

May 15, 2019

Melissa Pettrey, Senior Buyer  
Department of Administration  
Purchasing Division  
2019 Washington Street E.  
Charleston, West Virginia 25305

RECEIVED

2019 MAY 15 AM 10:26

WV PURCHASING  
DIVISION

**Subject: Professional A/E Services for the General Services Division  
Central Chiller Plant Ice Farm and Upgrades – CEOI 0211 GSD1900000008**

Dear Ms. Pettrey:

The Charleston, WV office of Michael Baker International, Inc. (Michael Baker) is pleased to respond to a solicitation for the Expression of Interest for Engineering and Architectural Services related to the proposed Central Chiller Plant Ice Farm and Upgrades at the Capitol Complex in Charleston, West Virginia. Michael Baker is interested in the mission of your agency and would like to engage with the General Services Division as a trusted facilities consultant. We believe that our team of professionals is uniquely qualified to partner with the General Services Division on this important project and to help make the Capitol Chiller Plant more energy efficient.

Michael Baker is well positioned to assemble a comprehensive design team (in-house) including: Mechanical, Electrical, Plumbing, Structural and Fire Protection Engineering, as well as Architectural, and IT Communications expertise. Our diverse team of professionals are well seasoned in the preparation of construction documents, bid specifications, and the application of required code compliance and construction permits. Michael Baker can also provide leadership or assistance during the Bidding process and the appropriate level of Construction Administration during the Construction Phase.

We thank you for your consideration and look forward to interviewing with the selection committee in order to share our thoughts and ideas for this exciting opportunity!

Should you have any questions or require additional information, please feel free to contact me at (304) 769-2152 or by e-mail at [dhilliard@mbakerintl.com](mailto:dhilliard@mbakerintl.com).

Very truly yours,

Michael Baker International, Inc.



David J. Hilliard, P.E., LEED® AP

Enclosure

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Purchasing Division  
 2019 Washington Street East  
 Post Office Box 50130  
 Charleston, WV 25305-0130

State of West Virginia  
 Centralized Expression of Interest  
 34 – Service - Prof

Proc Folder: 569921

Doc Description: EOI: Central Chiller Plant Ice Farm and Upgrades

Proc Type: Central Contract - Fixed Amt

Date Issued	Solicitation Closes	Solicitation No	Version
2019-04-18	2019-05-15 13:30:00	CEOI 0211 GSD1900000008	1

**BID RECEIVING LOCATION**

BID CLERK  
 DEPARTMENT OF ADMINISTRATION  
 PURCHASING DIVISION  
 2019 WASHINGTON ST E  
 CHARLESTON WV 25305  
 US

**VENDOR**

Vendor Name, Address and Telephone Number:

**Michael Baker International, Inc.**  
**100 Washington Street East, Suite 301**  
**Charleston, West Virginia 25301**  
**304-769-0821**

**FOR INFORMATION CONTACT THE BUYER**

Melissa Pettrey  
 (304) 558-0094  
 melissa.k.pettrey@wv.gov

Signature X

FEIN # **25-1228638**

DATE **15May2019**

All offers subject to all terms and conditions contained in this solicitation

**ADDITIONAL INFORMATION:**

Expression of Interest

The West Virginia Purchasing Division is soliciting Expressions of Interest ("EOI") for the West Virginia Department of Administration, General Services Division ("Agency"), from qualified firms("Vendors") to provide architectural/engineering evaluation and design services for The Campus Central Chiller Plant, WV State Building #11, per the bid requirements, specifications, terms and conditions attached to this solicitation.

SHIP TO	SHIP TO
DEPARTMENT OF ADMINISTRATION GENERAL SERVICES DIVISION 112 CALIFORNIA AVENUE, 5TH FLOOR CHARLESTON WV25305 US	DEPARTMENT OF ADMINISTRATION GENERAL SERVICES DIVISION BLDG 22 - TAX AND REVENUE 1001 LEE ST CHARLESTON WV 25301 US

Line	Comm Ln Desc	Qty	Unit Issue
1	EOI: Central Chiller Plant Ice Farm and Upgrades		

Comm Code	Manufacturer	Specification	Model #
81100000			

**Extended Description :**

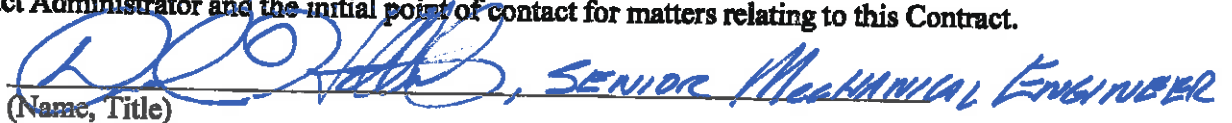
EOI: Central Chiller Plant Ice Farm and Upgrades

<b>GSD1900000008</b>	<b>Document Phase</b> Final	<b>Document Description</b> EOI: Central Chiller Plant Ice Farm and Upgrades	<b>Page 3</b> <b>of 3</b>
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**ADDITIONAL TERMS AND CONDITIONS**

See attached document(s) for additional Terms and Conditions

**DESIGNATED CONTACT:** Vendor appoints the individual identified in this Section as the Contract Administrator and the initial point of contact for matters relating to this Contract.

