a task manager/lead engineer of the Early Ditch I/I study modeling and was involved in developing and calibrating the Sanitary Sewer System hydraulic model for Early Ditch study area which was identified as a priority area in the Columbus Wet Weather Management Plan. He also played an instrumental role in the selection of design storm for the alternatives, developed and performed hydraulic modeling for the selected alternatives which included conveyance, storage and I/I removal. He provided technical oversight to the GIS team which developed tools to determine the Water-in-Basement risk of homes in the study area for several alternatives developed for the project. He also led the task of developing the Piping Ambiguity Records (PARs) and Manhole Structure Inventory Update System (MSIUS).

Blueprint Clintonville Integrated Solutions, Div. of Sewerage & Drainage, Columbus, Ohio*

As a technical lead for H&H tasks, Mr. Tangirala participated in the Pilot Area Technical Committee for Blueprint projects and was instrumental in the research and selection of the hydrologic, hydraulic and water quality models. He also led the development of a sediment transport model in HEC-RAS to analyze the effects of sediment transport and erosion/deposition based on several peak flow and sediment loading scenarios to determine the water quantity and quality Level of Service objectives for Blueprint projects. Mr. Tangirala presented the methodology, findings and recommendations to the Blueprint Steering Committee.

***Experience prior to MS**

DAVID KOZMAN, PE

Engineer

Mr. Kozman has several years of experience in the planning, design, and construction of numerous water, wastewater, and stormwater related projects. These projects have included water treatment plants and distribution systems, wastewater collection and treatment facilities, and stormwater collection and treatment systems.

TECHNICAL COMPETENCY

Mr. Kozman is a recognized expert in the design and construction of water and wastewater facilities. His wide-ranging experience has given him first-hand experience in all aspects of utility management. He has extensive experience with integrating designs with municipal GIS.

DESCRIPTION OF ROLE ON RELEVANT PROJECTS

City of Columbus, Department of Public Utilities (DPU) | Sexton Drive Area Water Line Improvements

GIS Integration and Quality Control. Mr. Kozman served as QA/QC Manager for the design of approximately 10,000 feet of water line located in a residential neighborhood in the southwest corner of Columbus. The water line design consists of replacing existing 6-inch and 8-inch water lines along five residential streets with new 8-inch water lines and replacing existing 2-inch water lines in eight residential cul-de-sacs with new 6-inch water lines. The improvements were integrated into the City's GIS.

City of Columbus, Department of Public Utilities (DPU) | Deland Avenue Area Water Line Improvements

GIS Integration and Quality Control. Mr. Kozman provided QA/QC services for approximately 12,000 feet of water line located in a residential neighborhood in the northern part of Columbus. The water line design consists of replacing existing 6-inch and 8-inch water lines with new 8-inch water lines and replacing an existing 12-inch water line with a new 12-inch water line. Replacement via open cut construction was selected for the main lines. The design was integrated into the City's GIS.

City of Columbus, Department of Public Utilities (DPU) | Alum Creek Stormwater Mitigation and Remediation Project, Columbus, Ohio

GIS Integration and Quality Control. Mr. Kozman served as the QA/QC Manager who coordinated and submitted the site plan compliance documents to the City of Columbus. A stormwater management plan was prepared to detain the 25-year storm event and release at the 1-year pre-developed runoff rate. Green best management practices were employed for treatment of post-developed runoff. A stream corridor protection zone existed along the property line adjacent to Alum Creek requiring coordination with the City. An NOI, SWPPP, and PTI documents were submitted for approval.

EDUCATION & CERTIFICATIONS

Bachelor of Science, Civil Engineering, Ohio State University, 1970
Professional Engineer, OH
American Water Works Association
Water Environment Federation

MICHAEL NAVABI, PE, D.WRE, BCEE, FASCE AND WILLIAM BOGGS, PE

Civil Engineer, Water/Wastewater

Mr. Navabi and Mr. Boggs have several years of experience and have managed all phases of civil and environmental engineering public works utilities and facilities from conducting feasibility studies to design and construction completion, including GIS integration. They have completed numerous projects for the City of Columbus Department of Public Utilities.

TECHNICAL COMPETENCY

Both Mr. Navabi and Mr. Boggs have managed staff in use of GIS and engineering design software (HEC RAS / HEC HMS, SWWM, KyPIPE, Poundpack).

DESCRIPTION OF ROLE ON RELEVANT PROJECTS

City of Columbus, Department of Public Utilities (DPU), Division of Sewerage and Drainage - Southerly Wastewater Treatment Plant, Grit Removal Facility and 96-inch Conduit

Project Management. Mr. Navabi directed preliminary design for the 330 MGD Grit Removal Facility. He directed detail design involving hydraulics, system connectivity, and process; 1,075 LF of 96-inch PCCP conduit; site development; drainage systems; and flood control. The project was integrated with the City's GIS.

City of Columbus, Department of Public Utilities (DPU), Division of Sewerage and Drainage - Olentangy Augmentation Relief Sewer (OARS)

Project Management. Mr. Navabi provided design specifications and quality control activities for selected disciplines as a part of the major $320 million construction relief sewer and tunneling project for the City of Columbus DOSD. The project was integrated into the City's GIS.

City of Columbus, Department of Public Utilities (DPU) - Sexton Drive Area Water Line Improvements.

Project Management. Mr. Navabi managed the design of approximately 12,000 feet of 60-inch to 8-inch waterline to replace existing 2-inch to 8-inch waterline at 13 separate sites on the west side of Columbus. Consideration was given to cured-in-place pipeline rehabilitation, horizontal directional drilling, and open cut construction. The improvements were integrated into the City's GIS.

Utility Engineering. Mr. Boggs provided design engineering of waterline, pavement replacement, construction plans, construction cost estimates, and utility coordination. Work included replacing fire hydrants, transferring service connections, making branch waterline connections, abandoning existing waterlines, replacing pavement, and maintaining traffic during construction.

EDUCATION & CERTIFICATIONS (MICHAEL NAVABI)

MS, Civil Engineering, Project Management, Lamar University, 1985

BS, Civil Engineering, Lamar University, 1984

Professional Engineer, OH, CT, IN, KY, MD

EDUCATION & CERTIFICATIONS (WILLIAM BOGGS)

BS, Environmental Engineering Technology, Shawnee State University, 1998

Professional Engineer, OH

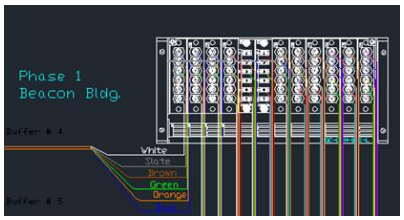
American Society of Civil Engineers (ASCE)

SECTION 3 | RELEVANT PROJECT EXPERIENCE

The T&M Team has project experience pertinent to your RFP relating to GIS solutions within Utility organizations. Our team has valuable project experience with long-term clients which prove our successful GIS implementation. The following projects showcase our experience with utilities as well as sophisticated GIS applications and development.

FIBER OPTIC NETWORK DATA CONVERSION PROJECT

City of Columbus, Department of Technology (DoT)



CLIENT CONTACT

Shoreh Elhami
Citywide GIS Manager
City of Columbus, Department of Technology
614.645.2109

TYPE OF PROJECT

Data Conversion and Development; GIS Integration; Fiber Optic GIS Asset Management

DATE OF ACTIVITIES

May 2014 – Ongoing

DESCRIPTION OF FIRM ACTIVITIES

The City of Columbus, Department of Technology (DoT) operates and maintains a fiber optic network between City facilities providing data services to employees and equipment such as traffic cameras and traffic control systems. T&M worked closely with Department of Technology Fiber management Staff and GIS staff to develop and populate a geodatabase to support the use of Schneider Electric's ArcFM fiber manager extension for ArcGIS.

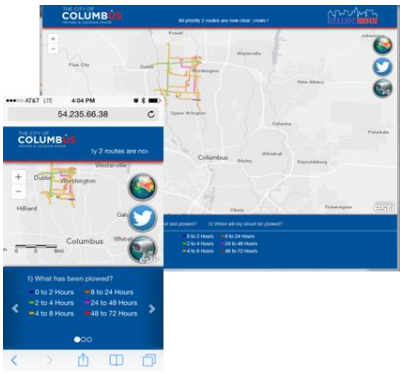
Data Quality Assessment
T&M performed a thorough assessment of DoT's existing fiber optic source data which consisted of Microsoft Excel Spreadsheets, Microsoft Access Databases, AutoCAD .DWG files, paper maps, Esri shapefiles, field images, and hand drawn field notes. A combination of automated and manual review techniques were employed to determine the quality and priority of the existing data sets to be used during the data conversion process. Performing this detailed quality assessment provided DoT with a clear understanding of the quantity and quality of the existing source information and helped define the many of the data conversion techniques and procedures.

