

Technical Proposal
Mapping Services
for
Southern Counties of West Virginia
RFQ Number DEP15938



Submitted to:
State of West Virginia
Department of Administration
Purchasing Division
Charleston, West Virginia

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Submitted by:
Michael Baker Jr., Inc.
Charleston, West Virginia

Baker

September 2012

Baker

Michael Baker Jr., Inc.
A Unit of Michael Baker Corporation

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September 5, 2012

State of West Virginia
Department of Administration
Purchasing Division
2019 Washington Street, East
Charleston, WV 25305-0103

Attention: Mr. Guy L. Nisbet, Senior Buyer

**Re: Expression of Interest for Professional Engineering and Mapping Services within Southern Counties of West Virginia for the West Virginia Department of Environmental Protection's Office of Abandoned Mine Lands And Reclamation
RFQ Number DEP15938**

Dear Mr. Nisbet:

Michael Baker Jr., Inc. (Baker) is pleased to submit this Expression of Interest to provide professional engineering and mapping services for the **West Virginia Department of Environmental Protection's (WVDEP) Office of Abandoned Mine Lands and Reclamation**. Baker has an in-house team of experienced personnel who have successfully demonstrated our capabilities on similar assignments for the WVDEP. Our seasoned team members have also provided engineering services for numerous abandoned mine land reclamation and related projects for a variety of clients.

Baker's staff is experienced in all aspects of AML/R/AMD projects. Baker has been providing engineering services for abandoned mine lands since the Federal government first enacted AML legislation. We have provided these services for the WVDEP, the Pennsylvania Department of Environmental Protection, Ohio Department of Natural Resources, and the U.S. Office of Surface Mining among others. Since 1983 Baker has been providing the WVDEP with superior service, which gives us the knowledge and confidence to ensure our assignments will be completed on time, within budget, and to your exacting standards.

Baker is also one of the few companies to provide high definition scanning services involving static and mobile LiDAR to supplement conventional surveying and aerial mapping. This would be beneficial for areas not captured by aerial mapping where access or safety might be an issue (i.e. high walls, unstable ground or other unsafe conditions). Baker will use these technologies to survey areas from a safe and suitable location.

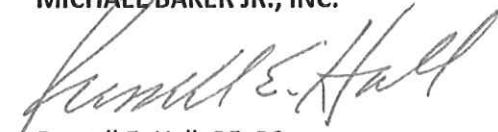
Baker

Mr. Guy Nesbit
State of West Virginia
September 5, 2012
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This submittal illustrates our qualifications and experience to deal with this assignment of work arising from this contract. If you have any questions or require additional information concerning our qualifications, experience or approach, please contact me at 304.769.2144.

Sincerely,

MICHAEL BAKER JR., INC.



Russell E. Hall, PE, PS
Office Principal

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INTRODUCTION

Michael Baker Jr., Inc. (Baker) was founded in 1940 as a civil engineering and surveying firm and is now one of the largest professional services firms in the United States, consistently ranked in the top 10% of engineering firms by Engineering News Record. In the 1950s, Baker became one of the first private firms to provide photogrammetric mapping services, and we have continued to be at the forefront of the mapping sciences ever since. Our clients have been able to effectively leverage our experience for their mapping and modeling of flood plains, highway and road preliminary route location, final design, and rehabilitation projects, among others. We have grown because we continually leverage our project experiences to deliver services to meet the needs of the specific organization, such as the West Virginia Department of Environmental Protection.

In addition to providing surveying and Photogrammetry services, Baker has invested on acquiring the high definition scanning services including Mobile and Static LiDAR. Using our Mobile LiDAR, Baker has scanned the City of Charleston using our Mobile LiDAR. As part of the project, Baker has established 800 control points through the project. Baker has also performed mine surveys.

We know we must deliver our high-quality service in a cost-conscious and timely manner including when we perform under open-end contracts. To that end, our success is evidenced by the fact that more than 85% of our business is from repeat clients. Our goal is to *deliver a quality job on schedule and within budget every time.*

CAPACITY

We are accustomed to supporting multiple, concurrent task orders under indefinite delivery/indefinite quantity (IDIQ) or open-end contracts and can easily meet the WVDEP's needs with in-house capabilities. Baker routinely executes work through contract mechanisms for a variety of federal, state, local government, and private sector clients.

Baker has a rich surveying history in West Virginia and minimally deploys 10 to 20 field **survey crews** throughout the region. The crews are outfitted with both electronic total stations and Real Time Kinematics (RTK) equipment, enabling them to quickly transition to the most efficient field operations based upon localized site conditions. In addition, Baker has several robotic electronic total stations facilitating the collection of topographic survey data by a single person.

Baker has full, in-house, **photogrammetric mapping capability**, including aerial film scanning. Stereo compilation is performed using Z/I Imaging softcopy stereo workstation running ImageStation Feature Collection Software for data capture. Data is delivered in standard CAD files, such as AutoCAD.

Aerial photography acquisition will be provided by Air Photographics, Inc. (API) of Martinsburg, West Virginia, a subcontractor with whom Baker maintains a close-working relationship. The experience and expertise we gained when we operated our own aircraft for aerial photographic missions now enables us to effectively manage our aerial subcontractor.

API maintains a fleet of eight aircraft and Leica precision cameras equipped with forward motion compensation.

Baker has the necessary human and computing resources to perform topographic and photographic mapping per the RFQ. Baker has the capacity and capability to accelerate the schedule if necessary by reassigning production personnel to the project and operating on a multiple shift basis. We have the capabilities for providing additional services and/or services under an accelerated schedule. With annual revenues over \$500 million, we can reassign personnel, equipment, and facilities as necessary to support the project as needed, or to work on other projects, if a suspension should occur in this project.

To support the client's needs Baker has established a state-of-the-art server called Baker Enterprise Architecture for Spatial Technology (BEAST). A Central Citrix/ArcSDE/DB server, the BEAST provides an effective and efficient work environment that enables our geospatial professionals to share data and applications around the globe. The BEAST enables internal users connect to applications through the local network, and remote users access the system using the Internet. In the past this data would have been manipulated through files located on local machines and forwarded to different offices on CDs via postal mail. The BEAST allows Baker to avoid these manual data sharing and coordination efforts that waste valuable time and resources.

The BEAST provides for the capacity to store and manipulate large datasets from any laptop or desktop computer attached to the communications network in a consistent manner. Software packages including CADD can be easily loaded for use by any project employee in any office. The centralized project server provides 24-7 system access in all time zones. It also facilitates system support for all users promoting timely responses to project and/or system questions and issues as encountered. This support can run in parallel with project schedules across all time zones.

Redundant project servers are a typical method employed by Baker to assure project continuity and mitigate the risk associated with system interruption. Periodic synchronization ensures nearly identical systems running in separate and distinct locations. Maintaining the project server in both locations promotes uninterrupted access should system integrity be compromised at one of the two locations.

KEY STAFF

Baker has the trained and experienced staff to develop detailed topographic mapping using both field survey and photogrammetric methods for the WVDEP. Our project team includes West Virginia licensed land surveyors, field crews knowledgeable of the local conditions in West Virginia, and AutoCAD experts familiar with the preparation of topographic drawings.

Key staff qualifications are outlined below.

Mr. Russell E. Hall, PE, PS (WV Professional Engineer #10947 and Professional Surveyor #1878) – Principal-In-Charge. Mr. Hall currently serves as Assistant Vice President of Michael Baker Jr., Inc., as well as Office Manager of our Charleston, West Virginia office. He is an experienced transportation engineer who has been involved in numerous bridge and highway design projects in West Virginia for over 25 years. His primary role is to assure the on-going project assignment of experienced technical staff, administration, and management systems to Mr. Davidson, the Project Manager.

Mr. Gregory P. Hynes, PE (WV Professional Engineer #013850) – Mining Engineer. Mr. Hynes has a background in reclamation of abandoned mine lands, including acid mine drainage. He has worked on over 30 AML reclamation projects, many of them for the WVDEP, Abandoned Mines and Reclamation Office. He will be a resource available to the mapping operation to ensure that the topographical mapping meets the needs of the WVDEP.

Mr. C. Douglas Davidson, PS (WV Professional Surveyor #819) – Project Manager. Mr. Davidson is a licensed West Virginia Surveyor and all work will be performed under his direction. He is located in our Charleston, West Virginia office and will be the primary point of contact with the WVDEP. His responsibilities will include overall administration and coordination of issued Work Directives, establishing and maintaining project schedules, arranging the on-site meetings, and submitting cost proposals. He was selected for this role based on the excellent fit of his experience and proximity to the WVDEP.

Dr. Srini Dharmapuri, CP, PPS, PMP, GISP – Photogrammetry Manager. Dr. Dharmapuri, a Certified Photogrammetrist, will sign and seal the photogrammetry products. He has over 26 years of experience in mapping and will be lead the production efforts. He will be responsible for flight planning, horizontal and vertical control layout, stereo compilation, and CAD editing of the final topographic map products.

Mr. Michael J. Given, PS (WV Professional Surveyor #896) – Survey Supervisor. Mr. Given is a licensed West Virginia Surveyor and will be available to assist Mr. Davidson in the day-to-day field operations. He has over 20 year's experience performing surveys, supervising field crews, and preparing topographic map deliverables. He will accompany Mr. Davidson and the DEP representative on the field reconnaissance for the Work Directives.

Mr. Michael Dooley – Photogrammetry QMS. Mr. Dooley will oversee the QA/QC process for key Baker projects. He has successfully handled over 500 projects over the past 12 years.

Resumes for these key personnel, as well as field, CADD, and photogrammetric production staff follow.

Name	Title
Russell (Rusty) E. Hall, PE, PS	Principal-In-Charge
C. Douglas Davidson, PS	Project Manager
Gregory P. Hynes, PE	Mining Engineer
Dr. Srinidharan Dharmapuri, CP, GISP, PMP, PPS	Photogrammetry Manager
Michael J. Given, PS	Survey Supervisor
Jason Smithson, PS	Survey Crew Chief
Joseph Crowder, PS	Survey Crew Chief
Matthew Perdue, Jr.	Survey Crew
Michael Dooley	QA/QC
James Equels, Jr.	Stereo Compiler
James D. Lamey	Stereo Compiler
Stacey Taylor	CAD Specialist

SURVEY AND MAPPING EXPERTISE

For over 70 years, Baker has successfully delivered topographic mapping projects to our clients using field surveys and aerial photography. The WVDEP has identified the need for topographical mapping from field survey data, as well as aerial photography, design data surveys, the development of field survey information suitable and adequate for the development of detailed plans and specifications. Baker has been providing such services for the last 70 years to various federal and state agencies

Control Surveys

Baker has considerable expertise in developing control plans and performing surveys for topographic mapping projects. We have performed horizontal and vertical control surveys for the United States Geological Survey (USGS), Pennsylvania Department of Transportation, Pennsylvania Turnpike Commission, major utility companies, numerous US Army Corps of Engineers Districts, plus various cities and counties. We know what is required to meet the accuracy standards for WVDEP.

Topographic Surveys

Baker's topographic survey expertise covers diverse site conditions for engineering design, from commercial developments to the Border Fence to military sites in Iraq, Afghanistan, and Jordan. A variety of advanced, industry-grade equipment is used to complete a topographic survey. This includes total stations, electronic data collectors, GNSS RTK receivers, levels, and other associated tools and equipment needed to precisely measure and successfully operate in the field.

Boundary Surveys

Baker's boundary surveying projects are led by highly-capable, licensed surveyors who manage, direct, and oversee field survey crews in both "metes and bounds" and "Public Lands" systems. Projects begin with thorough research of existing records which involves reviewing title reports, examining public records, and analyzing legal descriptions with strict metes and bounds. This is followed by meticulous field reconnaissance efforts to recover old survey monuments and features to aid in the execution of the boundary survey. Upon completion of these initial steps, the surveying team transitions to performing the boundary survey.

Construction Surveys

Our construction surveyors perform measurements, make calculations, design "on-the-fly" field changes, and give advice and recommendations to engineers, architects, contractors, and other associated professionals at every stage of any construction project. They understand construction plans and specifications, and are knowledgeable in the construction process.

Aerial Photography

For 32 years Baker flew its own aerial photography. We now subcontract the aerial mission to qualified data acquisition firms with whom we maintain a close, working relationship. The considerable experience and expertise we gained flying our own photography now enables us to effectively plan aerial missions and ensure quality imagery. In addition, Baker has the experience and in-house capability for scanning the aerial film.

Stereo Compilation

Baker began providing photogrammetric mapping services in the 1950's; one of the first private firms with the capability. Over the ensuing 60 years, Baker grew with the technology, from the early balplex and multiplex plotters, to the Kelsh plotters of the 60's, and the analog and analytical plotters that followed. Today, Baker operates softcopy stereo workstations for photogrammetric data compilation.

CAD Drafting

CAD drafting has been an integral part of Baker's surveying and mapping operation for over 30 years and topographic mapping was the first discipline to implement CAD into its production work process. Today, CAD is the standard procedure for creating topographic mapping by both field survey and aerial photography methods.

In addition, Baker's civil engineering group is experienced in all aspects of AML/AMD and has been providing engineering services for abandoned mine lands since the Federal government first enacted AML legislation. We have provided these services for the WVDEP and this specific experience will benefit the Department by ensuring that the topographical mapping developed under this contract will meet the requirements for developing detailed plans and specifications.

PROJECT OBJECTIVE & METHODOLOGY

Understanding

Baker has reviewed the Scope of Work prepared by the WVDEP for the development of detailed topographic mapping and designed an approach to create the required deliverable products. Our goal is simple – provide the WVDEP with accurate, high quality survey and mapping products.

Our approach is broken down into the following logical steps of a project:

- ❖ Initiation and Planning
- ❖ Surveys
- ❖ Aerial Photography
- ❖ Stereo Compilation
- ❖ CAD Drafting

Initiation and Planning

Project initiation and planning is one of the most important phases of any project. The decisions made at startup will affect not only the production activities, but also the suitability of the mapping products for the development of detailed plans and specifications.

Projects will begin with the issuance of a Work Directive by the WVDEP Project Manager specifying the location of the project, the specific problem, the work required, and the time frame for completion. This will be followed by the Baker Project Manager arranging an on-site meeting with WVDEP and completing the field reconnaissance with a WVDEP representative.

A flight plan will be prepared to acquire stereoscopic photo coverage of the project site. Once the flight line(s) have been defined, the horizontal and vertical control required to achieve the specified accuracy will be located and the control plan developed.

The final task of the Initiation and Planning Phase will be the submission of the cost and final schedule to the WVDEP Project Manager.

Surveys

Field surveys will be performed to establish horizontal and vertical control for preparing the topographic maps. Baker uses total station, differential leveling and GNSS to perform control surveys. Regardless of the methodology used, each survey assignment stands on its own with redundant observations. When existing control points are used, the full complement of existing control documentation is referenced in the surveys notes and reports. Specific project requirements including terrain, environment, altitude, site access/restrictions, client needs, etc. are factored into the survey's mission planning and determine which survey methodology is applied for establishing control.

Global Navigation Satellite Surveying

Based on its lower costs and overall efficiency, GNSS is the preferred survey method of supplying high order control points provided that the elevation result meets the requirement. This method, which broadcasts location from a known place to a roving unit or leverages a network of virtual reference stations (VRS), makes GNSS an option in most locations.

Terrestrial (Total Station) Surveys

When local land use and environmental factors obscure or prevent the use of GNSS survey, Baker employs total station to establish survey control. Every control survey is 3D, and traverse surveys must be closed within themselves.

Differential Leveling

In circumstances where precision is more important than any other project variable, particularly in regards to vertical measurement, Baker uses leveling to accomplish the control. Level survey may be needed when a project requires survey accuracies to be within hundredths of a foot instead of tenths of a foot. Level and rod survey methods are also used to transfer elevations from benchmarks to features of interest. An example of this is when an elevation must be transferred from a benchmark to a photogrammetric control point by GNSS means but the benchmark is not suitable for collecting data by virtue of its location. In this case, the level is used to transfer the elevation to one that is considered a suitable setup for the tripod with clear sky.

Since horizontal and vertical control is the foundation of all aspects of project delivery, Baker has established criterion for selecting which survey method to use and best practices for performing the survey to achieve required accuracy standards.

Aerial Photography

New aerial photography will be flown during the period when deciduous trees are "leaf-free", and generally between 10:00 a.m. and 2:00 p.m., local time, when the sun angle is not less than 30°. Photography will not be undertaken when the ground is obscured by clouds, snow, haze, fog, smoke, or dust; when streams are not within their normal banks; or when cloud shadows appear on more than 5% of the area of any individual photograph. The photographs will not contain objectionable shadows caused by relief or low solar altitude.

The flying altitude will be 3,600 feet above mean ground level with no departures exceeding 5%, resulting in photography at the nominal scale of 1"=600'.

API's aircraft are equipped specifically for airborne GPS photo missions. A GPS antenna is mounted permanently to the fuselage of the aircraft over the aerial camera. Careful measurements are made to determine the vertical distance (in the attitude of flight) from the base of the antenna to the entrance node of the camera.

The camera is connected to the GPS receiver so that the time of events can be logged precisely using the on-board atomic clock of the GPS unit. These events are simply the midpoint of each exposure taken with the FMC camera. At the midpoint of each exposure, the camera sends a 5-volt logic pulse to the GPS receiver. This pulse travels along a short cable to one of the ports on the GPS receiver. Each pulse is logged as an event within the GPS receiver.

In addition to capturing these events, the receiver is capturing satellite data at one second intervals during the flight. A similar receiver located over a known point on the ground in the vicinity of the project also captures information at this one second interval. This information is post-processed using on-the-fly kinematic techniques to determine the accurate position of the aircraft at each of these one second points in time. Non-linear interpolation is used to determine the position of the camera at each of the logged events (which occur at random points between the logged one second intervals). API will post process the data along with the data from the aerial camera GPS unit to produce final photo center coordinates for each exposure. These photo center coordinates will be utilized by Baker in addition to the ground control points to control the Analytical Triangulation solution.

Overlap and Sidelap

Consecutive photos in each flight line will have an average forward overlap of 60 percent. Lateral overlap between flight lines will be 30 percent.

Aerial Film

Kodak Aerocolor III 2444 or equivalent film will be used for the black and white photography. Outdated film will not be used. The film will be stored and handled in accordance with the manufacturer's written instructions.

Scanning

Baker will scan the film using our Z/I-Imaging PhotoScan High Resolution Scanner with a measured geometric accuracy of one micron. Baker will scan each exposure at a 14-micron (1814 dpi) resolution. This will result in a raw pixel size of 0.33' from the 1"= 600' photography. This flatbed scanner has been a part of Baker's production process since 1996. The scanner software allows for radiometric corrections and histogram adjustments to be made and stored on-line ensuring accurate and complete reproduction of each exposure. The parameters of each scan are recorded and the histogram statistics are checked and compared to develop consistent, high quality scans. Features within dark areas are visible and not "blackened out" because of over stretching or over manipulating the histograms. The same is true for features located in bright regions. All necessary measures are taken to ensure that even the most subtle tonal differences are correctly captured and displayed in the scan files during the scanning operation to produce scans of exceptional quality.

Images are output as 8-bit black and white TIFF files.

Stereo Compilation

Stereo compilation is accomplished using Z/I Imaging stereo workstations running ImageStation Feature Collection Software for digitizing.

Compilation begins with digitizing 3D surface data. Mass points are generated at a regular 50-foot grid interval using ImageStation Automatic Elevation (ISAE) Software, proven automatic elevation generation software from Z/I imaging. Additional mass points are stereo digitized where required. These mass points are then supplemented with breaklines at significant terrain changes such as ridges, summits, depressions, and valley floors. Breaklines are also captured along road edges and hydrographic features such as rivers, lakes and shorelines.

Each stereo model is then subjected to a full stereoscopic quality control review to edit out point outliers that do not meet the project accuracy standards for the topographic mapping or that fall in buildings or on

bridges. This review of the superimposed points and breaklines is performed on the softcopy stereo workstations for immediate verification of the elevation accuracy of the DTM data.

As each stereo model is begun, the tie to surrounding models is verified, ensuring there are no breaks or gaps in the DTM.

Immediately following the completion of the DTM data collection, the stereo operator generates check contours at the workstation enabling the review of the resulting contours in conjunction with the stereo model, verifying the completeness and correctness of the data collected.

Following completion of the DEM/DTM, the planimetric features that were captured during the creation of the DTM, such as roads, railroads, and streams, are extracted, smoothed, and written to the planimetric file. Compilation then continues with the digitizing of additional physical features, such as vegetation, rock outcrops, etc. This is followed by the digitizing of cultural features, such as houses, barns, pipelines, fences, power lines, and other cultural features that can be located and identified.

The planimetric mapping is edge-matched between adjacent stereo models and features with a common boundary are given the same digital representation in all common occurrences. Features that span more than one model are compiled in the model that contains the majority of the feature. Features too expensive to be compiled in this manner are captured in two or more models and then analytically snapped and combined.

The appropriate symbology and data structure requirements are incorporated into Baker's feature collection software for each feature identified above. The symbols and abbreviations used will be in accordance with "Standard Map Symbols" published by the Soil Conservation Service, U.S. Department of Agriculture, January 1965.

CAD Drafting

Once a sufficient backlog of completed models is generated, the planimetric models are merged to form seamless datasets. These files then undergo an edit process where the integrity of the linework is validated, features are labeled, and the data is checked for compliance to the project's graphic standards.

Contours are generated by processing the DTM and interpolate the final two-foot contours for the project areas.

The following section provides a concise description of the significant procedures that occur to create contours for the project.

The points in the DTM are related and connected to each other by creating a Triangulated Irregular Network (TIN). Drawing 3D triangles whose corners are the DTM points create the TIN. The TIN represents the ground surface.

The TIN is then processed to create the contour levels using contour interpolation software. After processing, attributes for elevation and line type are automatically populated for each line. Since the TIN covers many individual sheet tiles, the contours across sheet (tile) edges are generated as continuous lines, resulting in an exact edge match of contours along the tile boundaries after clipping to the tile format.

Creating an aesthetic cartographic contour map is the next step in the process. At editing workstations, contours are smoothed, enhanced, and verified to be within the tolerances of the accuracy specifications. A final inspection of the vertical accuracy is then performed by comparing spot elevations to the interpolated contours.

Contour files are extracted for the contour data based on the final sheet layout. Contours are at a two-foot interval with a ten-foot index. The index contours are generated at a heavier weight and labeled. The contours are processed with the building data and contour segments within buildings and under bridges are coded as hidden. In addition, an operator reviews the index contour labels, makes appropriate aesthetic adjustments, and processes the file for automated validation of the line work.

The final CAD files will be AutoCAD format and prepared for 1"=100' output. The drawing files will include:

- ❖ The name of the project
- ❖ Inserts showing the location of all reference points
- ❖ The location of the project (County map)
- ❖ Legend
- ❖ Title block for approval signatures
- ❖ Map scale and North Arrow

The sheets will be oriented such that the direction of stream flow is from left to right or from top to bottom of the sheet and the direction of stream flow will be indicated by arrows. All horizontal and vertical control points, permanent and temporary, will be located and identified on the map.

PROJECT MANAGEMENT

Project Planning

Project planning is clearly the most important phase of a project. The decisions made at this stage affect not only the mapping activities, but also the long-term usability of the data. The Project Plan is a management document that serves as a road map for the project. The Baker PM is responsible for developing a comprehensive plan that defines the project goals and milestones, the schedule for meeting these goals and milestones, the work breakdown structure (WBS) for the project into tasks and subtasks, the corresponding budgets for each task and subtask, and the resource requirements to complete each task on schedule. The ultimate goal of the plan is to ensure the success of the project. Project planning will include the flight plan, final control layout, the project kickoff meeting, and the final project schedule.

Kickoff Meeting

We begin each project with a kick-off meeting to clearly define requirements. Specific objectives of the kick-off meeting include:

- ❖ Introduce team members to one another
- ❖ Review the project schedule and milestones
- ❖ Review deliverables and expectations
- ❖ Discuss Quality Assurance procedures
- ❖ Discuss Technical Requirements and Acceptance Criteria

Baker will prepare notes of the meeting and furnish a copy to FGMI.

QA/QC Program

Baker's QA/QC program is a tested and proven system. Our approach is to integrate the quality into the work process by establishing checkpoints for each interim step, not just the final deliverable. This eliminates the extensive checking and rework cycles prior to delivery to control data quality. In our approach, these QC steps are described, not only as to what will be done, but also when it occurs. Visual and automated methods are used for validation.

- ★ Baker is committed to quality assurance and quality control of our mapping products. Baker's LiDAR processing office in Beaver is certified to **ISO 9001:2008** and is registered for the Design and Provision of Professional Engineering and Consulting Services with a focus on Geospatial Information Technologies.

COMPLETED PROJECTS (PAST 5 YEARS)

Photogrammetric Mapping Services

Saxonburg, Pennsylvania

Baker provided professional services to acquire new aerial photography, stereo-compile digital mapping data, and produce digital orthophoto files for a project site encompassing an area of approximately 3,738 acres.

Prior to the aerial photography mission, Baker established geodetic control using geographical positioning system (GPS) or conventional survey methods, as required. Baker obtained new aerial photography at a scale of 1 inch = 500 feet to support 1 inch = 50-foot mapping. Baker acquired the photography using airborne global positioning system (GPS) technology and scanned the black and white film to produce a set of raw scan files in uncompressed TIFF format.

Baker performed Fully Analytic Aerial Triangulation (FAAT) to extend and densify the ground control for setting stereo models and for the production of digital orthophoto files.

Digital Terrain Model (DTM) compilation was accomplished using Z/I Imaging softcopy stereo workstations running ImageStation DTM collection software for digitizing. For each stereo model, Baker stereo digitized 3D surface data. Mass

points were generated at a regular 50-foot grid interval and were then supplemented with breaklines at significant terrain changes such as ridges, summits, depressions, and valley floors. Breaklines were also captured along road edges and hydrographic features such as rivers, lakes and shorelines.

Baker stereo digitized planimetric features within the project limits such as structures, roads, shoulders, curbs, ramps, driveways, fences, docks, hydrants, poles, parking lots, railroads, rivers, streams, sidewalks, signs, catch basins, woodlines, trees, and shrubs visible on the aerial photography.

Baker produced black and white digital orthophotos at a scale of 1 inch = 50 feet with 0.5-foot pixel resolution. The orthophoto images were of consistent tone and contrast within individual tiles and throughout the project area. Mosaic lines between overlapping images were selected interactively and did not cross through buildings, bridges, or other fabricated structures not at ground level. Baker delivered 36 orthophoto sheet files measuring 2,500 feet by 2,500 feet.

Client

Saxonburg Area Authority
420 W. Main Street
Saxonburg, PA 16056

Paul J. Cornetti, PE, Manager
724-325-1400, x228

Completion Date

2011

Contract Value

\$43,350

Baker's Role

- Aerial Photography
- Scanning
- Geodetic Control
- Aerial Triangulation
- Digital Terrain Model
- Stereo Digitizing
- Digital Orthophoto Production

IDC – A/E Contract for Multidiscipline and Related Services for Department of Homeland Security

Various Locations in TX, AZ, NM, CA

With the passage of the Secure Fence Act of 2006, Congress mandated the construction of a border fence and associated lighting, vehicle barriers, and checkpoints at the Mexican border. This highly visible initiative placed pressure on the Corps' Fort Worth District to rapidly develop specs and Request for Proposal (RFP) packages for two separate initiatives: the design and construction of 225 miles of border fence (PF 225) and 300 miles of vehicle fence (VF 300) at various locations in Texas, Arizona, New Mexico, and California. Because these initiatives were taking place concurrently, Baker performed a series of design, construction, and program management projects under a compressed schedule. All projects under PF 225 and VF 300 were delivered on schedule and within the allocated budget.

Surveying and Mapping: Before Baker's Engineers could begin the design phase, the entire 200 plus miles of project area was mapped utilizing softcopy stereo compilation. Color aerial film was flown at 1"=400" to produce 1"=50' planimetric and topographic mapping as well as to support digital orthophoto production. Aerial photo acquisition was done under a tighter-than-normal aggressive schedule and required the coordination of subcontractors as well as Corps of Engineers Real Estate (COE RE) Division. One of the primary challenges, in addition to a tight schedule, was the difficulty in acquiring right-of-entry (ROE) for placement of geodetic photo control panels. Land owners were often non-responsive or against the placement of the fence. To overcome this Baker relied heavily upon airborne GPS in order to reduce the number of control panels required. Prior to scheduling the aerial mission, Baker would develop flight plans showing panels on available high elevation imagery and provide to the COE verification that ROE was acquired where markers were to be placed. When ROE did not exist, the flight plans were modified and panels re-located so that the ground survey crews could set the panels and gather the necessary ground control to support the aerial mission. Upon acceptable photo acquisition Baker performed analytical aerotriangulation, stereo map compilation utilizing our ImageStation softcopy stereo mapping system. During compilation a DTM was created that would support the generation of 1' contours. The DTM was also used in the rectification of color digital orthophotos with a 0.5' ground pixel resolution. The deliverables included both Microstation V8 and AutoCAD digital files, ortho-rectified aerial imagery TIFFs and a digital terrain model.

Client

U.S. Army Corps of Engineers
Forth Worth District
819 Taylor Street
Fort Worth, TX 76102

Eric W. Verwers
817- 886-1463

Completion Date

2009

Project Costs

\$15,898,707

Baker's Role

- Aerial Photography
- Analytical Aerotriangulation
- Stereo Mapping Compilation
- Digital Orthophotography
- Horizontal and Vertical Control Surveys
- Geodetic Surveys

Land Port of Entry (LPOE) Aerial Mapping Refresh

North and South US Borders

For the Land Port of Entry Aerial Mapping Refresh project the DHS relied heavily upon photogrammetric mapping and surveying service to capture, track and document layers of facilities data on U.S. land ports of entry. This project originally was contracted through the Architect Engineer Resource Center (AERC) for the legacy U.S. Immigration and Naturalization Service (INS), which was retired on March 1, 2003. Legacy INS duties were subsequently absorbed into various components of the Department of Homeland Security (DHS). The information generated for this project is now being used for the US-VISIT program, a component of the DHS.

The original project consisted of photogrammetric mapping, geodetic and land surveys. Data collection included aerial photography to create GIS base maps and GIS topology maps using ESRI's ArcGIS and ArcMAP. Color, film-based aerial photography consisting of 2 lines per site flown at nominal 1"=300' negative scale was acquired for 168 land ports of entry. Geodetic surveys were performed to control the new aerial photography utilizing GPS technology. Upon completion of the analytical aerotriangulation, Baker performed softcopy stereo compilation to produce 1"=50' planimetric mapping and topographic mapping to support 1' contour generation.

Because significant development has occurred during DHS's initiatives to better secure our borders there was a need to update the 2002 mapping. Baker was awarded the 2008 contract to perform the necessary updates, but with the U.S General Services Administration (GSA) as the contract manager for US-VISIT.

While similar in scope to the original 2002 project, some changes to specifications and requirements for this project were recognized. During the 6 years that passed since the original mapping, 3 LPOE's in the northern woods of Maine had been closed, reducing the number of sites to 165. Reconnaissance also determined that significant planimetric and topographic changes had occurred on several sites along the U.S. – Mexican border.

Baker acquired new geodetic control for the purpose of controlling the analytical aerotriangulation solution on LPOE's that had significantly changed since 2002. Control locations on LPOE's that had not changed were

Client

Department of Homeland Security, US-VISIT
1616 North Fort Myer Drive
Arlington, VA 22209

John Corbett

Program Manager, US-VISIT - 2008
202-298-5238

Completion Date

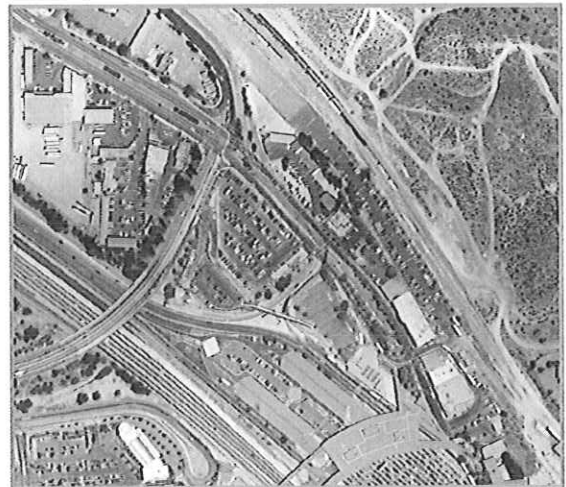
2008

Project Costs

\$2,093,394 (Fee)

Baker's Role

- Aerial Photography
- Analytical Aerotriangulation
- Stereo Mapping
- Compilation/Topographic Mapping
- Digital Orthophotography
- Horizontal and Vertical Control Surveys
- Land use/Land cover Interpretation
- Geodetic Surveys
- SDSFIE Compliance



transferred to the new aerial photography, saving significant time and money, with no impact to accuracy requirements.