Database Design
An extensive database design phase was performed by T&M staff to educate DoT staff on the advantages of the ArcFM data model and to customize the feature classes, domains, and relationships within the geodatabase to better meet the needs of DoT staff. For example, attribute domains were customized to match internal naming conventions for various devices such as patch panels and patch panel support structures.

ArcFM Data Conversion and Quality Assurance
T&M GIS analysts used a combination of standard ArcGIS editing tools and the ArcFM fiber manager extension to populate the geodatabase with high quality information based off the existing digital and non-digital data sources. An extensive quality assurance plan was put in place to document and confirm feature geometry correctly participated in geometric networks, required attributes were populated, and related tables were populated to enable custom ArcFM reporting functionality.

WARRIOR WATCH APPLICATION

City of Columbus, Department of Public Service (DPS)



CLIENT CONTACT

Rick Garrabrant
GIS Manager
City of Columbus, Department of Public Service
614.645.7203

TYPE OF PROJECT

GIS Needs Assessment and BPA; GIS Application Development; GIS Integration; GeoEvent Processor; Mobile

DATE OF ACTIVITIES

January 2013 – Ongoing

DESCRIPTION OF FIRM ACTIVITIES

During the winter weather season, the City of Columbus's snow and ice removal operations are a high profile activity that significantly impacts anyone using the street network within the City. The unpredictable nature of snow and ice events makes it difficult to track costs, measure resources, and monitor where and how these resources are distributed throughout the City during an event.

Web-based Application
T&M developed a web based mapping application designed to improve the Department's ability to coordinate resources during snow events and enhance their ability to track the costs associated with cleanup efforts. The application allows users to search vehicle activity using the map or entering information into a standard search form and provides custom reporting capabilities that are easy to access.

T&M worked closely with City Department of Technology Staff throughout the project to develop the general system architecture capable of handling a large amount of real-time telematics and sensor data. More specifically, Esri's GeoEvent Processor extension for ArcGIS Server 10.2 is utilized to provide access to real-time sensor stream provided by Networkfleet, the City's Automated Vehicle Location vendor. Configuration of the GeoEvent processor enables the application to display the current location of snow operations vehicles and any additional sensor information such as heading, speed, whether the plow is up or down, and whether the salt spreader is activated every 15 seconds.

A JavaScript framework was employed for the web application which enables users to access the application without the need for separate, desktop browser plugins. The application also takes advantage of modern web browsers support of WebSockets which enable real-time two-way communication between servers and browsers. This enables truck information to be updated in real-time within the browser without having to refresh the map refresh the server for new information.

Additional python geoprocessing tools were developed to run on the server to enhance the information provided by the vehicle sensors which could not be performed using the GeoEvent Processor. For example, a scheduled python script runs at a regular frequency to add the street name and snow maintenance zone that each vehicle location is associated. The server architecture uses a combination of ORACLE 11g, Microsoft

WARRIER WATCH APPLICATION (CONT.)

SQL Server, and ArcGIS server 10.2 running on Windows Server 2012 R2. While the initial scope of this project has focused on snow and ice vehicles, T&M's successful deployment has led the Department of Public Service to extend the application to also include mowers and street sweepers.

Public Facing and Mobile Application

T&M is in the process of developing a public facing and mobile application to assist the City of Columbus and surrounding area residents with up-to-date snow removal information. The public facing site will provide residents with an updated ticker displaying the status of treated and untreated streets, snow emergency level, or other snow operations messages. Additionally, the site will provide tools for users to determine if their street has been treated and, if not, when it will be treated. The application will pull from the live data that the internal Warrior Watch is reading to keep the display as up to date as possible.

The public facing site is being built on the same platform as the private one utilizing Esri's JavaScript API, HTML5 but will be designed to incorporate the City's branding as well as be a responsive site. By developing a responsive site the City extends the use of the application to users at desktops as well as those on mobile devices.

LUCITY ASSET MANAGEMENT / WORK ORDER MANAGEMENT INTEGRATION

City of Columbus, Department of Public Service (DPS)

CLIENT CONTACT

Rick Garrabrant
GIS Manager
City of Columbus, Department of Public Service
614.645.7203

TYPE OF PROJECT

GIS Needs Assessment and BPA; GIS Application Development; GIS Integration; Mobile

DATE OF ACTIVITIES

January 2013 – March 2014

DESCRIPTION OF FIRM ACTIVITIES

The City of Columbus, Department of Public Service (DPS) is responsible for managing and maintaining a wide variety of assets and infrastructure such as street lights, streets signs, traffic signals, cross walks, and traffic control structures. DPS integrated Lucity's public works management software to standardize asset management and work order management procedures throughout the department. T&M supported this process by analyzing existing business processes and procedures as well as developing GIS datasets and supporting web application development to allow for further GIS integration with existing business processes.

Business Process Analysis
T&M staff worked closely with City staff to review the existing street sign and pavement management programs in order to document the established maintenance procedures for these assets. This allowed T&M staff to develop a customized geodatabase schema which streamlined the data maintenance procedures and allows for integration with the Lucity work order / asset management components. T&M educated DPS staff on the differences between other street sign inventory data models such as Esri's Local Government Data Model and develop a data model that meets the specific needs of DPS.

Data Conversion
T&M GIS analysts reviewed, converted and consolidated key GIS features such as street intersections, street sign, and bridge inspection data using ArcMap and Microsoft Access. The street intersection layer was a particularly complex layer to develop as large number of DPS work orders submitted through the City's 311 call center are tracked by street intersection. Over time the department has developed and maintained multiple street intersection files and as a result establishing a clear relationship between work orders and intersections was difficult. T&M used a combination of geometric network analysis tools and python scripts to develop a consolidated street intersection file that resolved discrepancies between intersection data sources.

Application Development
T&M staff also supported the development of map services used in DPS web applications which consume the work history information directly from the Lucity geodatabase. T&M worked closely with DPS staff to develop the required fields, field formatting, and map symbology to support users throughout DPS.

BULK REFUSE ROUTING*

City of Columbus, Department of Public Service (DPS)

CLIENT CONTACT

Rick Garrabrant
GIS Manager
City of Columbus, Department of Public Service
614.645.7203

TYPE OF PROJECT

Data Conversion and Development; GIS Needs Assessment and BPA; GIS Application Development; GIS Integration

DATE OF ACTIVITIES

January 2008 – Ongoing

* *A portion of this project was performed and initiated by members of our team while at a previous firm. T&M is currently under contract with the City of Columbus Department of Public Service for this project*.

DESCRIPTION OF FIRM ACTIVITIES

T&M staff has deployed two separate applications designed to assist the City of Columbus's Department of Public Service Refuse Division in their efforts to respond to an average of 300 daily bulk refuse pickup requests placed by City of Columbus citizens. Prior to these applications city staff spent time each morning manually developing routes to pick up the bulk refuse across the City as network analysis capabilities were simply unavailable to users without considerable ArcMap training.

Routing Desktop Application
The first application utilized Esri ModelBuilder and python to provide an automated, server side routing solution which integrated into the city's existing Business Objects reporting service to provide PDF reports to refuse collection staff. The python script runs nightly and performs a detailed vehicle routing problem, with scheduled pickup requests pulled directly from the city's existing 311 call center database (Oracle 10g). This vehicle routing problem develops routes for three different transfer stations for three different customer types and determines the most efficient path and sequence to visit all requests and produces associated driving directions.

Routing Web-based Application
The second application utilizes a Flex based web application, an XML data conversion library, and an Esri geoprocessing service to provide desktop quality network analysis tools to any user within the Department of Public Service. The geoprocessing service was developed as an extension of the automated routing application, providing similar functionality but with greater flexibility and the ability to be used on demand or as needed. For example this application may be used to generate routing results for bulk refuse collection if an existing facility is temporarily closed and must be re-routed to another facility. The application could also be used by city sidewalk inspectors whose workload varies based on weather conditions and number of available staff. This tool allows users upload a set of orders or pickup requests to the application as a Microsoft Excel spreadsheet which are then sent to the geoprocessing service for a routing solution. The routing solution is capable of generating multiple routes with different starting and ending locations, can account for time constraints on the pickup requests, and can account for the pickup or drop off capacity as the pickup requests are visited. By utilizing an excel spreadsheet this application offers complex geoprocessing to a wide range of users with little or no GIS experience.