Similar in scope to the 2002 initiative, this update project included acquisition of color, film-based aerial photography consisting of 2 lines flown at nominal 1"=300' negative scale for the revised site count of 165 land ports of entry. Baker superimposed the original 2002 planimetric and topographic mapping onto the 2008 aerial photography within the softcopy stereo compilation environment and proceeded to update the 2002 mapping to reflect 2008 conditions. These mapping updates produced 1"=50' planimetric mapping and topographic mapping to support 1' contour generation. The digital terrain model (DTM) updated during softcopy compilation was utilized for the generation of color digital orthophotos with a 6" ground pixel resolution. Project deliverables for the 2008 project now included Microstation .dgn files and ArcView shapefiles in SDSFIE compliant format for the vector mapping data. The digital orthophotos were delivered in .TIF and .SID file format with their respective World files for geo-positioning.

The 2008 project was completed within 8 months of notice to proceed.

Open-End Photogrammetric Services – PennDOT

Pennsylvania

Through a series of nine open-end contracts, Baker has been providing surveying and mapping services to PennDOT continuously since 1986. Our current contract E01292 runs through November 2012.

The Statewide Photogrammetric Mapping Agreements require aerial photography, first, second and third order conventional surveys, highway construction staking, GPS surveys, analytical aerotriangulation, digital topographic mapping and digital orthophotos on an as-need basis assigned by work orders. These work orders typically consist of 1"=50', 1 foot contour interval design scale mapping for various lengths and widths of state highway projects. Work orders have been requested in metric units at 1:300 scale with contours at 0.25 meter intervals. Task orders assigned to Baker are located throughout the State of Pennsylvania.

The trend of services within this latest Open End Agreement has been to provide low altitude, higher accuracy mapping products that can be derived from conventional photogrammetric procedures. Richard Crouse and Associates (RC&A) has been selected by Baker to perform all aerial photography when the desired vertical accuracy of the mapping is greater than what can be achieved at 1"=50'. RC&A has utilized helicopter-mounted aerial mapping cameras to provide 1:600 scale photography on several work orders within this open end agreement. The low altitude photography allows for stereo production of 1"=10' scale mapping, with vertical mapping accuracies field verified to be greater than 1/10 of one foot.

The low altitude aerial photography has also been used to produce color digital orthophoto mosaics of several transportation corridors, at a ground pixel resolution of 0.25'.

Baker performs all surveying and mapping tasks in accordance with the Department's Surveying and Mapping Manual, Publication 122M dated March 2002 and also in accordance with instructions set forth in the task order request

Client

Department of Transportation
Bureau of Design
145 Limekiln Road, Suite 300
New Cumberland, PA 17070-2423

L. Bradley Foltz
Design Services Division
717-346-4278

Completion Date

Estimated: 2012

Project Costs

\$2,000,000 (NTE)

Baker's Role

- Aerial Photography
- GPS Control Surveys
- Conventional Control Field Surveys
- Monumentation
- Analytical Aerotriangulation
- Digital Photogrammetric Mapping
- Digital Orthophotos



City of Norfolk Planimetric Update

Norfolk, Virginia

The City of Norfolk, in its ongoing efforts to maintain their City enterprise Geographic Information System, contracted with Baker to update existing 1999/2002 planimetric data layers. In accordance with its regular maintenance program, Baker was tasked with updating roads, buildings, sidewalks and driveways within the City of Norfolk as well as 200' beyond the City boundaries. The 1"=100' planimetric update does not include the Naval Base. This planimetric update is based on spring 2006 color aerial photography, airborne GPS data and aerial triangulation solutions provided by the Virginia Geographic Information Network (VGIN).

Baker converted the existing 2D ArcInfo planimetric data furnished by the City to 3D MicroStation format, compatible with stereo compilation software. From this data set, stereo model files were extracted based on the aerial photography flight plan.

Prior to starting full production, Baker completed a pilot project. The pilot is located in the East Beach area of the City and is an area that the City feels is most representative of all features requiring updating.

Baker performed the planimetric update by using softcopy stereo workstations. Each stereo model was inspected for changes by comparing the existing City data with the new photography, superimposed in 3D. Changes detected were then compiled and incorporated into the City data. In addition to changes to the existing data, the mapping was extended at least 200 feet beyond the City limits as defined by the boundary received from the City.

Client

City of Norfolk
810 Union Street
Norfolk, VA

Charles Kennedy
Information Management
Supervisor, Division of Surveys
757-664-6471

Completion Date

March 2008

Project Costs

\$160,000 (Fee)

Baker's Role

- Planimetric Update Mapping
- Data Conversion
- Database Development



CURRENT PROJECTS

Brea California

Baker is providing aerial photography, ground control, aerotriangulation, planimetric mapping at a scale of 1"=40', Digital Terrain Mapping, 1' Contour Mapping and 3" Pixel Color Orthoimagery for an approximately 230 acre site in Brea, California. The vector data (planimetrics, DTM, contours) was provided in a client specified layering schema in AutoCAD and MicroStation formats. The mosaicked imagery was provided in a TIF file (with accompanying TFW world file) and a compressed SID file (with accompanying world file).

The purpose of the project was to provide mapping services to facilitate the design and engineering of a particularly challenging sloped hillside. The property contains a municipal water tower, active oil wells, and shifting hillside under compaction and construction. Due to the many ongoing activities on site, the project was placed on a fast-track to be completed in less than three weeks. The project was complete in July 2012 and the cost to provide services including the aerial photography mission was approximately \$13,000. As a value added feature, Baker provided the client oblique imagery for marketing purposes of the site from the north, south, east and west directions.

Client

9990 Mesa Rim Rd
San Diego, CA 92121
Phone: (858) 526-6500

Location

Brea, California

Completion Date

July 2012

Project Costs

\$13,000 (Fee)

Baker's Role

- Aerial Photography
- GPS Control Surveys
- Analytical Aerotriangulation
- Digital Photogrammetric Mapping
- Digital Orthophotos

San Juan Capistrano, California

Baker is providing aerial photography, ground control, aerotriangulation, planimetric mapping at a scale of 1"=40', Digital Terrain Mapping, 1' Contour Mapping and 3" Pixel Color Orthoimagery for an approximately 330 acre site in San Juan Capistrano, California. The vector data (planimetrics, DTM, contours) was provided in a client specified layering schema in AutoCAD and MicroStation formats. The mosaicked imagery was provided in a TIF file (with accompanying TFW world file) and a compressed SID file (with accompanying world file).

The purpose of the project was to provide mapping services to provide mapping services for an active silica mine operation. The mapping will include the active pit as well as mapping in the planned expansion area. The project will be completed in September 2012 and the cost to provide services including the aerial photography mission was approximately \$16,000.

Client

Premier Silica LLC.
5205 N. O'Connor Blvd, Suite 200
Irving, Texas 75039

Location

San Juan Capistrano, CA

Completion Date

July 2012

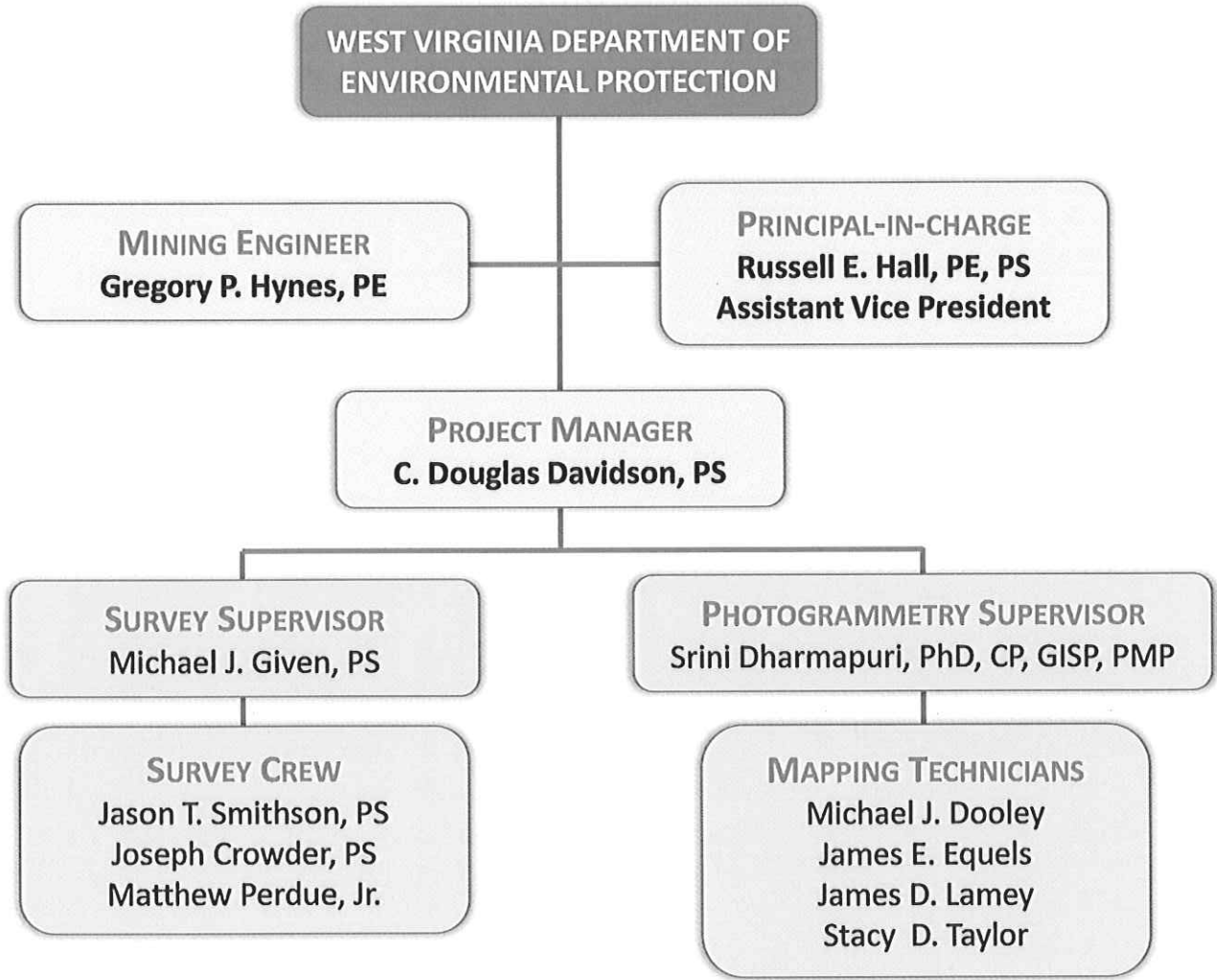
Project Costs

\$16,000 (Fee)

Baker's Role

- Aerial Photography
- GPS Control Surveys
- Analytical Aerotriangulation
- Digital Photogrammetric Mapping
- Digital Orthophotos

ORGANIZATION CHART AND RESUMES



C. Douglas Davidson, P.S.

Project Manager

General Qualifications

Mr. Davidson, based in Baker's Charleston, WV office, has over 40 years of very diverse and very successful survey and mapping experience in utility, pipeline and telecommunications surveys, highway, boundary and ALTA/ACSM land title surveys, as well as aerial photography / photogrammetric control surveys. He most recently provided Marcellus Shale pipeline surveys and certified boundary surveys for proposed compressor stations and pipeline interconnect sites. He is in direct responsible charge of numerous survey crews (ranging from 1-4 crew-persons), as well as survey business development and management. Mr. Davidson's other responsibilities include project cost estimates and proposal submissions through specific technical control and design, as well as oversight of final QA/QC for survey/engineering drawings

Experience

Twenty three plus miles of 24" pipeline within Mingo and Wyoming counties, West Virginia, for **NiSource Gas Transmission & Storage**, Grant compressor station, Rte 52 to Huff creek compressor station, Hanover, West Virginia, Responsibility was given for new pipeline alignment selection, with oversight of third-party survey activities and was followed by successful completed pipeline construction. Alignment approval was obtained by interaction with multiple coal companies, coal operators and land holding companies. These companies included Old Ben Coal, Energy Mountain Coal, Min Inc., Mingo Logan Coal Company, White Flame Energy, Mate Creek Energy of West Virginia, Premium Energy, Inc., Duchess Coal Company, Old Dominion Mining, James Coal, Mingo Wyoming Coal, Gaddy Engineering, Hickory gap Partnership and Pocahontas Land. Pocahontas Land was fee owner for nine + miles of 23 miles of proposed pipeline corridor. Mr. Davidson was responsible also, for unprecedented condemnation survey over said nine + miles of proposed pipeline corridor along with eleven + miles of access road surveys. Included was the additional responsibility for multiple other individual condemnation surveys.

Ten + miles of 20" pipeline within Mingo and Wyoming counties, West Virginia, for **NiSource Gas Transmission & Storage**, Grapevine creek, south of Matewan, West Virginia to waters of Gilbert creek, responsibility was given for new pipeline corridor selection for first six miles and where possible selection of corridor along or parallel to the an existing NiSource 20" pipeline. Numerous diversions were encountered from same above corridor with routing approval granted from many of the same companies listed above. Also routing approvals received from the following, Logan Coal & Timber Association and Pocahontas Land Company from which condemnation proceedings were determined as not necessary based upon Mr. Davidson's past collaboration. Pipeline construction was successfully completed on time and within budget.

Responsibility given for route selection and survey for the relocation of two pipelines, one mile of 24" and one 20" of **NiSource Gas Transmission & Storage**. Both pipelines were located in Mingo County, West

Years with Baker: 1

Years with Other Firms: 40

Education

Diploma, 1976, Survey and Mapping, International Correspondence Schools

Licenses/Certifications

Professional Surveyor, West Virginia, #819

Licensed Surveyor, Kentucky, 1986, #2835

Land Surveyor, North Carolina, 1989, #L-3191

Land Surveyor, Virginia, 1994, #001999

Virginia, near the community of Red Jacket. The combination mountaintop removal and highway bed corridor was constructed by Nicewonder (coal)/ Eagle Companies. The highway bed being that of the proposed King Coal highway / I-73. The coal removal and highway bed corridor were both completed by Nicewonder Group. The pipelines were successfully relocated under, across and along this coal company / highway construction.

Twenty-two hundred feet + of 20" gas pipeline belonging to **NiSource Gas Transmission & Storage** was successfully relocated for Trinity Coal Company / Frasure Branch Coal Company. This action followed Mr. Davidson's responsible charge to determine an appropriate routing around or through mining operations involving mountain top coal removal, access roadway construction and spoil valley fill area.

Community of Martin, Floyd County, Kentucky is the location of 10,744 feet of 12" pipeline relocation for **NiSource Gas Transmission & Storage** because of coal operations by Black Diamond Mining Company, LLC. This approved relocation routing and survey involved decisions directed towards existing surface mine cracks caused by present underground mining operations.

Four pipelines of varying sizes and lengths were successfully relocated for **NiSource Gas Transmission & Storage** because of multiple coal activities and coal removal techniques on holdings of Coal Mac Inc. These lines were located in eastern Pike county, Kentucky, Logan and Mingo counties of West Virginia.

Subsidence surveys were conducted for **NiSource Gas Transmission & Storage** over existing coal long-wall mining operations. These surveys correlated depth of mining operations, 15 degree draw angle of subsidence and where necessary pipelines were determined to be relocated or uncovered and left to remain in place with the appropriate gauged monitoring equipment installed or periodic monitoring surveys conducted.

Upon retirement from **NiSource Gas Transmission & Storage** approximately ten pipeline projects involving coal operations were pending. Of these, six projects had reroute reconnaissance and stakeout surveys partially or nearly completed. Communication with this former employer about these pending projects continues as a third-party survey consultant.

Completed for **Triana Energy** was approximately 6.5 miles 12" (Curry) pipeline corridor routing in Taylor County, West Virginia. This effort was conducted over almost entirely private ownership tracts. Individual road crossing permit surveys were conducted under Mr. Davidson's direction. Permit drawings and related individual permit filing applications were prepared and provided, turn-key. Successful road crossing permits were returned to **Triana Energy**. Pipeline construction was successfully completed.

Professional Society Affiliations

West Virginia Association of Land Surveyors
Kentucky Association of Professional Land Surveyors
North Carolina Society of Surveyors, Inc.
Virginia Association of Surveyors, Inc.

Russell E. Hall, P.E., P.S.
Principal-in-Charge

General Qualifications

Mr. Hall currently serves as an Assistant Vice President of Michael Baker Jr., Inc., as well as Office Manager of our Charleston, West Virginia office. He is an experienced transportation engineer who has been involved in numerous bridge and highway design projects in West Virginia for over 25 years. His project management responsibilities involve overseeing staff from project inception through completion, and ensuring that the clients' needs and requirements are met.

He also has over 14 years of office management experience. His office management responsibilities include financial oversight and accountability for a staff of over 30 engineers, scientists, and administrative personnel for Baker's Charleston office. His major strengths include organizing and managing a project team, quality control and quality assurance, and problem resolution. He provides overall direction and maintains direct communications with all clients.

Mr. Hall is very proud of the fact that he has been able to spend his entire career in West Virginia working to address West Virginia's transportation needs.

Experience

I-64/U.S. 35 Interchange Study, I-64 to WV 34 Interchange, Putnam County, West Virginia. *West Virginia Department of Transportation, Division of Highways.* Principal-In-Charge. Responsible for oversight of project finances, schedules and quality control. This project under first phase was for the study of two interchange sites on I-64, Cow Creek and Crooked Creek. This project under the final phase was for the complete preparation of right of way plans and construction plans for a new location of US 35 from I-64 (Crooked Creek location) to and including an interchange with WV 34.

Gypsy Bridge, Gypsy Bridge over West Fork River, Gypsy, West Virginia. *West Virginia Department of Transportation, Division of Highways.* Principal-In-Charge. Responsible for oversight of project finances, schedules and quality control. This project involved the study, design and preparation of construction contract plans and related documents for the replacement of the Gypsy Bridge carrying US 19 over West Fork River and located approximately 0.12 miles north of the intersection of US 19 and Harrison CR 19/63 for a distance of approximately 0.4 miles.

NPDES Permit Review, Boone County, West Virginia. *Consol, Inc.* Principal-In-Charge. Responsible for oversight of project finances, schedules and quality control. Baker developed a geologic model in SurvCADD, utilizing the core hole data provided by the client for the approximately 11,500 acre Miller Creek Project Area in Mingo County and completed a reserve analysis for the entire area. In addition, Baker developed a general mine plan and layout for a variety of permitting options for the client and subsequently completed an overall AOC+ spoil optimization for the initial permit area to be developed by the client.

Years with Baker: 7

Years with Other Firms: 19

Education

B.S., 1985, Civil Engineering, West Virginia Institute of Technology

Professional Registrations

Professional Engineer, West Virginia, 1990, #10947

Professional Surveyor, West Virginia, 1996, #1878

Veteran's Memorial Six Year Bridge Inspection, Route 22 over the Ohio River. *West Virginia Department of Transportation, Division of Highways.* Principal-In-Charge. Responsible for oversight of project finances, schedules and quality control. Baker was selected by the West Virginia Division of Highways (WVDOH) to provide bridge inspection and load rating services per NBIS and WVDOH standards. The project is 6 years in length with an inspection required every year from 2005 through 2010.

Fort Pleasant Farms Two Lane Road Design, Moorefield, West Virginia. *Fort Pleasant Farms, Inc.* Principal-In-Charge. Responsible for oversight of project finances, schedules and quality control. This project involved the study, design and final construction plan development for a new two-lane access road approximately 1500' in length. This access road was designed to connect a commercial/residential development to the Moorefield Interchange on Corridor H in Moorefield, West Virginia.

Fort Pleasant Access Road Project, Moorefield, West Virginia. *Fort Pleasant Farms, Inc.* Principal-In-Charge. Responsible for oversight of project finances, schedules and quality control. Baker prepared contract construction plans and related documents for a 3-lane access road connecting Corridor H to private property in Moorefield, West Virginia.

Corridor D over Ohio River Post Design Services, Washington, West Virginia. *West Virginia Department of Transportation, Division of Highways.* Principal-In-Charge. Responsible for oversight of project finances, schedules and quality control. Baker provided shop drawing review services for the bridge over the Ohio River and Blennerhassett Island.

Blennerhassett Island Bridge, Appalachian Corridor D, Washington County, OH and Wood County, West Virginia. *West Virginia Department of Transportation, Division of Highways.* Principal-In-Charge. Responsible for oversight of project finances, schedules and quality control. Upon completion of construction of the Blennerhassett Island Bridge over the Ohio River by 2007, the 878' – 6" long network tied arch that ranks as the longest of its type in the United States and one of the longest in the entire world. Baker provided project management, environmental and location studies, permitting, preliminary and final design as well as construction phase services.

Design Manual for Deep and Shallow Foundations, Statewide, West Virginia. *West Virginia Department of Transportation, Division of Highways.* Principal-In-Charge. Responsible for oversight of project finances, schedules and quality control. The goal of this project is to develop geotechnical factors for LRFD, as found in AASHTO Specifications and update other geotechnical guidelines for the WVDOT/DOH Bridge Design Manual.

Drainage Manual, Charleston, West Virginia. *West Virginia Department of Transportation, Division of Highways.* Principal-In-Charge. Responsible for oversight of project finances, schedules and quality control. Baker prepared a revised Drainage Manual for the West Virginia Department of Highways. The manual was completely rewritten based on the AASHTO Model Drainage Manual.

Fort Henry Six-Year Bridge Inspection, Wheeling, West Virginia. *West Virginia Department of Transportation, Division of Highways, District 6.* Principal-In-Charge. Responsible for oversight of project finances, schedules and quality control. Baker has performed annual condition inspections over a six-year period for the Fort Henry Bridge. The first inspection performed in 2001 was an in-depth inspection, which included cleaning and testing. The remaining five yearly inspections are of varying magnitude with Interim Inspections alternating with Periodic Inspections. The Interim Inspections highlight critical (defective) areas only while the Periodic Inspections require inspection of the entire bridge.

Gregory P. Hynes, P.E.

Mining Engineer

General Qualifications

Mr. Hynes is an engineer with a background in reclamation of abandoned mine lands, including acid mine drainage abatement, earthwork and grading plans preparation, hydrologic and hydraulic analysis, and erosion and sediment control structures. He also has extensive experience in the design of water distribution systems, hydraulic structures, and sanitary collection systems; and permitting of mining facilities. At Baker, he has worked on over thirty abandoned mine land reclamation projects which include reclamation of coal refuse piles, sealing of mine portals, grouting for mine subsidence, treatment of passive and active water, evaluation of pre-law mining impacts on drinking water supplies, and restoration of stream channels. Many of these projects have been for the West Virginia Department of Environmental Protection, Abandoned Mine Lands and Reclamation Office. He has also served as project engineer for over 30 water distribution projects located in Ohio, Pennsylvania, and West Virginia.

Experience

North Chickamauga Creek and Nolichucky River Watershed Restoration Studies, Tennessee and North Carolina. *U.S. Army Corps of Engineers, Nashville District.* Engineer. Assisted in preparation of a conceptual AMD abatement system design. Project involved field and literature research to determine the water resources problems in the basins including flooding, erosion, stream stability, and ecosystem deterioration, and acid mine drainage (AMD). Potential solutions and economics of those solutions were investigated to determine if a federal interest existed. Solutions investigated included flooding control levees, structure elevation, flood warning systems, wetland creation and mitigation, AMD mitigation, and stream bank stabilization. As a result of the watershed evaluation, a preliminary design for an AMD abatement system was performed.

Turnhole Branch Reclamation Project, McDowell County, West Virginia. *West Virginia Department of Environmental Protection.* Engineer. Responsible for performing research of geological data and mining maps, designing reclamation measures, and preparing construction plans, specifications, and cost estimates for the project which included erosion and sedimentation control measures, site earthwork and regrading, underdrain, slope stability analysis, mine seals, collection and diversion ditches, soil cover placement, and revegetation. The project involved control of acid mine drainage (AMD) discharging from abandoned mine openings and reclamation of steep and unstable refuse piles which had encroached on the waters of Turnhole Branch and nearby private property.

Dogtown Road Waterline Extension, Preston County, West Virginia. *West Virginia Department of Environmental Protection.* Engineer. Responsible for design of water distribution system upgrades. Baker

Years with Baker: 21

Years with Other Firms: 4

Education

M.S., 1997, Civil Engineering,
Youngstown State University

B.E., 1987, Civil Engineering,
Youngstown State University

Graduate Studies, Civil Engineering,
University of Pittsburgh

Licenses/Certifications

Professional Engineer, West
Virginia, 1998, #013850

Professional Engineer, Ohio, 1998,
#PE.62948

Professional Engineer, Pennsylvania,
1993, #PE044310E

designed extension of waterline along Dogtown Road and the adjacent area affected by past mining disrupting the existing ground water supply system.

Payeton Mine Refuse Reclamation, Payeton, West Virginia. *West Virginia Department of Environmental Protection.* Engineer. Responsible for performing research of geological data and mining maps, designing reclamation measures, and preparing construction plans and specifications for the project which included erosion and sedimentation control measures, site earthwork and regrading, slope stability analysis, mine seals, collection and diversion ditches, soil cover placement, and revegetation. Baker was responsible for the design and preparation of construction documents for the reclamation of a severely eroded, unstable refuse pile. It was located on a hillside slope that had encroached into a stream. The project site covered a nine-acre area.

Twilight Burning Refuse Reclamation, Twilight, West Virginia. *West Virginia Department of Environmental Protection.* Engineer. Responsible for performing research of geological data and mining maps, designing reclamation measures, and preparing construction plans, specifications, and cost estimates for the project which included erosion and sedimentation control measures, site earthwork and regrading, mine seals, methods of extinguishing/quenching actively burning refuse, collection and diversion ditches, soil cover placement, and revegetation. Baker was responsible for designing and preparing construction documents for the reclamation of an unstable and burning refuse pile and three mine entries. The site experienced uncontrolled discharge on steep hillside slopes, covering an approximate 12-acre area with refuse up to 60 feet thick.

Maple Creek Mine Permit Application. *Mon Valley Progress Council, Inc.* Engineer. Assisted in Pennsylvania Coal Mining Activity Permit preparation. Baker prepared a renewal/revision application for the Coal Mining Activity Permit to include 1,675 additional acres. Permitting activities involved mapping, environmental resources inventory, subsidence and hydrogeologic impact evaluations, ground and surface water inventories and sampling, water sampling, research of property ownership, permit preparation and coordination with the review agency as needed to secure the permit. The proposed permit area included perennial stream segments having less than 400 feet of cover.

Cheat Lake Highwall, Monongalia County, West Virginia. *West Virginia Department of Environmental Protection.* Engineer. Responsible for performing research of geological data and mining maps and review of water quality data. Prepared construction plans, specifications, and cost estimates for the project which included erosion and sedimentation control measures, site earthwork and regrading, mine seals (wet and dry), collection and diversion ditches, stream crossings, soil cover placement, and revegetation. The Cheat Lake Highwall abandoned mine land site consisted of a 19-acre refuse pile, numerous abandoned mine openings discharging acid mine drainage (AMD), and a dangerous highwall in close proximity to a residential area.

Odd-Moore Mine Reclamation, Raleigh County, Odd, West Virginia. *West Virginia Department of Environmental Protection.* Engineer. Responsible for performing research of geological data and mining maps, designing reclamation measures, and preparing construction plans, specifications, and cost estimates for the project which included erosion and sedimentation control measures, site earthwork and regrading, underdrains, limestone ditches, abandoned mining structure removal, soil cover placement, and revegetation. The Odd Moore Refuse Pile abandoned mine land site consisted of two refuse piles covering approximately 12 acres with steep unstable slopes, four abandoned mining impoundments, a concrete foundation and remains of an old tipple, and acid mine drainage (AMD) seepage, all in close proximity to an existing residence.

Michael J. Given, P.S.

Surveyor – Survey Supervisor

General Qualifications

Mr. Given is a professional surveyor with more than 23 years' experience in the surveying field. He has worked with government, public utility, commercial, educational, and industrial clients. Mr. Given has experience in managing survey projects; preparing cost estimates and technical proposals; scheduling and supervising field crews; establishing property lines; computing utility rights-of-way; researching land titles in the courthouse; establishing mineral lines; preparing reports, legal descriptions, and plats of survey; surveying with Trimble and Leica GPS equipment and Topcon and Leica total stations; and performing hydrographic surveys, construction stakeout surveys, route surveys, geotechnical stakeouts, construction inspections, and pipeline route analysis.

Experience

Mapping & GIS for INS Border Station Infrastructure Security Enhancement, Nationwide. *U.S. Department of Justice.* Surveyor. Responsible for preparing cost estimates, scheduling and supervising field crews and CADD personnel, establishing property lines, reviewing land title reports, coordinating utility company locations, processing field data, and preparing legal descriptions and site boundary / topographic drawings. In support of the United States Visitor and Immigrant Status Indicator Technology (US-VISIT) Program being conducted by The Department of Homeland Security (DHS) US-VISIT Program Office of Facilities Policy, & Planning, Michael Baker Jr., Inc. has provided geospatial consulting at a programmatic level to facilitate and accelerate the execution of all associated activities.

Appalachian Corridor D - Environmental Impact Statement, US 50 Belpre, Ohio to US 50/I-77, Parkersburg, West Virginia. *West Virginia Department of Transportation, Division of Highways.* Surveyor. Responsible for performing various surveying duties. The West Virginia Department of Transportation, Division of Highways (WVDOH) in conjunction with the Federal Highway Administration (FHWA), proposed to complete Appalachian Highway Corridor D from US 50 in Belpre, Ohio, to the vicinity of the US 50/ Interstate 77 (I-77) Interchange east of Parkersburg, West Virginia. The study area includes portions of Wood County, West Virginia; and Washington County, Ohio. The completed project will complete the "missing link" of Corridor D between West Virginia and Ohio and will require spanning the Ohio River.

Survey and Mapping Services for AEP, Various Sites - Eastern Ohio, Ohio. *American Electric Power (AEP).* Surveyor. Responsible for performing various surveying duties. Baker has performed a wide variety of survey and mapping projects throughout the AEP / Ohio Power / Wheeling Power system area. Following is a listing of our experience and services: New Transmission Line Surveys, Topographic Surveys and Mapping, Microwave Site Surveys, Substation Surveys, Right-of-Way Surveys and Plans, Boundary Surveys and Related

Years with Baker: 21

Years with Other Firms: 3

Education

A.S., 1986, Land Surveying, Glenville State College

Licenses/Certifications

Professional Surveyor, West Virginia, 1991, #896

Notary Public, Pennsylvania, 1997, #1059200

Land Surveyor, Virginia, 2004, #2693

Professional Land Surveyor, Delaware, 2001, #S6-0000666

Professional Land Surveyor, Pennsylvania, 2008, #SU075179

Professional Land Surveyor, North Carolina, 2009, L-4820

Mapping, GPS Control Surveys, Aerial Photography, Photogrammetric Mapping, Underground Electric Relocation Survey, Pole and Guy Stakeout.

17th Street Bridge Rehabilitation over the Ohio River, Huntington, West Virginia. *West Virginia Department of Transportation, Division of Highways.* Surveyor. Responsible for performing various surveying duties. Baker prepared contract plans and related construction documents for renovation of the 17th Street Bridge including field surveys, cursory inspection, concrete deck and expansion joint replacement, superstructure and substructure analysis, and identification of fatigue. The 17th Street Bridge is an 11-span structure carrying U.S. 52 over the Ohio River at Huntington, West Virginia.

AEP - Mitchell Flue Gas Desulfurization (FGD) Landfill, Kammer-Mitchell Power Plant, Moundsville, West Virginia. *American Electric Power (AEP).* Surveyor. Responsible for supervising field crews, assigning field crew tasks, performing courthouse research, processing field data, establishing property lines, preparing legal descriptions and plats and signing and sealing all drawings. Baker field surveyors performed a 527-acre ALTA boundary survey, on five tracts of land, to ACSM/ALTA specifications and options to those specs as requested by AEP. The options included topographic location surveys and setting monuments at all missing exterior corner locations. Baker office staff and technicians processed all field data, deeds, and performed all computations needed to prepare plats, replace corner monuments, resolve all boundary issues, write legal descriptions and prepare signed sealed plats for each of the five included tracts of property.