CHERRY STREET AND FOURTH STREET INFLOW REDIRECTION

City of Columbus, Division of Sewerage / Drainage

CLIENT CONTACT

Robert Herr, PE
City of Columbus, Division of Sewerage / Drainage
614.645.2416

TYPE OF PROJECT

Data Conversion and Development; Field Data Collection; GIS Integration; Mobile ArcGIS, PipeTech, AutoCAD

DATE OF ACTIVITIES

2014

DESCRIPTION OF FIRM ACTIVITIES

The City retained ms consultants to provide engineering services to redirect the inflow of stormwater that is currently entering the combined sewers and sanitary sewers in the area around the intersection of Cherry and 4th Street. The project goal is to eliminate overflows for the typical year event level of control.

Field Investigations
The ms consultants team field-verified the condition of all sanitary and combined sewer pipe through sewer cleaning and televising. The results of the CCTV inspection were a tool in determining if and where rehabilitation or reconstruction is necessary, and aided in identifying sources of infiltration and inflow (I/I). In addition, the team verified field conditions of the sewer, such as inverts, length, sizes, etc., throughout the 100-acre project area to assure that the SWMM sewer model accurately portrays sewer flows during dry and wet weather events. Additionally, the field crew verified sewer connectivity.

Data Review and Incorporation into GIS
ms consultants reviewed the city's existing records, including complaint records (water in basements, sewer odors, etc.) and tap records indicating where existing building laterals connect to the sewer main. Existing data was incorporated into a GIS file. ms consultants worked with the city to determine acceptable standards for GIS file submittals on this type of project. Ultimately, the database provided a searchable record of sewer complaints, sewer PACP scores, tap records and other data.

Alternative Analysis and Preliminary Design

After the existing information was compiled and incorporated into the GIS file, ms consultants prepared an alternative analysis to determine the needed improvements, which considered separation of the combined sewers, replacement of existing sewers, implementation of green infrastructure practices for runoff reduction, regulator structure modification and rehabilitation of existing sewers using CIPP technology.

Basement Flooding GIS Analysis
The City of Columbus maintains a database of complaints received regarding the sewer system. As part of this project, all Water-in-Basement (WIB) complaints were reviewed. Additionally, potential basements that could be impacted by the proposed project solution were analyzed for the Typical Year Storm (TYS) and the 10-year storm to ensure that negative impact would be avoided.

MARION ROAD AREA NEIGHBORHOOD IMPROVEMENTS

City of Columbus, Division of Sewerage / Drainage

CLIENT CONTACT

Michael Griffith, PE
City of Columbus, Division of Sewerage / Drainage
614.645.2416

TYPE OF PROJECT

GIS Integration, General Project Management and Staff Augmentation, Field Data Collection, ArcGIS, AutoCAD

DATE OF ACTIVITIES

2014

DESCRIPTION OF FIRM ACTIVITIES

The City of Columbus retained ms consultants to provide engineering and surveying services for the inspection and evaluation of ponding problems in the Marion Road area.

Project Description / Tasks Undertaken
The project involved storm sewer on Studer Avenue, Reeb Avenue, Lawrence Drive, Sheldon Avenue and Linwood Avenue. Approximately 8,800 linear feet of 6-inch to 12-inch sewer was cleaned, televised, input into a PipeTech database and organized into a GIS database as part of this project.

This area had approximately 5,000 LF of previously undocumented storm sewer. Field survey and CCTV was performed to locate storm sewer structures, to determine sewer connectivity and to provide accurate information regarding storm sewer sizes. Field survey provided northing, easting, depth, size and material of various infrastructure. This information was input into ArcGIS to create project deliverables.

ms summarized this information and presented the design alternatives in a Preliminary Design Report. Alternatives included traditional infrastructure improvements such as new storm sewer as well as alternative improvements such as pervious pavement.

Ponding on Lawrence Drive
After the City's approval of the desired rehabilitation alternatives, ms prepared construction drawings detailing the existing sewer as well as proposed recommendations for infrastructure improvements including new storm sewer and re-grading of pavement. Both PipeTech database and PipeTech library files are deliverables for this project as well as the Design Report and the construction drawings.

BRIMFIELD AREA SANITARY SEWER SYSTEM IMPROVEMENT

City of Columbus, Division of Sewerage / Drainage

CLIENT CONTACT

Matthew Panko
City of Columbus
614.645.8396

TYPE OF PROJECT

Data Conversion and Development; Field Data Collection; GIS Integration; Mobile ArcGIS, AutoCAD

DATE OF ACTIVITIES

2011

DESCRIPTION OF FIRM ACTIVITIES

The goal of the Brimfield Area Sanitary Sewer System Improvement project in Columbus, Ohio was to determine the cause of the sewerage backup and to provide a detailed design for the improvements required of the sanitary sewer. The project led to construction and rehabilitation of sanitary manholes and approximately 570 feet of sanitary sewer.

PRIME investigated the sanitary sewer and soil conditions in the area, found the cause of the sewerage backup, and determined that a portion of the sanitary sewer had settled forming a negative slope which caused the backup. PRIME also determined that the existing soil conditions were the cause for this settlement and that an extensive bedding and foundation matrix was needed to properly support the proposed sewer.

PRIME researched and coordinated with existing private utilities in the project area by providing stage construction plans to the private utilities and coordinating the relocation of any private utilities that were in conflict with the sanitary sewer under construction.

The project area was located in a narrow utility easement that has many privately-owned amenities in close proximity to the project area. PRIME held community interaction meetings to inform the surrounding community on the existing condition of the sanitary sewer and the construction that will need to occur to correct the negative slope and sewerage backup.

PRIME developed all plans in accordance with the most current Construction and Material Specifications and Standard Construction Drawings of the City of Columbus.

CLINTONVILLE INTEGRATED SOLUTIONS PROJECT

City of Columbus, DPU

CLIENT CONTACT

Michele Griffith, City of Columbus DPU
614.645.2416

TYPE OF PROJECT

Data Conversion and Development; Field Data Collection; GIS Integration

DATE OF ACTIVITIES

Ongoing

DESCRIPTION OF FIRM ACTIVITIES

The Clintonville Integrated Solutions Project, called Blueprint Columbus, involves the retrofit of a 279-home highly urbanized neighborhood in the Cooke-Glenmont area of Columbus, Ohio. PRIME is participating in the project as a major teaming partner to investigate one of six areas in Clintonville. The purpose of the project is to determine the effectiveness of implementing a green infrastructure improvement program with the long term goal of reducing or eliminating combined sewer overflows.

Historically, the City of Columbus has relied on interceptors and tunnels to convey grey water to the wastewater treatment plants. The City believes that a better use of their funds would be to invest in above-ground green infrastructure improvements in lieu of the more expensive below-ground conveyance facilities. GI solutions may include rain gardens, porous pavement, lining private sewer laterals, and downspout diversions.

PRIME will perform field investigations, prepare plans and specifications, and assist with construction oversight. The results will serve as a model for similar projects throughout the City of Columbus.

DOHERTY ROAD WATERLINE IMPROVEMENTS

City of Columbus, , Division of Power and Water

CLIENT CONTACT

Brian Hammerle, PE, Columbus DPU
614.645.0856

TYPE OF PROJECT

Data Conversion and Development; GIS Integration

DATE OF ACTIVITIES

2009

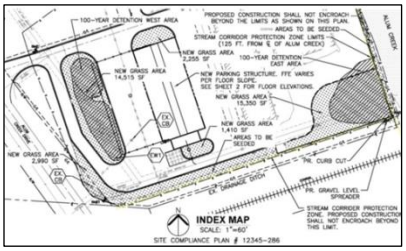
DESCRIPTION OF FIRM ACTIVITIES

PRIME was contracted by the City of Columbus, Division of Power and Water to provide design services for a new 12-inch waterline to serve a residential development in Columbus, Ohio. The project involved a 4,300-linear-foot waterline and included new fire hydrants and directional borings beneath existing railroad tracks along some of the alignment.

PRIME's scope of work for the project included performing a site survey, subsurface investigation, and preparation of construction documents. Design of the project was performed in accordance with applicable City of Columbus design guidelines. Civil engineering services provided by PRIME included design of the waterline and appurtenances per City of Columbus Standards, preparation and coordination of construction plans, coordination of easement and right of way documentation for railroad access, construction and survey coordination with the Franklin County Engineer's Office, maintenance of traffic, and construction cost estimates.

ALUM CREEK STORMWATER MITIGATION AND REMEDIATION

City of Columbus, Division of Sewerage / Drainage



CLIENT CONTACT

Andrew Bobay
City of Columbus DPU
614.645.8405

TYPE OF PROJECT

Data Conversion and Development; GIS Integration

DATE OF ACTIVITIES

2013

DESCRIPTION OF FIRM ACTIVITIES

The Alum Creek Stormwater Mitigation and Remediation project consisted of demolishing the existing trash pulverizer building and constructing a new, 16,500-square-foot, cantilevered parking shelter for the City of Columbus refuse collection vehicles at the Alum Creek Refuse Station in Columbus, Ohio.