On-Call Engineering and Architectural Services, Wheeling-Ohio County Airport (HLG), Wheeling, West Virginia. *Ohio County Commission.* Surveyor. Responsible for performing various surveying duties. Since 2001, Baker has provided on-call engineering and architectural services at Wheeling-Ohio County Airport under a comprehensive engineering services agreement with the Ohio County Commission. Typical tasks performed include feasibility studies and surveys, bituminous pavement design, runway lighting design, civil site design, construction cost estimation, and construction management and inspection services.

Avis Overhead Bridge Replacement, Hinton, West Virginia. *West Virginia Department of Transportation, Division of Highways.* Surveyor. Responsible for performing various surveying duties. The bridge was designed by Baker for the West Virginia Department of Transportation. This five-span bridge measures 483 feet in length and carries WV Route 107 over the CSX Railroad in the town of Hinton, Summers County, West Virginia. The spans measure 84', 105', 105', 105', and 84' in length. The bridge deck is 39'-4" wide and carries two lanes of highway traffic and a 5'-1" wide sidewalk. The superstructure consists of four steel welded plate girders spaced at 11'-0" supporting the 8" thick concrete deck. The superstructure is supported by two abutments and four piers.

Page-Kincaid Waterline Design, Kincaid, West Virginia. *West Virginia Department of Environmental Protection.* Surveyor. Responsible for performing various surveying duties. Baker performed preliminary design and final plans, specifications, and construction quantity estimates for a 10-mile extension of this water system. The extension included 6-inch PVC water lines and some 2-inch PE spur lines in several separate locations. The project was located in a rural area with very rugged terrain.

Appalachian Corridor H, Various Counties, West Virginia. *West Virginia Department of Transportation, Division of Highways.* Surveyor. Responsible for scheduling field crews and assigning field tasks; processing field data, centerline and right-of-way computations for field stakeout and referencing, geotechnical stakeout computations, property line and right-of-way determinations and quality control on traverse loops. Appalachian Corridor H is a proposed four-lane highway that will provide access from Interstate 79 in western West Virginia through the rugged, mountainous terrain of West Virginia's Appalachian Highlands Region to Interstate 81 in western Virginia.

Jason T. Smithson, P.S.

Surveyor – Survey Crew Chief

General Qualifications

Since joining the company in 2006, Mr. Smithson has been assigned to the Civil Services Department and is currently a Project Manager. During his career, Mr. Smithson has performed geotechnical analysis, civil design, and environmental assignments and functioned as a survey party chief.

Experience

WVDEP14176, Kanawha County. Wet mine seals, the installation of bat gates, open limestone channel design, culvert and structure design, structure removal and reclamation grading at four sites (Marmet (Wells Drive), Cabin Creek (Stapler), East Bank (Garten), and the Mill Hollow Complex) in eastern Kanawha County.

WVDEP14387, Crooked Run #5, Harrison County. As a Senior Engineering Technician, performed research of geological data and mine maps, collected and reviewed water quality data, coordinated drilling activities, and assisted in the design of open limestone channels. Assisted in the development of construction plans and specifications for the project. The Crooked Run #5 project is comprised of six (6) work sites. These sites included numerous abandoned (draining) mine portals, refuse areas, a bench pond, trash dump areas and miscellaneous mine debris and subsidence areas.

Abandoned Mine Lands, Statewide Contract, Various Locations, West Virginia. As a Project Surveyor, Mr. Smithson provided services for topographic mapping for various Abandoned Mine Land (AML) projects throughout West Virginia. During these projects he provided topographic mapping and coordinated aerial photogrammetry. This data was incorporated in the design of landslide correction, retaining wall design, site grading, drainage improvements, acid mine drainage collection and neutralization, water line upgrade and extensions. Work on these projects also included: establishing horizontal and vertical control surveys for aerial photogrammetry mapping, baseline layout, referencing control points, generating check cross sections and site surveys including all physical and topographic features of each unique site.

West Virginia Department of Environmental Protection, Photogrammetric Control Surveys, Various Locations, West Virginia. Work performed by Mr. Smithson on these projects included establishing horizontal and vertical control surveys for aerial photogrammetry mapping, baseline layout, and referencing control points. This work was performed utilizing GPS and conventional survey methods.

Mine Safety and Health Administration - Martin County Coal, Slurry Impoundment Failure Investigation, Martin County, Kentucky. As a Project Geologist, Mr. Smithson's duties included the coordination of drilling activities with multiple drilling crews supported by a team of engineers and geologists. He supervised and participated in the subsurface investigation logging activities, the creation of bedrock contour maps, report preparation, and analytical testing on samples extracted from the drilling efforts.

Years with Baker: 6

Years with Other Firms: 7

Education

B.S., 1999, Geology, West Virginia University

Licenses/Certifications

Professional Surveyor, West Virginia, 2005, #2153

OSHA 40-Hour HAZWOPER Certification, 1999

CSX Hotels, Inc., d.b.a. The Greenbrier, White Sulphur Springs, West Virginia. As an Environmental/Geotechnical Geologist, Mr. Smithson was responsible for subsurface investigation activities, in an alluvium/karst aquifer type to determine overburden and bedrock descriptions and groundwater flow analysis, along with the supervision of multiple environmental delineation crews. As a Geologist, assisted the Licensed Remediation Specialist in performing site characterization investigations at the four parcels entered into the West Virginia Voluntary Remediation Program. Work tasks included performing Geoprobe® direct-push investigations, groundwater sampling, landfill gas monitoring, and surface water and sediment sampling.

USACE West Virginia Ordnance Works, Point Pleasant, WV. Performed as the technical manager for the former West Virginia Ordnance Works (WVOW) NPL Site located in Point Pleasant, WV consisting of over 8,000 acres. This site has two groundwater pumps and treats systems that require weekly maintenance along with over 200 monitoring and extraction wells. Associated responsibilities included; preparing scopes of work and budgets, selecting consultants/contractors, overseeing consultant/contractor work, meeting with Region 3 EPA, WVDEP, and WVDNR and distributing work to others within the district when necessary.

USACE Section 202 Program, Various Sites in WV, VA, & KY. As a geologist in the HTRW section for the Huntington District, performed multiple environmental site assessments for the Section 202 Flood Prevention Programs in West Virginia, Virginia, and Kentucky. One notable project for Dickenson County Schools in Virginia was selected as project of the year for the Huntington District for FY2012.

USACE Solutia, Nitro, WV. As a Geologist with the HTRW section for the Huntington District, represented and coordinated directly with the EPA Region 3 Project Manager. Responsibilities included overseeing all aspects of the construction of 3 bentonite slurry walls to help resolve contamination issues at the site.

Joseph Crowder, P.S.
Surveyor – Survey Crew Chief

General Qualifications

Mr. Crowder is a Professional Surveyor based in Baker's Charleston, West Virginia office. Mr. Crowder has over 18 years of diverse surveying and mapping experience that includes assignments in civil design, surveying, construction inspection and field testing.

Experience

Coal River Energy-Aldrich Branch Permit. *Coal River Energy, LLC.* Surveyor. Assisted in GPS survey control for project. Also served as Instrument Person and Survey Party Chief during field surveys.

Commonwealth of Kentucky-Upper Cane Creek of Red River.

Commonwealth of Kentucky. Surveyor. Participated as Instrument Person and Survey Party Chief to physically locate streams during survey. Also participated with GPS Surveying of control for LiDAR Mapping of project.

Town of West Milford-Sidewalk Improvements, West Milford, West Virginia. *Town of West Milford.* Surveyor. Participated in construction stakeout and monitoring. Baker performed complete planning, design and construction management services for new sidewalks along U.S. Route 270 (Main Street) for the Town of West Milford. The improvements included concrete sidewalks with integral concrete curbs, driveway curb cuts, ADA accessible curb ramps with truncated domes, "ladder-style" crosswalks and storm drainage design. Baker provided Construction Administration and resident inspection services as well as periodic site review during construction.

Miscellaneous Surveying and Mapping Projects, Various Locations. *Columbia Gas Transmission Corporation.* Surveyor. Participated in duration of complete survey. Responsible for courthouse research, helped with actual field locations and mapping and plotting of deeds. Also, assisted in writing of legal description. Over the past nine years, Baker has performed well over 120 miles of extensive gas line surveys and mapping projects throughout the Columbia Gas System.

DuPont, near Washington Works Plant, Wood County, WV. Sampling of water wells. Assisted in gathering data from residents, locating potential sample points, such as old drilled water wells, cisterns, and springs. Assisted in actual water sampling using various methods - bailers, air pumps, etc.

Winfield ACF Site, ACF/Corps of Engineers, Winfield, WV. Work included Boundary, Topographic, Construction Layout, and Sample Point Layout of 15 acres along the Kanawha River. This project had over 12,000 sample points laid out on a 3' grid.

Poor Charlie, Riverside Site, Glasgow, WV; Poor Charlie, Sattes Site, Nitro, WV; Poor Charlie, Cramer Metals Site, Parkersburg, WV. Work included Boundary, Topographic, Location and Boring Stakeout of various VERA sites and adjoining properties.

Years with Baker: 2

Years with Other Firms: 16

Education

A.S., 1989, Computer Aided Drafting, West Virginia State University

Licenses/Certifications

Professional Surveyor, West Virginia, #2010

Real Estate License, West Virginia, #WV 0010396

Elkem Metals Disposal Facility, Elkem Metals, Alloy, WV. Work included Control Network, Boundary, Topographic Surveys, and yearly volume reports.

Solutia, Nitro, WV. Work included Boundary, Topographic and Location Surveys for various projects, disposal facility caps, charcoal filtering systems, and monitoring well control network throughout the site and adjoining properties.

Nicholas County Landfill, Summersville, WV. Work included Control Network, Boundary and Topographic Surveys for expansion of cells and yearly volume reports.

Pocahontas County Landfill, Pocahontas County, WV. Work included Control Network, Boundary and Topographic Surveys for expansion cells and yearly volume reports.

Fleming Landfill, WVDEP, Sissonville, WV. Work included Boundary and Topographic Surveys, along with control network and baseline stakeout for landfill closure.

Cunard Landfill, WVDEP, Fayetteville, WV. Work included Topographic and Construction Layout for landfill closure.

Mingo County Landfill, J & B Contracting, Mingo County, WV. Work included Topographic and Construction Layout for landfill closure.

Mercer County Landfill, Jimmy Dunn, Mercer County, WV. Work included Topographic and Construction Layout for landfill closure.

Merritts Creek Connector Road, WVDOT, Barboursville, West Virginia. Crew Chief/Project Manager. Preliminary route survey of 2.2 miles of four-lane roadway. Work included courthouse research, property owner questionnaires, stake proposed centerline, tie to properties, set and reference construction control points.

Bentons Ferry Bridge Replacement, WVDOH, Fairmont, West Virginia. Crew Chief/Project Manager. Work included Topo survey of project area, property owner questionnaires, tie to property lines, river cross sections, stake and reference centerline and construction control points.

North Bridgeport Connector Road, WVDOH, North Bridgeport, West Virginia. Crew Chief/Project Manager. Work included GPS control survey of project area, preliminary route survey of centerline, tie to property lines, stake and reference centerline and construction control points, courthouse research, property owner questionnaires.

Corridor H, WVDOH, Section 15, Elkins, West Virginia. Crew Chief/Project Manager. Work included courthouse research, property owner questionnaires, GPS control of project area, preliminary route survey of 2.2 miles of centerline, tie to property lines, stake and reference centerline and construction control points.

Professional Affiliations

West Virginia Society of Professional Surveyors (WVSPS)

Matthew Perdue, Jr.

Survey Crew

General Qualifications

Mr. Perdue has over 19 years' experience in MicroStation V7 & V8, Autocad 2009, and other CADD packages and design software. He also has three years' experience working on a survey crew which has enhanced his ability to generate drawings from survey field data. His work experience includes WVDOT highway projects, landfill cap and liner projects, landscape architectural and site development projects for various sites including convenience stores, hospitals, sports complexes, schools and regional jail and Juvenile detention facilities, and large storm water impoundment facilities including complete dam design and renovation and upgrade of existing substandard facilities. As a CADD operator, Mr. Perdue's responsibilities on a daily basis are coordinating with project managers and other staff professionals to generate a final cadd product that meets client expectations and satisfies all project requirements.

Years with Baker: 3

Years with Other Firms: 20

Education

Vocational/Technical, 1987,
Drafting/Surveying Studies, Carver
Career and Technical Center

Coursework, Computer-Aided
Drafting and Design, West Virginia
State College

Experience

Drainage Improvements and Reclamation Measure Design for Four Abandoned Mine Sites, Kanawha County, West Virginia. WVDEP - Office of AML&R. CADD Designer. Responsible for conceptual design and final design drawings. Baker is providing surveying and mapping, field investigation, subsurface investigation, water testing and sampling, and conceptual, preliminary and final design for the reclamation of four abandoned mine sites that are affected by uncontrolled drainage, debris, and hazards from open portals. Baker is also providing bid phase and construction phase support for the remedial measures.

Engineering Design for Remediation of Crooked Run #5, Harrison County, West Virginia. WVDEP - Office of AML&R. CADD Designer. Responsible for conceptual design and final design drawings. Baker provided engineering services to remediate seven abandoned mine sites along Crooked Run Stream near Clarksburg, West Virginia. Services included field investigation and surveys; core boring and water sampling; conceptual, preliminary, and final design of remediation measures; and bid phase and construction phase support.

Engineering Services to Remediate Landslide Caused by Abandoned Mine Activity, McDowell County, West Virginia. WVDEP - Office of AML&R. CADD Designer. Responsible for conceptual design and final design drawings. Baker is providing field investigation, engineering services, and construction support to remediate a landslide on private property caused by drainage from abandoned mine portals. Baker will provide conceptual, preliminary, and final design documents for remedial drainage measures and will provide support during construction.

Mine Subsidence Remediation Design, Marion County, West Virginia. WVDEP - Office of AML&R. CADD Technician. Responsible for conceptual design and final design drawings. Baker is providing engineering services to mitigate the effects of mine subsidence at four residential sites. Baker's services include surveying and mapping; field investigation; conceptual, preliminary, and final design of subsidence remediation measures; and bid-phase and construction-phase support.

Engineering, Construction Management, and Inspection Services for Conversion of Railroad Trestle to Hiking and Biking Trail, Parsons, West Virginia. *City of Parsons, West Virginia.* CADD Technician. Responsible for the generation of an existing site conditions drawing from survey field data. Baker is providing engineering, construction management, and construction inspection services for the conversion of an old, abandoned railroad bridge to a pedestrian and bicycle trail that will become part of the Allegheny Highlands Trail. Baker's services include base mapping, structural inspection, cost estimates, and development of construction and bid documents. Baker will also provide bid phase support, construction management, and construction inspection.

U.S. 60 Virginia's Chapel Interpretive Pull-Off, Cedar Grove, West Virginia. *Town of Cedar Grove.* CADD Technician. Responsible for the generation of an existing site conditions drawing from survey field data. Baker is providing engineering services for the construction of a visitor pull-off parking area with landscaping improvements, walkways, pedestrian amenities, and interpretive signage for the U.S. 60 Virginia's Chapel Interpretive Byway Pull-off Project. Baker's services include base mapping, background data collection, preliminary and final design, bid-phase support, construction management, and construction inspection.

WVDOH Six-Year Bridge Inspection Program, Various Locations, West Virginia. *West Virginia Department of Transportation, Division of Highways.* CADD Technician. Responsible for drawing miscellaneous details. Baker was responsible for performing the inspection services and report writing for the New River Gorge Bridge, Veteran's Memorial Bridge, Fort Hill Bridge, Fort Henry Bridge, and Wheeling Tunnels.

West Virginia State Capitol Restroom Renovations. *State of WV General Services Division.* CADD Technician. Responsible for working with the project Architect to generate design and construction drawings for the renovation of the existing facility. Baker is leading a planning study for the renovation of 31 restrooms in the historic West Virginia Capitol Building. The planning study will assess the facilities and their conformance to current code requirements and code-required capacities, compliance with Americans with Disabilities Act (ADA) requirements, quantification of the building occupancy during normal and peak periods, and an evaluation of gender distribution of restrooms within the capitol. Baker will provide design, construction sequence, and scheduling recommendations. Upon approval of the design, Baker will prepare construction documents and provide construction administration services for the renovation of three restrooms on the basement level.