The project was divided into two phases. Phase 1 consisted of the demolition and removal of the existing pulverizer, pavements, associated utilities, and construction of vegetated areas in place. Phase 2 consisted of the construction of the parking shed, a new truck wash facility, new utilities, and establishment of vegetated areas. The project area, when completely constructed, will result in a zero net increase in impervious surfaces and an increase in the usable pervious area for stormwater treatment.

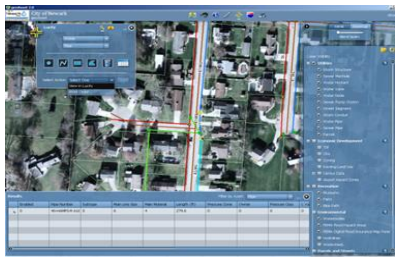
PRIME coordinated and submitted the site plan compliance documents to the City of Columbus. These documents were submitted to and reviewed by the City Zoning Department for compliance with City ordinances and design guidelines. The compliance documents included a site plan, stormwater management plan (CC plan), stormwater management report, water service plan, and easement documents. PRIME also coordinated with the City of Columbus for the demolition permits for Phase 1.

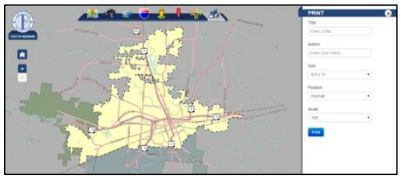
PRIME prepared a Stormwater Management Plan according to the City of Columbus Stormwater Drainage Manual for approval by the City. The Plan included runoff hydrographs for the 1-year, 5-year, 10-year, 25-year, 50-year, and 100-year storm events. The Plan also calculated the critical storm runoff flows and provided for control of runoff to the 1-year pre-developed flow rate.

The NRCS (SCS) Curve Number Method was employed to calculate the stormwater runoff volume using the Hydraflow program for modeling stormwater events. The water quality treatment volume was found, and BMPs were designed to treat the volume based on City standards, using a detention pond and vegetated areas. PRIME also prepared NOI and PTI documents and submitted them to the Ohio EPA for approval.

ENTERPRISE UTILITY GIS SERVICES*

City of Newark, Ohio





CLIENT CONTACT

Roger Loomis, Utilities Superintendent
City of Newark
740.670.7945

TYPE OF PROJECT

Data Conversion and Development; Field Data Collection; GIS Staff Augmentation; GIS Needs Assessment and BPA; GIS Application Development; GIS Integration; Mobile

DATES OF ACTIVITIES

January 2006 – Ongoing

**A portion of this project was performed and initiated by members of our team while at a previous firm. T&M is currently under contract with the City of Newark for this project.*

DESCRIPTION OF FIRM ACTIVITIES

Since 1999, the City of Newark has proactively managed and maintained its infrastructure utilizing asset management and GIS software. The Division of Water and Wastewater initiated the conversion of infrastructure information from paper documents to a digital asset management system in order to comply with EPA regulations and cMOM requirements. T&M serves as the primary GIS consultant for the City of Newark and has performed numerous tasks including the conversion of parcel, water (210 miles), storm, and wastewater (230 miles) infrastructure into digital GIS format using GPS technology. This conversion led to the design and creation of a utility geodatabase that links to inspection, maintenance and workorder information. T&M staff has also assisted with the linkage of geographically referenced photos, documents, engineering plans, TV inspections to individual assets within asset management software and ArcGIS.

geoAsset | Work Order Management System
This internal application, geoAsset, was created with Flex technology and serves as the enterprise utility management system that consists of water, sanitary and storm infrastructure. geoAsset utilizes ArcSDE (SQL Server2005) and ArcGIS Server web-based technology to integrate information stored and maintained in existing work order management software (Lucity) and an existing utility billing system (Eden). Customer service and other utility staff use this application on a daily basis to analyze and track customer complaints, create work orders and route field crews.

The city staff utilizes geoAsset to communicate across city departments, field crews and with the public. This enables all users to view the information seamless across multiple divisions throughout the city. By linking GIS infrastructure, complaints and workorder maintenance, the city has modified common operating procedures so that they are more efficient and cost effective. Service requests from billing accounts are tied into the application with a routing configuration so that field crews can constantly communicate with the administration office and the public. This has assisted with adhering to EPA mandates and improving overall responsiveness of the city staff.

Programmers used the Flex API and Lucity API to create widgets for a variety of uses. Specially, users can create work orders and service requests from an XY location or a selected set of assets; generate routes and reports for utility inspections using the city's street network; review

ENTERPRISE UTILITY GIS SERVICES (CONT.)

infrastructure information from Lucity based on an asset selection from the map; review and display workorder information from Lucity based on an asset selection from the map; navigate from Lucity to the map by selecting an asset or workorder; and a custom print widget to create custom maps and PDF files. Another widget allows the staff to track complaints by type, date and severity so that all departments are aware of the same public concerns.

Mobile Application for Curb Box Location

T&M recently began this task order to create a mobile application using ArcGIS Online for field crews to find existing curb boxes throughout the city. Curb box point locations will be added to a map service and tied into ArcGIS Online with the other existing services for crews to view information in the field. Tablets will use a cellular or wireless connection to stream live data into the application. Users will be able to see their location in relation to the spatial features. Users will also be able to perform general searches for address information and click on curb box points for additional attribute display. Users will be able to edit attributes of features as well as view existing workorder information showing previous work history in the area of concern.

Combined Sewer Overflow Management Site

EPA Phase II requirements mandate that cities must provide mapped locations of CSOs to the general public. T&M supported the City of Newark to fulfill this commitment through the development and implementation of a public facing Flex web mapping application which effectively linked the City's overflow point GIS data to CSO event information tracking event dates, flow rates, and providing links to standard reports and other web resources.

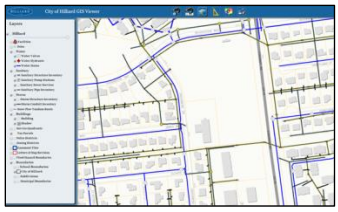
The Flex web mapping application developed as part of this project takes advantage of ArcGIS feature data services to allow real time access to combined sewer overflow event data stored in the City's enterprise geodatabase as technicians enter the data. Customized search and identify tools were developed based on input from the client. These search and identify tools enable users to quickly organize large amounts of data in a data table and export the information for further processing and analysis offline.

A ModelBuilder tool was developed to perform a quality check on CSO event data before submission to the enterprise geodatabase, increasing the overall accuracy and quality of the data published to the public. Additionally, by organizing and displaying all of the documentation required for EPA Phase II requirements this application provides a common operating picture to Newark staff and EPA regulators. This single application reduces the time spent by Newark staff providing information to the EPA as the required information is continually available and up to date. This application is available to the public at this url (http://gis.newarkohio.net/cso).

T&M is currently working on updating this application with the JavaScript API in order to utilize the latest GIS technology.

ENTERPRISE GIS SERVICES

City of Hilliard, Ohio



CLIENT CONTACT

Michael D. Kelnhofer
GIS Administrator
City of Hilliard
614.334.2306

TYPE OF PROJECT

Data Conversion and Development; GIS Needs Assessment and BPA; GIS Application Development; GIS Integration

DATES OF ACTIVITIES

September 2013 – Ongoing

DESCRIPTION OF FIRM ACTIVITIES

The City of Hilliard recently went through a major data conversion from AutoCAD to Esri software. This entailed the review and conversion of over 50 datasets including parcels and utility infrastructure. The City anticipates using this data for workorder management as well as network analysis. Several data standards were established to meet these goals and the City is in the process of receiving data management training. The project also included the install and configuration of ArcGIS Server 10.2 and a GIS website utilizing the JavaScript API.

GIS Needs Assessment and BPA | Collections of existing CAD drawings were maintained by the City to track their parcel, emergency management, water, sanitary and storm network. T&M reviewed the data and all of the elements to migrate the information to the Esri Local Government Data Model. This took a careful review and customization of all fields, domains, etc. in order to fit this model. T&M chose another data model for utilities such as storm, water and sanitary that mirrored a workorder management software package. This allows the City to easily utilize the detailed, geometric network functionality for analysis and tracing.

Data Conversion and Development | After the source data review, T&M staff used the Esri Local Government Data Model as the basis for the conversion. However, there were several missing elements within this model. T&M worked with Hilliard and suggested custom fields and domains that enhanced the model to fit the needs of the City without compromising the integrity of the model so that Esri web templates can be deployed. T&M also utilized an asset management data model to organize the infrastructure information so that the details of the connections, manholes and valves for network analysis and workorder management. This was a very detailed process and required attention to detailed features so that the model would work efficiently. T&M project staff reviewed existing source data for the entire City. This review helped inform the creation of a custom geodatabase schema to support asset management and further analysis. A thorough set of internal data conversion procedures were developed which were easily transferred into a set of data maintenance procedures, allowing the City to efficiently maintain their utility information using existing internal GIS resources.

GIS Application Development | T&M developed an online parcel and utility viewer using the Esri Local Government Template. This site includes robust search, print and measuring tools. T&M Is in the process of creating enhancements to the viewer with the addition of an aerial basemap blender, right-of-way editing tool, and City-hosted aerial and basemap cached services. Separate, more focused applications will also be created to display different data based on a user's choice from a landing page. http://maps.hilliardohio.gov/gisviewer/.

CITYWORKS MOBILE SERVICE REQUEST APPLICATION

City of Toledo, Public Service Department, Information & Communications Department

CLIENT CONTACT

Danielle, Coats
GIS Manager
City of Toledo
419.936.2695

TYPE OF PROJECT

GIS Staff Augmentation; GIS Needs Assessment and BPA; GIS Application Development; GIS Integration; Mobile

DATES OF ACTIVITIES

September – April 2014

DESCRIPTION OF FIRM ACTIVITIES

The City of Toledo utilizes Cityworks to track and manage service requests made by public citizens and internal requests made by individual departments. Prior to this application Citizens would call the City's service center to generate service requests. The application developed by T&M enables users to submit and track the status of service requests using mobile phones or desktop browsers.

Application Development and Asset Management Software (Cityworks) Integration | T&M staff worked closely with Toledo Public Service and GIS staff to design and develop a web application that allows users to submit service requests which are instantly actionable by City staff using Cityworks. The application is designed with modern "responsive" principles and scales to fit the screen size of the device accessing the application. This allows Toledo the ability to maintain a single application that meets the needs of mobile users and desktop users.

T&M utilized the Cityworks server API to pull service request types and automatically assign service requests to departments by using the existing logic and business processes implemented within Cityworks. This reduces the amount of configuration and maintenance the City must perform as any changes to the Cityworks system will be automatically reflected within the application.

COUNTYWIDE FLOODING MITIGATION PLAN AND GIS ANALYSIS

Louisville Metropolitan Sewer District, Jefferson County, Kentucky

CLIENT CONTACT

Justin Gray, PE
Louisville Metropolitan Sewer District
502.540.6398

TYPE OF PROJECT

Hazard Mitigation; GIS Application Development; GIS Integration

DATES OF ACTIVITIES

January 2014 – Ongoing

DESCRIPTION OF FIRM ACTIVITIES

T&M has been retained by the Louisville Metropolitan Sewer District (MSD) to develop a countywide strategic flooding mitigation plan. The primary objective of this project is to develop a comprehensive understanding of completed, current and proposed flood mitigation activities. In order to achieve this objective, this strategic plan includes documenting prior mitigation activities, developing a countywide approach for identifying and mitigating approximately 12,500 flood prone structures, identify available funding sources, creating grants for property acquisition in two previously targeted areas, and providing on-going grant administration and support.

T&M was selected for this project due to prior experience and capabilities using GIS and automated analysis procedures. The strategic plan will be created by using advanced GIS tools and techniques to a) inventory all flood prone structures within the 100-year floodplain and within combined sewer flooding areas, b) perform risk evaluations on all the structures, c) identify mitigation alternatives including acquisition, structural measures and flood-proofing, d) determine the impacts of the Biggert-Waters Flood Insurance Reform Act of 2012 (BW-12), and e) develop public outreach to impacted citizens.

The project will include the development of a custom geodatabase repository for tracking all previous and proposed mitigation activities conducted throughout Jefferson County including property acquisitions, flood protection projects, flood control storage basins, channel realignments, etc. The geodatabase will also contain all locations and pertinent attributes from the identified flood-prone structures. These structure data will then be imported into FEMA's Benefit Cost Analysis (BCA) software to calculate benefits from reducing annualized damages, identify implementation costs, and calculate benefit to cost ratios for the mitigation measures for areas identified as high priority. These measures will then be grouped into projects and made "grant-ready". The results of these BCA analyses will then be stored in the geodatabase to support further mitigation activities at MSD.

As a result of the analyses performed, T&M will develop a report of findings with maps and recommended mitigation actions for flood-prone areas identified in the risk evaluation. T&M will also prepare a summary presentation for MSD to include plan results, findings, and recommendations. The report and presentation will be used to support further outreach and to raise the level of flood risk awareness of MSD's Board of Directors as well as the Louisville Metro Governments Council.

REGIONAL ASSET VERIFICATION AND EMERGENCY NETWORK (RAVEN 911) DESKTOP AND MOBILE WEB APPLICATION DEVELOPMENT

Ohio-Kentucky-Indiana Regional Council of Governments (OKI), Hamilton County, Ohio

CLIENT CONTACT

David T. Shuey, GISP
GIS Manager
OKI Regional Council of Governments
513.621.6300 x114

TYPE OF PROJECT

GIS Needs Assessment and BPA; GIS Application Development; GIS Integration; Mobile

DATES OF ACTIVITIES

January 2013 – Ongoing

DESCRIPTION OF FIRM ACTIVITIES

T&M worked closely with Hamilton County Emergency Management staff and OKI to enhance an existing Flex -based web mapping application designed to support emergency operations and develop a new mobile-optimized version of the application using JavaScript and JQuery Mobile. The Regional Asset Verification & Emergency Network (RAVEN911) application is actively used by over 50 public safety organizations throughout Ohio, Indiana, and Kentucky to identify critical infrastructure during an emergency and perform powerful spatial analysis to improve the communication and situational awareness of emergency management staff responding to an incident.

The T&M application development team worked closely with public safety staff, project managers, user interface leads, and Information Technology support staff to quickly build enhancements to an existing set of Flex-based geoprocessing tools accessible from desktop browsers and commonly used by dispatchers and field staff from laptop computers. The application development team's experience working with Flex and configuring ArcGIS server (10.x) allowed them to quickly and efficiently adapt the existing source code and generate new custom geoprocessing tools to enable new geoprocessing capabilities into the mobile, JavaScript and HTML5 application.

T&M's application development team has a broad range of technical knowledge and proven experience that allow them to quickly adapt existing source code and significantly enhance the usability of a tool or application to deliver meaningful results to end users. Another key component of this project was building a mobile-optimized application that delivered the same functionality emergency response staff could access from the existing Flex- based RAVEN911. T&M application design leaders and application developers presented Hamilton County Emergency Management staff and OKI technical staff with an overall framework for the application user interface that was flexible enough to accommodate the existing tools and workflows, could be utilized on multiple devices with a range of screen resolutions, and took advantage of touch screen based interfaces. Over twenty custom geoprocessing tools that were originally desktop based were transferred to the mobile interface, enabling the field staff to utilize the full capabilities of the desktop browser application using tablets such as iPads, Google Nexus Tablets, and Microsoft Surface tablets.

UTILITY GEODATABASE CREATION AND CITYWORKS IMPLEMENTATION

City of New Albany, Ohio

CLIENT CONTACT

William Dorman
Engineering Manager (former Engineering Assistant)
City of New Albany
614.216.7232

Brian Walkenspaw
GIS Analyst
614.855.0076

TYPE OF PROJECT

Data Conversion and Development; Field Data Collection; GIS Needs Assessment and BPA; GIS Application Development; GIS Integration; Mobile

DATES OF ACTIVITIES

January 2008 – Ongoing

DESCRIPTION OF FIRM ACTIVITIES

The City of New Albany, a growing municipality, has consistent new development needs. T&M has worked with the city for several years to create and enhance their GIS capabilities. The city staff desired a way to organize, maintain and integrate numerous infrastructure datasets in order to improve efficiency and ability to quickly respond to information requests from public and private stakeholders. Since New Albany works with the city of Columbus to maintain utilities such as water (93 miles) and sewer (88 miles), it was important to coordinate closely with both jurisdictions in order not to duplicate efforts and to establish data sharing agreements. The city was also extremely proactive with the EPA in managing storm sewer information and desired GIS to help maintain and analyze existing infrastructure.

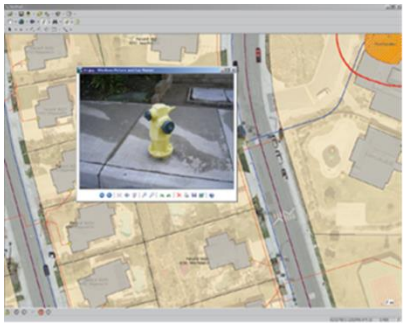
Over the past several years, T&M staff has worked with the city to maintain and upgrade their GIS as technology changes. This includes installing software, upgrading geodatabases and training. Our long term relationship with the city has allowed for continued growth of the technology and a mature GIS.