Indefinite Delivery-Indefinite Quantity Contract for Architectural and General Engineering Services, Tobyhanna Army Depot and, North-Atlantic, Division Locations. *Tobyhanna Army Depot.* CADD Technician. Responsible for working with the project Architect to generate HVAC construction drawings for the renovation of the existing facility. Baker is providing planning, architectural design, and general engineering services under a three-year indefinite delivery-indefinite quantity contract for projects at DOD installations within the North Atlantic Division. Representative projects include additions and renovations to the Rotary-Wing Maintenance Hangar at Fort Drum's Wheeler-Sack Army Airfield; Maneuver Enhancement Brigade facilities at Fort Drum, New York (barracks, Brigade Headquarters, Battalion Headquarters with classrooms, a five-Unit Company Operations Facility, and a Tactical Equipment Maintenance Facility); the Fort Drum North Post Space Study; and renovations to a number of buildings and amenities at Tobyhanna Army Depot, such as the Building 12 Defense Logistics Agency Headquarters renovation, Building 1-C roof replacement, family housing unit renovations, an elevator installation, and on-call HVAC engineering support services.

Dr. Srinivasan Dharmapuri, CP, GISP, PMP

Photogrammetry Supervisor

General Qualifications

Dr. Dharmapuri is the Certified Photogrammetrist and resident LiDAR Scientist. Dr. Dharmapuri has more than 26 years of experience in the Geospatial Industry both in public and private sector with experience in research and the business side of the industry. He has extensive experience in Project Management, Project Operations, and Operations Management.

His experience in Project Management includes Project Management of Photogrammetry/LIDAR projects involving Flight map generation, Plan/Topo Compilation, Ortho generation and final delivery; Project Management of GIS projects involving Cadastral mapping using Best fit, COGO and hybrid methods, Zoning, Landuse, Soil mapping and pin point addressing; Project setup, production flow, quality control, and client relationship management for all mapping projects; Overseeing development and implementation of various applications used for internal production on projects.

His experience in Business Development includes being responsible for business development in the areas of Photogrammetry, LIDAR and GIS, which includes RFP/RFQ responses, writing proposals, estimating cost, teaming with other potential companies and participation in the conferences; preparing and delivering highly professional and effective presentations for numerous government and private utility and engineering firms.

His experience in Operations Management is overseeing operation with over 100 employees in India and in USA.

Prepare reports of all financial and production information by compiling project costs and comparing to project work in progress and worked with corporate accounts.

Selected from 10,000 scientists as one of the 50 "bright young scientists" in Indian Space Research Organization to craft Vision, Mission, and Action Plan for the organization for the period 2000 - 2025

Experience

S.R. 25 Mobile LiDAR Vertical Accuracy Validation, Jackson, Mississippi. *Mississippi Department of Transportation.* QA/QC. Responsible for overall QA/QC of the LiDAR data. Performed the QA/QC of the final products both qualitatively and quantitatively to meet the requirements of the project. Baker provided mobile light detection and ranging (LiDAR) vertical accuracy validation services along an eight-mile corridor with 16 miles of divided roadway of State Route 25, and the first 500 feet of all intersecting public roads, to

Years with Baker: 2

Years with Other Firms: 24

Education

Ph.D., 2006, Photogrammetry and Remote Sensing, Andhra University, Visakhapatnam, India

M.Tech, 1985, Remote Sensing, Anna University, India

MSc, 1983, Physics, Madras University, India

Licenses/Certifications

Certified GIS Professional, 2009, #43865

Certified Photogrammetrist, 2008, #1347

Project Management Professional (PMP), 2010, #1333949

Land Surveyor Photogrammetrist, Virginia, 2010, #000142

FAA IDLE Level 3 Training - AC 150/5300-16A, 2011

FAA IDLE Level 3 Training - AC 150/5300-17B, 2011

FAA IDLE Level 3 Training - AC 150/5300-18B, 2011

perform vertical accuracy assessments and planimetric roadway feature extractions to support future traffic data collection, feasibility studies, geographic information systems (GIS), and highway performance monitoring system reporting.

I-20 LiDAR Data Collection and Mapping, Jackson, Mississippi. *Mississippi Department of Transportation.* QA/QC. Responsible for overall QA/QC of the LiDAR data. Performed the QA/QC of the final products both qualitatively and quantitatively to meet the requirements of the project. Baker provided mobile light detection and ranging (LiDAR) data capture of 26 lane miles of divided roadway along I-20, the first 500 feet of S.R. 35 and S.R. 481 beyond the overpasses, and all interchange ramps and ramp tapers to support roadbed replacement and resurfacing on Interstate 20, S.R. 35, and S.R. 481. Baker developed planimetric feature data, digital terrain models, and topographic mapping from the LiDAR data.

Joint Base General Master Plan, Joint Base-McGuire-Dix-Lakehurst, New Jersey. *U.S. Air Force, McGuire AFB.* QA/QC. Responsible for QA/QC of LiDAR data at the spatial constrain level to post processed level. Verified the breaklines generated using LiDAR Grammetry method. Baker prepared a joint-base general plan and commander's summary and developed a web-based planning system for the installation. Baker's services included project management, mapping, field investigations, land-use analysis, utility analysis, airfield infrastructure analysis, development of geographic information system (GIS) databases and mapping, and the development of a master plan and capital improvement program.

Airport Master Plan and Layout Plan, Upshur County Regional Airport (W22), Buckhannon, West Virginia. *Buckhannon Upshur Airport Authority.* QA/QC. Prepared the flight plan and imagery plan for the project. Baker performed engineering and planning services to create a master plan and airport layout plan (ALP) set for the Upshur County Regional Airport (W22). The overall objective of the plan was to identify improvements necessary to comply with Federal Aviation Administration criteria and to accommodate forecasted aviation demands throughout the 20-year planning period. Baker developed master plan elements including an airport inventory, forecast of aviation activity, facility requirements, airport alternatives, an ALP set, and a capital improvement program. Baker also provided an in-depth review of the airport's runway length, mapping services, and an aeronautical survey of features on and adjacent to the airport property and within the approach paths to each runway end.

Alaska Highway Aerial Mapping, Alaska. *Alaska Department of Transportation & Public Facilities.* QA/QC. Responsible for various products that were developed for LiDAR data covering various locations along the Parks Highway between mileposts 163 and 305. Performed an accuracy assessment of LiDAR data as compared to the survey control to ensure prescribed tolerances are met. TIN files generated from the topographic data were validated with respect to survey control. Baker provided professional services to acquire aerial mapping along stretches of the Parks, Dalton, and Elliott Highways in Alaska. The state required engineering quality 2-foot topographic contours and triangular irregular network (TIN) datasets. Baker provided LiDAR acquisition with simultaneous GPS base station control; conducted initial quality control (QC), preliminary processing, and accuracy assessment of LiDAR data; generated Triangulated Irregular Network (TIN) files; performed validation to survey control; produced two-foot contour topographic data; and provided final QC and deliverable assembly.

Professional Affiliations

American Society for Photogrammetry and Remote Sensing (ASPRS)

Michael J. Dooley
Manager of Photogrammetry

General Qualifications

Mr. Dooley has a total of 26 years of experience combined in the Civil Engineering, Surveying and Photogrammetry fields. He has held various positions including Chief Editor, Production Manager and Quality Control Manager and specializes in engineering scale base mapping, GIS and Digital Orthophoto based private and municipal projects. As Project Manager he has managed projects from a few small acres to the mapping of the entire country of the Dominican Republic. He has been involved in virtually every facet of mapping from field survey, editing, quality control, sales, proposal generation and project management.

Years with Baker: 1

Years with Other Firms: 25

Experience

S-W91278-10-D-0102. *U.S. Army Corps of Engineers, Mobile District.* Technical Manager. Responsible for oversight of all photogrammetric capture, digital terrain modeling, contour generation, orthophotography, obstruction analysis and E-Tab generation.

Airport Master Plan Update, Morgantown Municipal Airport (MGW), Morgantown, West Virginia. *Morgantown Municipal Airport.* Technical Manager. Responsible for oversight of all photogrammetric capture, digital terrain modeling, planimetric and topographic features, orthophotography, and obstruction analysis. Baker is preparing an update to the airport's 2003 master plan, including a comprehensive environmental assessment, a land-release request, an updated airport layout plan, a facilities inventory and requirements analysis, aviation forecasts and demand and capacity forecasts, and a capital improvement plan, and is managing comprehensive public involvement efforts for the master plan update. The master plan update includes updating forecasts, inventories, recommended future development and updating the Airport Layout Plan. The land release is to transfer 47 acres of airport property to the West Virginia Army National Guard for construction of a new readiness center and access road. Construction of the readiness center requires conversion of the crosswind runway to a taxiway to accommodate the new construction. Baker is preparing all documentation required for the conversion.

Surveying and Photogrammetric Mapping Services, Statewide, Pennsylvania. *Pennsylvania Department of Transportation, Central Office.* Project Manager. Responsible for oversight of all photogrammetric capture, digital terrain modeling, planimetric, and topographic features. Baker provided surveying and mapping services for transportation projects continuously since 1986, through a series of nine open-end contracts. Baker's services included aerial photography; first-, second-, and third-order conventional surveys; highway construction staking; global positioning system surveys; analytical aerotriangulation; digital topographic mapping; and digital orthophotos on an as-needed basis.

Professional Affiliations

American Society for
Photogrammetry and Remote
Sensing (ASPRS), 38003

James E. Equels

Stereo Compiler

General Qualifications

Mr. Equels is a stereo compiler experienced in both softcopy and analytic compilation methods. Mr. Equels is proficient in planimetric mapping and digital terrain modeling (DTM) for contouring and orthophoto rectification serving a variety of GIS and engineering applications in transportation, government, industry, utilities, mining, and the military. His military background includes four years of active duty with the U.S. Air Force, during which he performed satellite reconnaissance and imagery analysis.

Years with Baker: 19

Years with Other Firms: 5

Education

B.S., 1999, Human Resource Management, Geneva College

Experience

Open End Contract E00345, Statewide, Pennsylvania. *Pennsylvania Department of Transportation, Central Office.* Senior Stereo Compiler. Produced DTM and planimetric data utilizing softcopy photogrammetry techniques. Baker has provided surveying and mapping services to PennDOT under nine consecutive open-end contracts. The services include aerial photography; first, second, and third order conventional surveys; highway construction staking; GPS surveys; aerial triangulation; digital topographic mapping; and digital orthophotos. Work orders typically consist of design scale mapping at 1"=50' with 1 foot contours.

Allegheny County Landbase Update, Pittsburgh. *Allegheny, County of (Dept. Eng./Const.).* Senior Stereo Compiler. Produced DTM and planimetric data utilizing softcopy photogrammetry techniques. Baker performed a photogrammetric update for Allegheny County of their GIS landbase covering 730 square miles. Additions and revisions were made to the planimetric layer, the DTM was updated with new five foot contours generated, and color digital orthophotos created with a one foot pixel resolution.

City of Norfolk Planimetric Basemap Update, Norfolk, Virginia. *City of Norfolk, Virginia.* Senior Stereo Compiler. Produced DTM and planimetric data utilizing softcopy photogrammetry techniques. Baker was responsible for the review and update of the City's existing planimetric data layers using the Virginia Geographic Information Network (VGIN) aerial photography, airborne GPS data, and aerial triangulation solution. The City of Norfolk covers an area of sixty-six (66) square miles. The existing planimetric data layers were created during the City's 1999 base mapping project. Over the last eight years, Norfolk has experienced modest growth resulting from new development in areas scattered throughout the City, and approximately 20 percent of the City has witnessed changes requiring modifications/updates to planimetric layers.

Surveying and Mapping for New GPS Approaches to Runways 16, 34, and 21, Wheeling Ohio County Airport (HLG), Wheeling, West Virginia. *Ohio County Commission.* Senior Stereo Compiler. Responsible for planimetric and DTM collection. Baker is providing survey and mapping services for the development of new global positioning system approaches to Runways 16, 34, and 21. Baker's services include control surveys, preparation of a survey and quality control plan and a geodetic control plan, aerial photography, and photogrammetric mapping, in compliance with the related Federal Aviation Administration advisory circulars.

Appalachian Corridor H - Middle South Branch Valley Alternative, Phase I Archaeological Survey, Hardy County, West Virginia. *West Virginia Department of Transportation, Division of Highways.* Senior Stereo Compiler. Responsible for Planimetric and DTM Collection. Baker is conducting a Phase I-II archaeological study of an approximately 9-mile long, 300- to 1000-foot wide new highway corridor located in Hardy County, West Virginia. Baker is completing the project as part of the on-going cultural resource investigations for the Appalachian Corridor H project. Field testing of the Middle South Branch Valley corridor began in October of 1998 and has been completed. The corridor encompasses a variety of topographic settings including uplands and stratified alluvial floodplains along the South Branch of the Potomac River and its tributaries. Baker identified over 70 archaeological sites within the project corridor.

IDIQ Contract for Photomapping and Related Services for New Orleans COE, Various Locations, Louisiana. *U.S. Army Corps of Engineers, New Orleans District.* Senior Stereo Compiler. Responsible for Planimetric and DTM Collection. Baker provided aerial photography, analytical aerotriangulation, DTM production, digital orthophoto production, and photogrammetric digital mapping of plan and contours; digital map conversion, scanning and warping of aerial photos, surveying both by GPS and conventional methods, and creation of topographic maps directly from survey data collectors using InRoads and DTM.

AT&T Mexico Project, Mexico, Mexico. *AT&T Corp.* Senior Stereo Compiler. Responsible for the preparation and pugging process of approximately 1,000 exposures and assisted with the stereo compilation of the DEM data. Baker acted as prime consultant for a Feasibility Study completed for potential fiber optic telecommunications cable placement covering the entire country of Mexico during 1995. Management services to ALESTRA to meet the extremely demanding construction schedule.

Waterfront Boulevard, Bergen and Hudson Counties, New Jersey. *New Jersey Department of Transportation (NJDOT).* Senior Stereo Compiler. Performed stereo compilation of the DTM for this project. The Waterfront Boulevard, Sections 6 & 7 Widening project included improvement and widening of County Route 505 (River Road) between Route 5 in Bergen County and Hillside Avenue in Hudson County. Baker's work included documenting the project origin, existing inventory and conditions, and CMS Study for River Road. Tasks also included: traffic studies, collection of existing traffic data, development of Design Year Traffic Volumes, and Accident Analyses.

Color Digital Orthophotos for Walt Disney's Animal Kingdom, Walt Disney World, Florida. *Walt Disney Imagineering.* Senior Stereo Compiler. Responsible for DTM Collection for Digital Orthophoto. Baker provided photogrammetric mapping services including analytical aerotriangulation, high resolution scanning of aerial photographs, digital terrain modeling (DTM) and analysis, and color digital orthophoto production.

Continuing Education/Training

U.S. Air Force Imagery Interpretation Technical School

James D. Lamey

Stereo Compilers

General Qualifications

Mr. Lamey is a stereo compiler experienced in both softcopy and analytic compilation methods. Mr. Lamey is proficient in planimetric mapping and digital terrain modeling (DTM) for contouring and orthophoto rectification serving a variety of GIS and engineering applications in transportation, government, industry, utilities, mining, and the military.

Experience

Surveying and Mapping for New GPS Approaches to Runways

16, 34, and 21, Wheeling Ohio County Airport (HLG), Wheeling, West Virginia. *Ohio County Commission.* Senior Stereo Compiler. Responsible for planimetric and DTM collection. Baker is providing survey and mapping services for the development of new global positioning system approaches to Runways 16, 34, and 21. Baker's services include control surveys, preparation of a survey and quality control plan and a geodetic control plan, aerial photography, and photogrammetric mapping, in compliance with the related Federal Aviation Administration advisory circulars.

Appalachian Corridor H - Middle South Branch Valley Alternative, Phase I Archaeological Survey, Hardy County, West Virginia. *West Virginia Department of Transportation, Division of Highways.* Senior Stereo Compiler. Responsible for Planimetric and DTM Collection. Baker is conducting a Phase I-II archaeological study of an approximately 9-mile long, 300- to 1000-foot wide new highway corridor located in Hardy County, West Virginia. Baker is completing the project as part of the on-going cultural resource investigations for the Appalachian Corridor H project. Field testing of the Middle South Branch Valley corridor began in October of 1998 and has been completed. The corridor encompasses a variety of topographic settings including uplands and stratified alluvial floodplains along the South Branch of the Potomac River and its tributaries. Baker identified over 70 archaeological sites within the project corridor.

Digital Landbase Mapping, Allegheny County, Pennsylvania. *Allegheny County, Pennsylvania.* Senior Stereo Compiler. Assisted with the compilation of the DTM data. Baker was responsible for acquiring aerial photography, performing analytical aero-triangulation, and producing a digital landbase for the project area which is in excess of 800 square miles.

Scottsdale, Arizona GIS Landbase Mapping, Scottsdale, Arizona. *City of Scottsdale, Arizona.* Senior Stereo Compiler. Performed the DTM compilation to support the production of digital orthophotos for the project. The project consisted of developing a landbase for the GIS project that was developed by the City of Scottsdale, Arizona. The project covered a 185 square mile area. The project area varied from heavy urban to unpopulated desert foothills to portions of the rugged McDowell Mountains.

Cross-Country Cable System, Baltimore to Silver Spring, Maryland. *AT&T Corp. (ALESTRA).* Senior Stereo Compiler. Responsible for Planimetric and DTM Collection. Huge demands for increased digital service, along with the upgrading of existing systems to incorporate new technology, spearheaded plans to install a new fiber optic cable along a 38 mile route between Baltimore and Silver Spring, Maryland. Services such as

Years with Baker: 20

Years with Other Firms: 7

Education

B.A., 1985, Geography, Indiana University of Pennsylvania

Licenses/Certifications

Certified Photogrammetric Technologist (ASPRS), 2010

mapping, surveying, planning, design, permitting, and construction management were provided to facilitate this "fast-track" project.

Restaurant Center, The Pointe, North Fayette Township, Pennsylvania. *Forest City Enterprises, Inc.* Senior Stereo Compiler. Responsible for Planimetric and DTM Collection and Planimetric and DTM Collection. Baker was retained by the Metro Property Developers to design a five-building "Restaurant Center" on 8.2 acres, an access roadway, and all appurtenances required for operation. Baker completed the site design, access roadway design (for dedication to the Township), and obtained all local approvals including variances for the Center. The project took place concurrently and adjacent to a Sam's Club to the west, and utilized common features with said development in the design.

IDIQ Contract for Photomapping and Related Services for New Orleans COE, Various Locations, Louisiana. *U.S. Army Corps of Engineers, New Orleans District.* Senior Stereo Compiler. Responsible for Planimetric and DTM Collection. Baker provided aerial photography, analytical aerotriangulation, DTM production, digital orthophoto production, and photogrammetric digital mapping of plan and contours; digital map conversion, scanning and warping of aerial photos, surveying both by GPS and conventional methods, and creation of topographic maps directly from survey data collectors using InRoads and DTM.

AT&T Mexico Project, Mexico, Mexico. *AT&T Corp.* Senior Stereo Compiler. Responsible for the preparation and pugging process of approximately 1,000 exposures and assisted with the stereo compilation of the DEM data. Baker acted as prime consultant for a Feasibility Study completed for potential fiber optic telecommunications cable placement covering the entire country of Mexico during 1995. Management services to ALESTRA to meet the extremely demanding construction schedule.

Waterfront Boulevard, Bergen and Hudson Counties, New Jersey. *New Jersey Department of Transportation (NJDOT).* Senior Stereo Compiler. Performed stereo compilation of the DTM for this project. The Waterfront Boulevard, Sections 6 & 7 Widening project included improvement and widening of County Route 505 (River Road) between Route 5 in Bergen County and Hillside Avenue in Hudson County. Baker's work included documenting the project origin, existing inventory and conditions, and CMS Study for River Road. Tasks also included: traffic studies, collection of existing traffic data, development of Design Year Traffic Volumes, and Accident Analyses.

Color Digital Orthophotos for Walt Disney's Animal Kingdom, Walt Disney World, Florida. *Walt Disney Imagineering.* Senior Stereo Compiler. Responsible for DTM Collection for Digital Orthophoto. Baker provided photogrammetric mapping services including analytical aerotriangulation, high resolution scanning of aerial photographs, digital terrain modeling (DTM) and analysis, and color digital orthophoto production.

Pennsylvania Department of Transportation, Statewide, Pennsylvania. *Pennsylvania Department of Transportation, Central Office.* Senior Stereo Compiler. Responsible for Planimetric and DTM Collection. Baker has a long-standing professional relationship with PennDOT, providing surveys and photogrammetric services under numerous open-end agreements. Services requested include aerial photography, first, second and third order conventional surveys, highway construction staking, GPS surveys, analytical aerotriangulation, digital topographic mapping and digital orthophotos on an as-needed basis assigned by work orders.

Stacey D. Taylor

GIS Associate

General Qualifications

Ms. Taylor has over 30 years of diverse surveying, drafting, and CAD experience. She has worked on projects involving topographic surveys, cross-sections, road design, parks, and flood prone areas. Her experience includes numerous boundary surveys, municipal projects and projects for the Corps of Engineers, Middle East District, military base mapping. She is familiar with all AEC standards for CAD drawings and project configuration set up for MicroStation and AutoCAD. She has considerable skills and familiarity with MGE/MicroStation, ArcInfo, ArcView, InRoads, and other GIS software. She also is very experienced in creating digital terrain models from field survey data and preparing detailed cross-sections for design and earthwork projects.

Years with Baker: 13

Years with Other Firms: 20

Education

Certificate, 1977, Technical Drafting,
Southern California Regional
Occupational Center

Prior to working at Baker, Ms. Taylor worked for the County of Orange, California; work included projects for several county divisions: transportation, flood design/control, harbors, beaches, and parks. Her primary output consisted of topographic surveys, which included contours, cross-sections and various reports pertaining to volume, location of surface objects, and analytical data. Upon completion of the Orange County Landbase Information System, she was assigned to various GIS mapping/analysis projects, which included park boundaries and ownership, waste management routing, airport noise evaluation, dredging analysis, and various other applications. While living in Kenai, Alaska, she gained extensive subdivision and road construction experience, both in the field as a rodman/chainman and instrument man, as well as in the office as a board draftsman. Projects included plan and profile drawings, topographic interpolation and contouring, and final design drawings for construction and subdivisions for planning commission approval.

Experience

Telecommunication Surveys and Mapping in Pipeline Corridors, New York, Pennsylvania, Maryland,, Ohio, and West Virginia. *Columbia Transmission Communication Corp.* CADD Technician. Performed GPS data processing and plotting for preparation of detailed construction plans of utility corridor. In addition, numerous road, river, railroad, and stream crossing permit plats were prepared. Over 2 years (1999 - 2000), Baker has performed considerable field surveys (GPS and conventional) and related CAD route mapping for the following network projects involving proposed telecommunications lines in existing gas pipeline corridors over a total of 840 miles.

Open End Contract E00345, Statewide, Pennsylvania. *Pennsylvania Department of Transportation, Central Office.* CADD Technician. Responsible for Q/C line work, contours, and planimetric data. Baker has provided surveying and mapping services to PennDOT under nine consecutive open-end contracts. The services include aerial photography; first, second, and third order conventional surveys; highway construction staking; GPS surveys; aerial triangulation; digital topographic mapping; and digital orthophotos. Work orders typically consist of design scale mapping at 1"=50' with 1 foot contours.

Pipeline #1278 Replacement Project, Easton to Weber Road, Quakertown to Hellertown, in Northeastern, Pennsylvania. *Columbia Gas Transmission Corporation.* CADD Technician. Responsible for performing correction edits on right-of-way maps. This project consists of extensive surveying, mapping, engineering,

and geotechnical support for replacing an existing pipeline “in the same original ditch location” from Easton to Weber Road – approximately 43 miles, and from Quakertown to Hellertown – approximately 11 miles. Following coordination of right-of-way records and survey permissions, Baker mobilized multiple field crews to the site near Easton, Pennsylvania.

Nationwide Flood Database, Nationwide. *Transamerica Flood Hazard Certification.* CADD Technician. Responsible for digitizing new flood data from photos and/or client revisions. Baker developed a nationwide digital indexing tool of Flood Insurance Rate Maps (FIRM) for Transamerica Flood Hazard Certification. Following the completion of the index, Q3 Flood Data was developed for over 100 counties. Baker also assumed the task of maintaining TFHC’s flood database, updating the flood layer by posting changes as FEMA released revisions to the FIRMs.

Surveying and Photogrammetric Mapping Services, Statewide, Pennsylvania. *Pennsylvania Department of Transportation, Central Office.* CADD Technician. Responsible for Q/C line work, contours, and planimetric data. Baker provided surveying and mapping services for transportation projects continuously since 1986, through a series of nine open-end contracts. Baker’s services included aerial photography; first-, second-, and third-order conventional surveys; highway construction staking; global positioning system surveys; analytical aerotriangulation; digital topographic mapping; and digital orthophotos on an as-needed basis.

Border Stations Counter Terrorism Exit/Entry, Minnesota - Washington. *U.S. Department of Justice - INS.* CADD Technician. Responsible for ports of entry ALTA surveys; including boundary, topographic and contour data. Baker was responsible for providing Entry-Exit Control System Remote Sensing, Digital Photography, and Maps: Minnesota - Washington for INS Border Stations Counter Terrorism Initiatives.

Main Street Bridge Replacement, S.R. 8, Butler, Pennsylvania. *Pennsylvania Department of Transportation, District 10-0.* CADD Technician. Responsible for preparing digital terrain model and contours with additional topographic data. Baker was responsible for the final design of a bridge replacement on a new alignment. Total project length is 4,600 feet, including an eight-span dual structure of curved steel girders with a total length of 1,200 feet.

General Technical Assistance for the Pennsylvania Superfund Program, Statewide, Pennsylvania. *Pennsylvania Department of Environmental Protection.* CADD Technician. Responsible for using digital terrain data to create contours. Also created final plots using both topographic and contour layers. Under two consecutive general technical assistance contracts, Baker provided environmental consulting services for sites that had been identified as threats to public health or the environment, but did not qualify for inclusion on the U.S. Environmental Protection Agency’s National Priorities list. Baker’s services included project management, storage tank management and closures, site characterizations, feasibility studies, engineering design and construction inspection, emergency water provisions, public involvement support, and third-party reviews. Baker completed 92 work assignments under these two contracts.

US-VISIT Updating Boundary/Site Improvements and Utility Surveys, 17 Sites: Northern States of ME-VT-NY-MN-MT-ND-WA, Six Sites: Southwestern States of TX-NM-CA, 23 Land Ports of Entry. *General Services Administration.* CADD Technician. Provide updated boundary and utility survey maps based on new survey data and topographic mapping. Baker’s services included updating existing boundary/site improvements and utility surveys of 23 Land Ports of Entry (LPOEs) along the northern and southern borders in approximately 11 states. Baker updated detailed legal property boundary limits, physical locations and sizes of surface utilities, physically surveyed site improvements, performed map edits, and validated past land limits and current ownership of each LPOE based on local and government records. Baker also prepared detailed work plans, proposed schedules, and prepared detailed final surveys with information for all LPOEs.

ADDITIONAL SERVICES

High Definition Scanning Experience

Mobile LiDAR

Baker owns and operates the most innovative and productive surveying and mapping solution using Mobile LiDAR (Light Detection and Ranging) technology. Employing technological advancements that facilitate data-capture from a vehicle travelling at highway speeds, Baker's system provides a cost-effective and efficient method to acquire survey grade measurements. Applications in engineering, transportation and utilities can benefit dramatically from the high level of detail provided from LiDAR surveys. The deployment of Mobile LiDAR technology demonstrates Baker's commitment to continuously develop innovative and sustainable solutions.

Description

Baker's Mobile LiDAR system is powered by Optech's Lynx Mobile Mapper™. The platform consists of two Class 1 (eye-safe) lasers which collect a staggering 400,000 survey-grade measurements per second. Two on-board five mega-pixel cameras, capturing up to five images/sec, facilitate feature identification, image draping, video compilation and scene comprehension, while advanced positioning systems provide the framework for accurate and repeatable results.

Operating at highway speeds, the system can inundate a site with high-density scan information to provide remarkable visualization capabilities. Resulting products are not limited two 2D line drawings and reports. Rather, Mobile LiDAR data yields a seemingly limitless array of products and services, while remaining competitively priced to traditional surveying.

Applications in engineering, transportation and utilities can benefit dramatically from the high level of detail provided from a LiDAR survey. With a range of 200 meters per sensor (400 meter-wide corridor), and the ability to seamlessly transition to numerous platforms (boat, ATV, rail, etc), Baker's system enables comprehensive data-capture over large areas, with fewer staff, and without interrupting local operations or traffic-flow.



Static LiDAR

Baker provides terrestrial laser scan imaging services. Laser scanning technology provides incredible levels of detail and yields significant value for many capital projects, especially for complex structures and surface modeling. In terrestrial static acquisition, the LIDAR unit is mounted on a tripod. Since the range to target is dramatically less than with airborne systems, the point density and accuracy is much higher, as much as a point per square millimeter.

With tripod mounted systems, GPS control can be either from a GPS on the unit, plus one or more control points on the ground to provide geometry, or from multiple GPS targets on the ground. Multiple scans are combined as long as three or more common and distinct points exist between the scans. It is common practice to place targets in the scene that are highly reflective and have precise scannable markers in order to guarantee a minimum of scan combination points. These points, ideally, would be collected using GPS as well. A conventional control survey will be performed for the purpose of tying scan views together, and to register the scenes to the local horizontal and vertical control network. This will allow the development of virtual images and 3D models as finished planning concepts in the future.

Once collected, LIDAR data is post-processed for geometric correction as needed. The result of this stage is a geometrically accurate collection of points, or a 'point cloud,' typically coded with intensity of return and in some cases with the normal vector (roughly, the vector back to the scanner). Multiple scans for an area are combined, resulting in even larger data sets to increase either the scan area or the scan density.

Baker processes, each of the millions of data points includes north, east and elevation coordinates, and reflection intensity. The resulting point cloud data appears similar to a black and white photograph, with the added value that each of the image points is represented in its true horizontal and vertical position. The 3D point cloud data is typically accurate to within +/- 3mm. The laser light is invisible infrared and is eye safe.

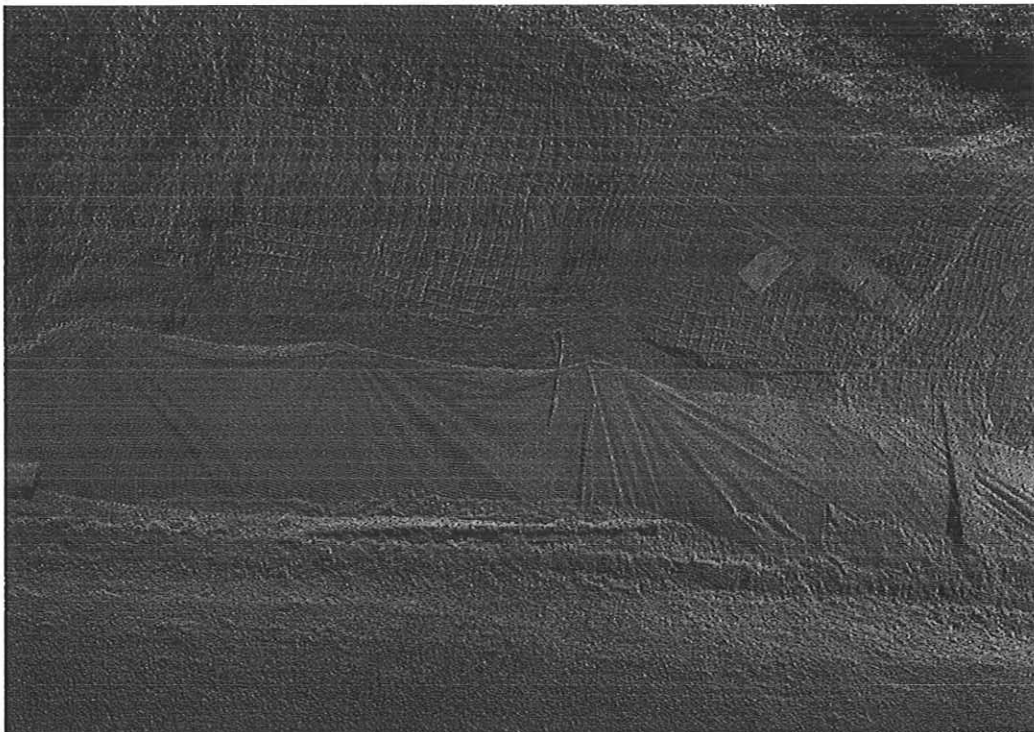


High-Definition Laser Scanning instrument

Using advanced integrated post processing techniques, Baker transforms the rich, three-dimensional point cloud data generated from laser scans, into usable CADD deliverables conveniently registered into standard geospatial reference systems. The resulting digital models allow users to access accurate, real world images on local CADD workstations using familiar CADD tools. Highly accurate three-dimensional models then provide the basis for computer simulations, complex design analysis, and visualizations.