Data Creation, Maintenance and Asset Management Software (Cityworks) Implementation | T&M staff worked closely with city staff to design a GIS that fits the needs of the multiple users with multiple disciplines. Interviews were conducted with city departments to design an enterprise GIS. T&M staff recommendations led to the design and creation of multiple geodatabase data models that were created to seamlessly integrate into the existing asset management software and support future enterprise business needs. The Geodatabase Development / Asset Management Software Implementation task represented the construction of a geodatabase file using ArcGIS. Using the geodatabase design, T&M staff was able to import CAD information as well as digitize existing utility engineering plans to create an accurate geodatabase. Detailed attributes collected included material, diameter, inverts (where available), type and size. Data was carefully reviewed against schema rules and parameters, with corrections made using ArcGIS editing tools. Data was then integrated into Cityworks for asset management activities.

ArcGIS Online Web Applications | Recently, T&M created a dashboard with ArcGIS Online mapping applications for multiple departments utilizing several map services. Police, Public Service, Development and City Hall will utilize these maps as a function of the city website. These maps display information in an organized way so that officials can effectively communicate with the public.

WATER AND SEWER DEPARTMENT GIS PROJECT

City of Middletown, Connecticut



CLIENT CONTACT

Bill Oliver
IT Director
City of Middletown, Public Works Department
860.344.3500

TYPE OF PROJECT

Data Conversion and Development; Field Data Collection; GIS Application Development; GIS Integration; Mobile

DATES OF ACTIVITIES

2012

DESCRIPTION OF FIRM ACTIVITIES

PRIME provided services for a GIS implementation which included geodatabase design, digitization of as-builts, and populating the geodatabase with features and attributes. Other tasks were software testing and installation, mobile application development, and integration with various other systems.

An enterprise geodatabase for the department was designed, developed, and implemented in ArcSDE on SQL Server 2008 according to Esri Local Government Data Model. Approximately 1,500 as-built maps were scanned and data was populated in the ArcSDE geodatabase using techniques of heads up digitization in ArcGIS 10.

Existing data in a legacy format was successfully converted into the newly designed geodatabase. The data was composed of approximately 7,000 valves of multiple sizes along with numerous other assets being managed by the utility in the water and sewer system.

For the purpose of collecting field data, mobile application development was provided by creating an ArcPad application. An internal GIS web application using Java/HTML5 was also designed and developed to look up valve, main, service connection, and other asset information by address.

The ArcSDE system was integrated with existing CIS systems, ArcGIS Application and OnBase. Basic workflows were created for the client using ArcPLTS Workflow Manager/JTX for tasks such as adding a water main for new subdivisions and replacing old water mains. Other services that were provided include planning for new GIS business requirements, design review and testing, Esri software testing and vendor management, training, and technical documentation supply and review.

ONBASE ESRI INTEGRATION PROJECT

Evansville, Indiana

CLIENT CONTACT

Jo Ann Kiefer,PMP
Vectren
812.491.4236

TYPE OF PROJECT

Data Conversion and Development;; GIS Needs Assessment and BPA; GIS Application Development; GIS Integration; Mobile

DATES OF ACTIVITIES

On-Going

DESCRIPTION OF FIRM ACTIVITIES

The main objective of this project is to integrate OnBase with existing Esri applications at Vectren and develop a custom web application in Java/HTML5 for users to look up any documents that are associated with that particular location in the field. Also included in this phase is a pilot deployment of OnBase in disconnected/offline mode. In particular, the latest preventative maintenance documents for inspections and condition assessment will be accessible by anyone who requires them in the office or field.

PRIME installed, configured and tested OnBase Esri modules and all other necessary components on Vectren's test environment. Analysis was conducted on Vectren's GIS Service Connection Layer for the most optimal fields in the operational data that can be linked and filtered by document type. A toolbar was installed in ArcGIS and configured for various options like importing documents, attaching documents or deleting documents based on the end user permissions in the ArcGIS platform. Keywords are also available depending upon permissions groups. This toolbar is embedded into existing ArcFM, ArcMap 10.1 and the ArcGIS Engine. This toolbar allows end users to retrieve dynamically linked operational documents from multiple assets that are identified in the beginning of the project.

PRIME created a GIS web application template giving users the ability to use web-based GIS application that will enable the end users to point and click on a map layer to retrieve associated documents from OnBase. Any feature on a layer of a geographical map can be automatically linked for single-click access to related documents and their workflow queues stored in OnBase.

Technicians in the field will be able to access inspection documents in OnBase via the mapping application when they do not have any internet connectivity. GIS staff will copy the ArcGIS service connection layer on to a local machine. Using supplied GIS asset management data, PRIME will install pilot instances of the OnBase- Esri offline/disconnected solution to devices for the client to use in the field.

The ArcSDE system was integrated with existing CIS systems, ArcGIS Application and OnBase. Basic workflows were created for the client using ArcPLTS Workflow Manager/JTX for tasks such as adding a water main for new subdivisions and replacing old water mains. Other services that were provided include planning for new GIS business requirements, design review and testing, Esri software testing and vendor management, training, and technical documentation supply and review.

Table 3.1. Summary of Experience

	Data Conversion and Development	Field Data Collection	GIS Staff Augmentation	GIS Needs Assessment and BPA	GIS Application Development	GIS Integration	Utilities
Fiber Optic Network Data Conversion Project	✓					✓	✓
Warrior Watch Application				✓	✓	✓	
Lucity Asset Management/Work Order Management integration	✓	✓		✓		✓	✓
Bulk Refuse Routing				✓	✓	✓	
Cherry Street and Fourth Street Inflow Redirection		✓	✓			✓	✓
Marion Road Area Neighborhood Improvements	✓	✓	✓			✓	✓
Brimfield Area Sanitary Sewer System Improvement	✓	✓				✓	✓
Clintonville Integrated Solutions Project	✓	✓				✓	✓
Doherty Road Waterline Improvements	✓	✓				✓	✓
Alum Creek Stormwater Mitigation and Remediation	✓	✓				✓	✓
Enterprise Utility GIS Services (Newark)	✓	✓	✓	✓	✓	✓	✓
Enterprise GIS Services (Hilliard)	✓			✓	✓	✓	✓
Cityworks Mobile Service Request Application			✓	✓	✓	✓	✓
Countywide Flooding Mitigation Plan and GIS Analysis					✓	✓	✓
RAVEN 911, Desktop and Mobile Web Application Development				✓	✓	✓	✓
Utility Geodatabase Creation and Cityworks Implementation	✓	✓		✓	✓	✓	✓
Water and Sewer Department GIS Project	✓	✓			✓	✓	✓
ONBASE Esri Integration Project	✓	✓			✓	✓	✓


gis
lifecycle
technology
experts
data
projects
solutions
pertinent
application
understanding
shown
clients
applications
management
complexities
experience
geodatabases
engineering
key
project
operational
web-application
development
stages
integrated
infrastructure
trends
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mobile
subject
deliverables
implemented
utility
showcase
several
perform
understand
efficiently
enterprise
vast
collection
utilities
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SECTION 4 | PROPOSED RATES

Labor Classification Descriptions | The following section describes the labor classifications for key personnel and other staff (organized by firm) as requested.

T&M CLASSIFICATIONS

CLASSIFICATION	PRINCIPAL
Minimum Education:	University degree in applied science, engineering or related field.
Required Education:	Professional Engineering License (PE) or Geographic Information Systems Professional (GISP) certification as appropriate
Average Years of Exp.:	15-20 years
Typical Promotion Track:	Staff in this category would have previously served as a Senior Project Manager or GIS Manager and would be working towards a role as an Office Leader.
Typical Responsibilities:	Serve in an operations role and work with office leadership to ensure appropriate technical resources are available. Work with clients to conceptualize and develop project opportunities. Coordinate technical and project resources across offices to ensure project and client needs are being addressed. Assist Project Managers as needed to address.

CLASSIFICATION	GIS DIRECTOR
Minimum Education:	University degree in applied science, engineering or related field.
Required Education:	Geographic Information Systems Professional (GISP)
Average Years of Exp.:	10-15 years
Typical Promotion Track:	Staff in this category would have previously served as a GIS Manager and would be working towards a role as a Principal.
Typical Responsibilities:	Coordinate operations for the GIS Practice Area across all offices for the company. Assess client needs and personnel capabilities. Review industry trends in GIS and support advancement and adaptation of staff capabilities for our projects. Manage projects and review project deliverables for key clients.