Intensity images of a mine from MLS



Intensity images of a mine from MLS

SIGNED DOCUMENTS

Solicitation

Certification and Signature Page

Addendum Acknowledgement Form

Vendor Preference Certificate

Purchasing Affidavit



State of West Virginia
 Department of Administration
 Purchasing Division
 2019 Washington Street East
 Post Office Box 50130
 Charleston, WV 25305-0130

Solicitation

NUMBER
DEP15938

PAGE
1

ADDRESS CORRESPONDENCE TO ATTENTION OF:
GUY NISBET 304-558-8802

VENDOR

RFQ COPY
 TYPE NAME/ADDRESS HERE

Michael Baker Jr., Inc.
 5088 W. Washington St., Second Floor
 Charleston, WV 25313

SHIP TO

ENVIRONMENTAL PROTECTION
 DEPARTMENT OF
 OFFICE OF AML&R
 601 57TH STREET SE
 CHARLESTON, WV
 25304 304-926-0499

DATE PRINTED
08/23/2012

BID OPENING DATE:

09/06/2012

BID OPENING TIME 1:30PM

LINE	QUANTITY	UOP	CAT. NO.	ITEM NUMBER	UNIT PRICE	AMOUNT
0001	1	JB		962-52		
MAPPING SERVICES FOR SOUTHERN COUNTIES OF WV REQUEST FOR SOLICITATION THE WEST VIRGINIA PURCHASING DIVISION FOR THE AGENCY WEST VIRGINIA DEPARTMENT OF ENVIROMENTAL PROTECTION'S OFFICE OF ABANDONED MINE LANDS AND RECLAMATION IS SOLICITING BIDS FROM QUALIFIED CONTRACTOR FOR AN OPEN-END CONTRACT TO PROVIDE MAPPING SERVICES IN THE SOUTHERN COUNTIES OF WEST VIRGINIA PER THE FOLLOWING SPECIFICATIONS, TERMS & CONDITIONS, BID REQUIREMENTS. THESE MAPPING SERVICES WILL RESULT IN THE DEVELOPMENT OF CONTRACT DOCUMENTS FOR DESIGN/CONSTRUCTION PROJECTS. ***** THIS IS THE END OF RFQ DEP15938 ***** TOTAL:						

SIGNATURE <i>Russell C. Hall</i>	TELEPHONE 304-769-2154	DATE 9/4/12
TITLE Office Principal	FEN 25-1228638	ADDRESS CHANGES TO BE NOTED ABOVE


WHEN RESPONDING TO SOLICITATION, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'

CERTIFICATION AND SIGNATURE PAGE

By signing below, I certify that I have reviewed this Solicitation in its entirety; understand the requirements, terms and conditions, and other information contained herein; that I am submitting this bid or proposal for review and consideration; that I am authorized by the bidder to execute this bid or any documents related thereto on bidder's behalf; that I am authorized to bind the bidder in a contractual relationship; and that to the best of my knowledge, the bidder has properly registered with any State agency that may require registration.

Michael Baker Jr., Inc.

(Company)



(Authorized Signature)

Russell E. Hall, PE, PS

(Representative Name, Title)

304-769-2154

(Phone Number)

304-769-0822

(Fax Number)



(Date)

ADDENDUM ACKNOWLEDGEMENT FORM

SOLICITATION NO.: DEP15938

Instructions: Please acknowledge receipt of all addenda issued with this solicitation by completing this addendum acknowledgment form. Check the box next to each addendum received and sign below. Failure to acknowledge addenda may result in bid disqualification.

Acknowledgment: I hereby acknowledge receipt of the following addenda and have made the necessary revisions to my proposal, plans and/or specification, etc.

Addendum Numbers Received:

(Check the box next to each addendum received)

- | | |
|---|--|
| <input type="checkbox"/> Addendum No. 1 | <input type="checkbox"/> Addendum No. 6 |
| <input type="checkbox"/> Addendum No. 2 | <input type="checkbox"/> Addendum No. 7 |
| <input type="checkbox"/> Addendum No. 3 | <input type="checkbox"/> Addendum No. 8 |
| <input type="checkbox"/> Addendum No. 4 | <input type="checkbox"/> Addendum No. 9 |
| <input type="checkbox"/> Addendum No. 5 | <input type="checkbox"/> Addendum No. 10 |

I understand that failure to confirm the receipt of addenda may be cause for rejection of this bid. I further understand that any verbal representation made or assumed to be made during any oral discussion held between Vendor's representatives and any state personnel is not binding. Only the information issued in writing and added to the specifications by an official addendum is binding.

Michael Baker Jr., Inc.

Company

Russell E. Hall

Authorized Signature

9/4/12

Date

NOTE: This addendum acknowledgment should be submitted with the bid to expedite document processing.

Rev. 07/12

State of West Virginia VENDOR PREFERENCE CERTIFICATE

Certification and application* is hereby made for Preference in accordance with *West Virginia Code*, §5A-3-37. (Does not apply to construction contracts). *West Virginia Code*, §5A-3-37, provides an opportunity for qualifying vendors to request (at the time of bid) preference for their residency status. Such preference is an evaluation method only and will be applied only to the cost bid in accordance with the *West Virginia Code*. This certificate for application is to be used to request such preference. The Purchasing Division will make the determination of the Resident Vendor Preference, if applicable.

1. Application is made for 2.5% resident vendor preference for the reason checked:
 Bidder is an individual resident vendor and has resided continuously in West Virginia for four (4) years immediately preceding the date of this certification; or,
 Bidder is a partnership, association or corporation resident vendor and has maintained its headquarters or principal place of business continuously in West Virginia for four (4) years immediately preceding the date of this certification; or 80% of the ownership interest of Bidder is held by another individual, partnership, association or corporation resident vendor who has maintained its headquarters or principal place of business continuously in West Virginia for four (4) years immediately preceding the date of this certification; or,
 Bidder is a nonresident vendor which has an affiliate or subsidiary which employs a minimum of one hundred state residents and which has maintained its headquarters or principal place of business within West Virginia continuously for the four (4) years immediately preceding the date of this certification, or,
2. Application is made for 2.5% resident vendor preference for the reason checked:
 Bidder is a resident vendor who certifies that, during the life of the contract, on average at least 75% of the employees working on the project being bid are residents of West Virginia who have resided in the state continuously for the two years immediately preceding submission of this bid; or,
3. Application is made for 2.5% resident vendor preference for the reason checked:
 Bidder is a nonresident vendor employing a minimum of one hundred state residents or is a nonresident vendor with an affiliate or subsidiary which maintains its headquarters or principal place of business within West Virginia employing a minimum of one hundred state residents who certifies that, during the life of the contract, on average at least 75% of the employees or Bidder's affiliate's or subsidiary's employees are residents of West Virginia who have resided in the state continuously for the two years immediately preceding submission of this bid; or,
4. Application is made for 5% resident vendor preference for the reason checked:
 Bidder meets either the requirement of both subdivisions (1) and (2) or subdivision (1) and (3) as stated above; or,
5. Application is made for 3.5% resident vendor preference who is a veteran for the reason checked:
 Bidder is an individual resident vendor who is a veteran of the United States armed forces, the reserves or the National Guard and has resided in West Virginia continuously for the four years immediately preceding the date on which the bid is submitted; or,
6. Application is made for 3.5% resident vendor preference who is a veteran for the reason checked:
 Bidder is a resident vendor who is a veteran of the United States armed forces, the reserves or the National Guard, if, for purposes of producing or distributing the commodities or completing the project which is the subject of the vendor's bid and continuously over the entire term of the project, on average at least seventy-five percent of the vendor's employees are residents of West Virginia who have resided in the state continuously for the two immediately preceding years.
7. Application is made for preference as a non-resident small, women- and minority-owned business, in accordance with *West Virginia Code* §5A-3-59 and *West Virginia Code of State Rules*.
 Bidder has been or expects to be approved prior to contract award by the Purchasing Division as a certified small, women- and minority-owned business.

Bidder understands if the Secretary of Revenue determines that a Bidder receiving preference has failed to continue to meet the requirements for such preference, the Secretary may order the Director of Purchasing to: (a) reject the bid; or (b) assess a penalty against such Bidder in an amount not to exceed 5% of the bid amount and that such penalty will be paid to the contracting agency or deducted from any unpaid balance on the contract or purchase order.

By submission of this certificate, Bidder agrees to disclose any reasonably requested information to the Purchasing Division and authorizes the Department of Revenue to disclose to the Director of Purchasing appropriate information verifying that Bidder has paid the required business taxes, provided that such information does not contain the amounts of taxes paid nor any other information deemed by the Tax Commissioner to be confidential.

Under penalty of law for false swearing (*West Virginia Code*, §61-5-3), Bidder hereby certifies that this certificate is true and accurate in all respects; and that if a contract is issued to Bidder and if anything contained within this certificate changes during the term of the contract, Bidder will notify the Purchasing Division in writing immediately.

Bidder: Michael Baker Jr., Inc.

Signed: 

Date: 9/4/12

Title: Office Principal

RFO No. DEP15938

STATE OF WEST VIRGINIA
Purchasing Division

PURCHASING AFFIDAVIT

West Virginia Code §5A-3-10a states: No contract or renewal of any contract may be awarded by the state or any of its political subdivisions to any vendor or prospective vendor when the vendor or prospective vendor or a related party to the vendor or prospective vendor is a debtor and the debt owed is an amount greater than one thousand dollars in the aggregate

DEFINITIONS:

"Debt" means any assessment, premium, penalty, fine, tax or other amount of money owed to the state or any of its political subdivisions because of a judgment, fine, permit violation, license assessment, defaulted workers' compensation premium, penalty or other assessment presently delinquent or due and required to be paid to the state or any of its political subdivisions, including any interest or additional penalties accrued thereon.

"Debtor" means any individual, corporation, partnership, association, limited liability company or any other form or business association owing a debt to the state or any of its political subdivisions. "Political subdivision" means any county commission; municipality; county board of education; any instrumentality established by a county or municipality; any separate corporation or instrumentality established by one or more counties or municipalities, as permitted by law; or any public body charged by law with the performance of a government function or whose jurisdiction is coextensive with one or more counties or municipalities. "Related party" means a party, whether an individual, corporation, partnership, association, limited liability company or any other form or business association or other entity whatsoever, related to any vendor by blood, marriage, ownership or contract through which the party has a relationship of ownership or other interest with the vendor so that the party will actually or by effect receive or control a portion of the benefit, profit or other consideration from performance of a vendor contract with the party receiving an amount that meets or exceeds five percent of the total contract amount.

EXCEPTION: The prohibition of this section does not apply where a vendor has contested any tax administered pursuant to chapter eleven of this code, workers' compensation premium, permit fee or environmental fee or assessment and the matter has not become final or where the vendor has entered into a payment plan or agreement and the vendor is not in default of any of the provisions of such plan or agreement.

Under penalty of law for false swearing (*West Virginia Code §61-5-3*), it is hereby certified that the vendor affirms and acknowledges the information in this affidavit and is in compliance with the requirements as stated.

WITNESS THE FOLLOWING SIGNATURE

Vendor's Name: Michael Baker Jr., Inc.

Authorized Signature: *Russel E. Hall* Russel E. Hall Date: 9/4/12

State of West Virginia

County of Kanawha, to-wit:

Taken, subscribed, and sworn to before me this 4th day of September, 2012.

My Commission expires April 14, 2013.

AFFIX SEAL HERE

NOTARY PUBLIC *Stephanie A. Hensley*



Cost Proposal
Mapping Services
for
Southern Counties of West Virginia
RFQ Number DEP15938



Submitted to:
State of West Virginia
Department of Administration
Purchasing Division
Charleston, West Virginia

Submitted by:
Michael Baker Jr., Inc.
Charleston, West Virginia

Baker

September 2012

Baker

Michael Baker Jr., Inc.
A Unit of Michael Baker Corporation

5088 West Washington Street
Charleston, West Virginia 25313

(304) 769-0821 Phone
(304) 769-0822 Fax

September 5, 2012

State of West Virginia
Department of Administration
Purchasing Division
2019 Washington Street, East
Charleston, WV 25305-0103

Attention: Mr. Guy L. Nisbet, Senior Buyer

**Re: Expression of Interest for Professional Engineering and Mapping Services within Southern Counties of West Virginia for the West Virginia Department of Environmental Protection's Office of Abandoned Mine Lands And Reclamation
RFQ Number DEP15938**

Dear Mr. Nisbet:

Michael Baker Jr., Inc. (Baker) is pleased to submit this Expression of Interest to provide professional engineering and mapping services for the **West Virginia Department of Environmental Protection's (WVDEP) Office of Abandoned Mine Lands and Reclamation**. Baker has an in-house team of experienced personnel who have successfully demonstrated our capabilities on similar assignments for the WVDEP. Our seasoned team members have also provided engineering services for numerous abandoned mine land reclamation and related projects for a variety of clients.

Baker's staff is experienced in all aspects of AML/R/AMD projects. Baker has been providing engineering services for abandoned mine lands since the Federal government first enacted AML legislation. We have provided these services for the WVDEP, the Pennsylvania Department of Environmental Protection, Ohio Department of Natural Resources, and the U.S. Office of Surface Mining among others. Since 1983 Baker has been providing the WVDEP with superior service, which gives us the knowledge and confidence to ensure our assignments will be completed on time, within budget, and to your exacting standards.

Baker is also one of the few companies to provide high definition scanning services involving static and mobile LiDAR to supplement conventional surveying and aerial mapping. This would be beneficial for areas not captured by aerial mapping where access or safety might be an issue (i.e. high walls, unstable ground or other unsafe conditions). Baker will use these technologies to survey areas from a safe and suitable location.

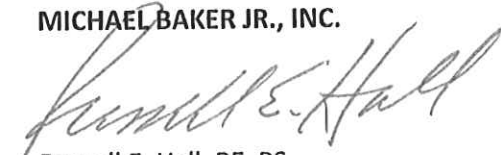
Baker

Mr. Guy Nesbit
State of West Virginia
September 5, 2012
Page 2 of 2

This submittal illustrates our qualifications and experience to deal with this assignment of work arising from this contract. If you have any questions or require additional information concerning our qualifications, experience or approach, please contact me at 304.769.2144.

Sincerely,

MICHAEL BAKER JR., INC.



Russell E. Hall, PE, PS
Office Principal

MICHAEL BAKER JR., INC.
 5088 W. WASHINGTON ST., SECOND FLOOR
 CHARLESTON, WV 25313

**MAPPING SERVICES IN SOUTHERN COUNTIES OF WEST VIRGINIA
 OPEN END CONTRACT
 DEP15938
 BID SCHEDULE**

The DEP reserves the right to request additional and supporting documentation regarding unit prices when the unit price appears to be unreasonable.

Item No.	Quantity	Description	Unit Price	Amount
1.0	700	2-Man Surveying Crew (per hour) - SEE NOTE 1	\$119.00	\$83,300.00
2.0	225	2-Man Surveying Crew (per hour) - SEE NOTE 1	\$147.00	\$33,075.00
3.0	280	Aerial Photograph Production (per sheet) - SEE NOTE 2	\$44.00	\$12,320.00
4.0		Topographic Mapping from Aerial Photography (per acre) (List only one rate for each category)		
	500	0 - 50 Acres	\$80.23	\$40,115.00
	280	51 - 100 Acres	\$38.16	\$10,684.80
	202	101 and up Acres	\$37.71	\$7,617.42
5.0		Professional Rates (Listed Disciplines Only) (per hour)		
	250	Licensed Land Surveyor	\$110.00	\$27,500.00
	1100	CAD Operator	\$67.00	\$73,700.00
	200	Draftsperson	\$61.00	\$12,200.00
	125	Secretary	\$60.00	\$7,500.00
	150	Word Processor	\$60.00	\$9,000.00
6.0		Travel and Per Diem		
	125	Per Diem (Rate/Person/Day)	\$123.00	\$15,375.00
				\$332,387.22

* These are estimated quantities for bidding purposes only

NOTE 1: Includes vehicles

NOTE 2: Unit Price and Amount are based on one (1) aerial mission for all contracted sites.