CLASSIFICATION	GIS MANAGER
Minimum Education:	University degree in applied science, engineering or related field.
Required Education:	Geographic Information Systems Professional (GISP)
Average Years of Exp.:	8-10 years
Typical Promotion Track:	Staff in this category would have previously served as a Senior GIS Analyst and would be working towards a role as a GIS Director.
Typical Responsibilities:	Manage day-to-day activities for the GIS Department for an office. Coordinate staffing resources across offices and within project teams. Coordinate and work with clients to make sure projects are delivered to client's satisfaction. Manage projects and review project deliverables.

T&M CLASSIFICATIONS

CLASSIFICATION	SENIOR GIS ANALYST
Minimum Education:	University degree in applied science, engineering or related field.
Required Education:	Geographic Information Systems Professional (GISP)
Average Years of Exp.:	4-8 years
Typical Promotion Track:	Staff in this category would have previously served as a GIS Analyst and would be working towards a role as a GIS Project Manager.
Typical Responsibilities:	Serve as a task leader for assigned GIS projects. Perform database design and development. Provide data editing and processing including QA/QC. Perform complex analyses of geographic data. Work independently or as the team lead to design the methodology, document procedures, perform the analysis and prepare presentations. Develop procedural, technical, or training documentation.

CLASSIFICATION	GIS ANALYST
Minimum Education:	University degree in applied science, engineering or related field.
Required Education:	None identified
Average Years of Exp.:	1-4 years
Typical Promotion Track:	This is an entry-level professional position and staff in this category would be working towards a role as a Senior GIS Analyst.
Typical Responsibilities:	Perform data development including digitizing, scanning, and conversion. Provide data editing and processing including QA/QC. Develop maps and other cartographic products. Provide technical support to staff on various GIS projects.

CLASSIFICATION	SENIOR APPLICATION DEVELOPER
Minimum Education:	University degree in applied science, engineering or related field.
Required Education:	None identified
Average Years of Exp.:	4-8 years
Typical Promotion Track:	Staff in this category would have previously served as an Application Developer and would be working towards a role as a Project Manager.
Typical Responsibilities:	Leads the design, develop, document, and maintain public-facing web mapping sites and applications through concept, design, and implementation phases. Works with clients and GIS Manager/ Project Manager to design and develop system architecture. Manage Application Developer team.

CLASSIFICATION	APPLICATION DEVELOPER
Minimum Education:	University degree in applied science, engineering or related field.
Required Education:	None identified
Average Years of Exp.:	1-4 years
Typical Promotion Track:	This is an entry-level professional position and staff in this category would be working towards a role as a Senior Application Developer.
Typical Responsibilities:	Assist with design, develop, document, and maintain public-facing web mapping sites and applications through concept, design, and implementation phases.

T&M CLASSIFICATIONS

CLASSIFICATION	SENIOR ENGINEER
Minimum Education:	University degree in applied science, engineering or related field.
Required Education:	Professional Engineer License (PE)
Average Years of Exp.:	6-10 years
Typical Promotion Track:	Staff in this category would have previously served as a Project Engineer and would be working towards a role as an Engineering Group Manager..
Typical Responsibilities:	Serve as task lead for assigned projects. Perform advanced or complex engineering analyses. Attend client meetings with Project Manager and present project findings. Provide instruction/oversight to other staff. Review project deliverables.

CLASSIFICATION	PROJECT ENGINEER
Minimum Education:	University degree in applied science, engineering or related field.
Required Education:	Engineer In Training (where applicable)
Average Years of Exp.:	1-4 years
Typical Promotion Track:	This is an entry-level professional position and staff in this category would be working towards a role as a Senior Project Engineer.
Typical Responsibilities:	Perform engineering analysis for assigned tasks on projects. Provide documentation support for explanation or report of findings.

CLASSIFICATION	CLERICAL ADMINISTRATIVE
Minimum Education:	High School, 2-year university degree preferred.
Required Education:	None identified
Average Years of Exp.:	2+ years
Typical Promotion Track:	This is an entry-level position and staff in this category would be working towards a role as an Administrative Assistant.
Typical Responsibilities:	Proficiency in MS Word, Excel and Access. Assists with organization and preparation of written project reports, invoices and memorandums. Performs data entry using Excel or other similar programs.

PRIME AE GROUP, INC. CLASSIFICATIONS

CLASSIFICATION	SENIOR GIS ANALYST
Minimum Education:	University degree in applied science, engineering or related field.
Required Education:	Geographic Information Systems Professional (GISP)
Average Years of Exp.:	8-10 years
Typical Promotion Track:	Staff in this category would have previously served as a GIS Analyst and would be working towards a role as a GIS Project Manager.
Typical Responsibilities:	Serve as a task leader for assigned GIS projects. Perform database design and development. Provide data editing and processing including QA/QC. Perform complex analyses of geographic data. Work independently or as the team lead to design the methodology, document procedures, perform the analysis and prepare presentations. Develop procedural, technical, or training documentation.

CLASSIFICATION	QA/QC MANAGER
Minimum Education:	University degree in applied science, engineering or related field.
Required Education:	Professional Engineer License (PE)
Average Years of Exp.:	15+ years
Typical Promotion Track:	Staff in this category would have previously served as a Senior Project Engineer and would be working towards a role as an Engineering Group Manager.
Typical Responsibilities:	Serve as team leader and overall manager for assigned projects. Single point of contact for the client. Perform advanced or complex engineering analyses. Attend client meetings and present project findings. Provide instruction/oversight to other staff. Review project deliverables.

CLASSIFICATION	PROJECT MANAGER / WASTEWATER
Minimum Education:	University degree in applied science, engineering or related field.
Required Education:	Professional Engineer License (PE)
Average Years of Exp.:	15+ years
Typical Promotion Track:	Staff in this category would have previously served as a Senior Project Engineer and would be working towards a role as an Engineering Group Manager.
Typical Responsibilities:	Serve as discipline lead for assigned projects. Perform advanced or complex engineering analyses. Attend client meetings with Project Manager and present project findings. Provide instruction/oversight to other staff. Review project deliverables.

CLASSIFICATION	SENIOR ENGINEER / WASTEWATER
Minimum Education:	University degree in applied science, engineering or related field.
Required Education:	Professional Engineer (PE)
Average Years of Exp.:	15+ years
Typical Promotion Track:	Staff in this category would have previously served as a Project Engineer and would be working towards a role as a Business Project Manager.
Typical Responsibilities:	Manage assigned projects, including ensuring project meets the designated scope, fee and schedule requirements. Serve as liaison to client and other consultants on project. Assigns relevant staff to project tasks. Review project deliverables. Ensure appropriate QA/QC is performed.

MS CONSULTANTS, INC. CLASSIFICATIONS

CLASSIFICATION	PROJECT MANAGER
Minimum Education:	University degree engineering.
Required Education:	Professional Engineer License (PE)
Average Years of Exp.:	10-30 years
Typical Promotion Track:	Staff in this category would have previously served as a Project Engineer and would be working towards a role as a Business Project Manager.
Typical Responsibilities:	Manage assigned projects, including ensuring project meets the designated scope, fee and schedule requirements. Serve as liaison to client and other consultants on project. Assigns relevant staff to project tasks. Review project deliverables. Ensure appropriate QA/QC is performed.

CLASSIFICATION	SENIOR ENGINEER
Minimum Education:	University degree in applied science, engineering or related field.
Required Education:	Professional Engineer License (PE)
Average Years of Exp.:	10-30 years
Typical Promotion Track:	Staff in this category would have previously served as a Project Engineer and would be working towards a role as a Technical Sector Manager.
Typical Responsibilities:	Serve as task lead for assigned projects. Perform advanced or complex engineering analyses. Attend client meetings with Project Manager and present project findings. Provide instruction/oversight to other staff. Review project deliverables.

CLASSIFICATION	PROJECT ENGINEER
Minimum Education:	University degree in applied science, engineering or related field.
Required Education:	Engineer In Training (where applicable)
Average Years of Exp.:	5-15 years
Typical Promotion Track:	Staff in this category were previously graduate engineers and would be working towards a role as a Senior Project Engineer.
Typical Responsibilities:	Perform engineering analysis for assigned tasks on projects. Provide documentation support for explanation or report of findings.

CLASSIFICATION	SURVEYOR
Minimum Education:	University degree in applied science, engineering or related field.
Required Education:	Professional Surveyor
Average Years of Exp.:	10-20 years
Typical Promotion Track:	Staff is this category were previously Surveyors-in-Training and would be working towards a role as the Surveying Technical Sector Manager.
Typical Responsibilities:	Serve as task lead for assigned projects. Responsible for ensuring field data is correctly input into basemapping. Reviews project deliverables. Provides instruction/oversight to field crews.

MS CONSULTANTS, INC. CLASSIFICATIONS

CLASSIFICATION	2 PERSON FIELD CREW
Minimum Education:	High School, 2-year university degree preferred.
Required Education:	None required
Average Years of Exp.:	2+ years
Typical Promotion Track:	This is an entry-level position and staff in this category would be working towards a role as a Field Crew Chief.
Typical Responsibilities:	Proficiency with current field surveying equipment including GPS. Able to correctly identify infrastructure for conversion into basemap data. Able to accurately obtain sewer inverts and other data.

CLASSIFICATION	CLERICAL / ADMINISTRATIVE
Minimum Education:	High School, 2-year university degree preferred.
Required Education:	None required
Average Years of Exp.:	2+ years
Typical Promotion Track:	This is an entry-level position and staff in this category would be working towards a role as an Administrative Assistant.
Typical Responsibilities:	Proficiency in MS Word, Excel and Access. Assists with organization and preparation of written project reports, invoices and memorandums. Performs data entry using Excel or other similar programs.

Labor Classification Rates | The below table shows the maximum (cap) hourly rate for all labor categories for 2014, 2015, 2016. **The hourly cost multiplier (HCM) for this project is 3.0%.**

Labor Classification	2014 Max Hourly Rate	2015 Max Hourly Rate	2016 Max Hourly Rate
T&M ASSOCIATES			
GIS Analyst	$25.00	$25.75	$26.52
Senior Application Developer	$35.44	$36.50	$37.60
Application Developer	$30.00	$30.90	$31.83
Senior Engineer	$56.02	$57.70	$59.43
Project Engineer	$36.10	$37.18	$38.30
PRIME AE GROUP, INC.			
Senior GIS Analyst	$28.85	$29.72	$30.61
QA/QC Manager	$62.50	$64.38	$66.31
Project Manager (Water/Wastewater)	$57.69	$59.42	$61.20
Senior Engineer (Water/Wastewater)	$33.65	$34.66	$35.70
MS CONSULTANTS, INC.			
Project Manager	$50.00	$52.00	$55.00
Senior Project Engineer	$61.00	$64.00	$67.00
Project Engineer	$45.00	$47.00	$49.00
Surveyor	$34.00	$36.00	$38.00
Clerical	$18.00	$19.00	$20.00
2-Person Field Crew	$43.00	$45.00	$47.00


gis
staff
operations
combination
data
valuable
unique
utilize
closely
provide
critical
proven
experience
solutions
entities
projects
understand
utilities
requirements
dpu
knowledge
applications
engineers
professionals
similar
personnel
surveyors
worked
validated
engineering
key

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

OFFICE LOCATIONS

T&M intends to manage this project from our office in Columbus, OH where over 90% of our Team's assigned personnel are located. Our Project Manager, Darlene Magold Scott will locally coordinate all project tasks as she has done on countless other projects for the City of Columbus. Having a local PM with direct access to local resources will provide the City with a highly-responsive and effective team.

Jesse Glascock (located in Cincinnati, OH) and Tom Tri (Located in Louisville, KY) will provide Application Development and QA/QC services respectively. Jesse and Tom have worked in a similar capacity on other assignments with Darlene and are proficient in the use of remote computing technologies for collaborative project participation. Although the nature of their assignments encourages the use of technology such as WebEX, Virtual Machines and Microsoft Lync to share desktops and work together in a team environment, sometimes a face-to-face meeting is the most effective communication method. When appropriate, Jesse and Tom are available for local meetings, just as they have been successfully in the past.

Below table indicates corporate and local office locations for T&M and our sub-consultants.

T&M ASSOCIATES	
CORPORATE OFFICE	**LOCAL OFFICE WITH PERSONNEL ASSIGNED TO THIS PROJECT**
Eleven Tindall Road Middletown, NJ 07747	4675 Lakehurst Ct, Suite 250, Columbus, OH 43016 300 E-Business Way, Suite 241A, Cincinnati, OH 45241 10200 Forest Green Blvd, Suite 112, Louisville, KY 40223
PRIME AE GROUP, INC.	
CORPORATE OFFICE	**LOCAL OFFICE WITH PERSONNEL ASSIGNED TO THIS PROJECT**
55 Capital Boulevard 2nd Floor Rocky Hill, CT 06067	3000 Corporate Exchange Drive, Suite 600, Columbus, OH 43231
MS CONSULTANTS, INC.	
CORPORATE OFFICE	**LOCAL OFFICE WITH PERSONNEL ASSIGNED TO THIS PROJECT**
2221 Schrock Road Columbus, OH 43229-1547	2221 Schrock Road, Columbus, OH 43229-1547

LOCAL WORKFORCE

T&M recognizes the importance of providing the City with a highly-qualified Team that supports the desire to utilize GIS as a tool to manage the City's resources. Our Team also consists largely of assigned personnel that are paying City of Columbus Income Tax, thereby providing revenue for the City. As indicated in table 5.2, over 90% of our Team's project labor costs are assigned to employees that currently pay City of Columbus income tax.

Firm	Assigned Personnel	Office Location	Labor Rate	Locally Taxed Labor Rate
T&M	Bill Foster	Columbus, OH	$36.10	$36.10
T&M	Cody Gierhart	Columbus, OH	$23.00	$23.00
T&M	Jesse Glascock	Cincinnati, OH	$35.44	
T&M	Terri Hennessy	Columbus, OH	$20.00	$20.00
T&M	Cindy Jacobsen	Columbus, OH	$56.02	$56.02
T&M	Erick Lobao	Columbus, OH	$39.95	$39.95
T&M	Michael Opritza	Columbus, OH	$25.00	$25.00
T&M	Darlene Magold Scott	Columbus, OH	$50.96	$50.96
T&M	Tom Tri	Louisville, KY	$45.68	
T&M	Jon Woyame	Columbus, OH	$30.00	$30.00
PRIME	Bill Boggs	Columbus, OH	$33.65	$33.65
PRIME	Dave Kozman	Columbus, OH	$62.50	$62.50
PRIME	Michael Navabi	Columbus, OH	$57.69	$57.69
PRIME	Matt Shade	Columbus, OH	$28.85	$28.85
ms	Christian Anzuini	Columbus, OH	$21.50	$21.50
ms	Alan Buck	Columbus, OH	$21.50	$21.50
ms	Beth Ehret	Columbus, OH	$50.00	$50.00
ms	Julie McGill	Columbus, OH	$45.00	$45.00
ms	Fred Smith	Columbus, OH	$61.00	$61.00
ms	Chad Snow	Columbus, OH	$34.00	$34.00
ms	Anil Tangirala	Columbus, OH	$45.00	$45.00
		TOTAL	$822.84	$741.71
Percentage of labor cost assigned to employees paying City of Columbus income tax*				90.1%

*Percentage was calculated by dividing the sum of locally taxed labor rates by the total combined labor rates of the Team.

SECTION 6 | OTHER PERTINENT INFORMATION

Proposal Quality

Our proposal is organized in a way that allows the City staff to easily evaluate our team, experience, and project management processes. The sections follow the requirements as defined by DPU and highlight the key elements as requested. The proposal is printed on recycled paper and printed on both sides in order to promote environmental stewardship.

Competence of the Project Team to Perform

The T&M Team is proposing a Project Manager and Assistant Project Manager that have previous experience managing this same General Services Contract successfully. Ms. Magold Scott has also managed general services for DoT and many other municipalities with a utility and asset management focus. She understands utility operations and can formulate teams to accomplish tasks utilizing the latest GIS technology on time and within budget. Mr. Lobao also has widespread experience managing and implementing GIS applications within utilities. Our personal experience (Section 2) highlights our education, successful past, as well as our ability to maintain long-term clients thought excellent performance.

Our Team consists of three (3) firms with staff who have proven experience with GIS and utilities. We have a unique combination of GIS professionals, engineers and surveyors who have completed projects similar to your requirements. As shown in Section 2, our key staff has worked closely with DPU staff (GIS and engineering) and we understand how data and applications are critical for utility operations. Our personnel experience with other entities is also valuable to DPU. We can utilize our knowledge to provide solutions that have been validated and proven.

Relevant Project Experience

Our vast project experience shown in Section 3, illustrate our understanding of GIS technology pertinent to utilities. We have experience with all stages of the GIS lifecycle from data collection to application development. Our projects showcase how we have integrated the latest GIS technology trends such as web-application and mobile development, so that our clients can perform utility operational tasks more efficiently. We also utilize subject matter experts who understand the complexities of utility management and infrastructure as shown by our Team's several engineering and GIS integration projects. Our Team has implemented enterprise solutions with the understanding that deliverables of key projects are integrated into GIS geodatabases or applications.

Local Workforce

Over 90% of the Team is proudly located within the City of Columbus. Several of our Team members have worked together for over a decade across offices successfully and will continue to provide excellent service if selected for this project.