 **SENIOR MECHANICAL ENGINEER**  
(Name, Title)

**David J. Hilliard, P.E., Senior Mechanical Engineer**

(Printed Name and Title)

**400 Washington Street East, Suite 301, Charleston, WV 25301**

(Address)

**304.769.0821 / 304.769.0822**

(Phone Number) / (Fax Number)

**dhilliard@mbakerintl.com**

(email address)

**CERTIFICATION AND SIGNATURE:** By signing below, or submitting documentation through wvOASIS, I certify that I have reviewed this Solicitation in its entirety; that I understand the requirements, terms and conditions, and other information contained herein; that this bid, offer or proposal constitutes an offer to the State that cannot be unilaterally withdrawn; that the product or service proposed meets the mandatory requirements contained in the Solicitation for that product or service, unless otherwise stated herein; that the Vendor accepts the terms and conditions contained in the Solicitation, unless otherwise stated herein; that I am submitting this bid, offer or proposal for review and consideration; that I am authorized by the vendor to execute and submit this bid, offer, or proposal, or any documents related thereto on vendor's behalf; that I am authorized to bind the vendor in a contractual relationship; and that to the best of my knowledge, the vendor has properly registered with any State agency that may require registration.

**Michael Baker International, Inc.**

(Company)

 **Patrick W. Fogarty, Senior Associate**  
(Authorized Signature) (Representative Name, Title)

**Patrick W. Fogarty, Senior Associate**

(Printed Name and Title of Authorized Representative)

**15 May 2019**

(Date)

**304.769.0821 / 304.769.0822**

(Phone Number) (Fax Number)

**ADDENDUM ACKNOWLEDGEMENT FORM**

**SOLICITATION NO.: CE01 0211 GSD1900000008**

**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)*

- Addendum No. 1
- Addendum No. 2
- Addendum No. 3
- Addendum No. 4
- Addendum No. 5

- Addendum No. 6
- Addendum No. 7
- Addendum No. 8
- Addendum No. 9
- 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 International, Inc.**

Company

Authorized Signature

**15 May 2019**

Date

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

SECTION I



## PROJECT BACKGROUND

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The West Virginia Department of Administration, General Services Division (GSD) is seeking a highly qualified architectural/engineering firm ready to provide design services and bid documents for the Building 11 Central Chiller Plant Ice Farm and Upgrades at the West Virginia Capitol Complex in Charleston West Virginia. The firm will be responsible to perform a thorough analysis of strategies to reduce the electrical load of the plant through efficiencies and the installation of an Ice Farm connected to the existing Chiller Plant systems. The "findings" report make recommendation and present cost-effective options followed by Construction Documents for upgrades and renovations to the Chiller building as specified in the Expression of Interest (EOI).

**Michael Baker International, Inc. (Michael Baker)** is a highly qualified firm with experience in providing Chiller Plant design and renovations similar to the type of services required for these projects, and *Michael Baker is extremely interested in continuing our relationship with WV General Service Division* and in providing an innovative, efficient and phased renovation project for Building Twenty-Two.

## QUALIFICATIONS & EXPERIENCE

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### Firm Introduction

**Michael Baker**

INTERNATIONAL

Michael Baker International, Inc. (Michael Baker), is a Pennsylvania-based corporation, founded in 1940, with its headquarters located in Pittsburgh, Pennsylvania. **Michael Baker has maintained a local presence in Charleston for over 50 years and our employees are committed to future of our state.** Corporately with over \$1.3 billion in annual revenue, Michael Baker has nearly 3,500 employees in over 90 offices located across the U.S. and internationally, and is ranked as the 5th largest design firm for government office buildings in the U.S. by Engineering News-Record.

Michael Baker's team of experienced professionals has demonstrated the ability to deliver quality work products to our clients, on-time and within budget. Each individual on the selected project team has extensive experience in their field of expertise and have demonstrated success on projects of similar size and scope. Michael Baker can provide the entire depth of design services necessary to complete the project but will engage an independent estimating service to insure an unbiased construction cost opinion. An Elevator inspection and consulting service will also be engaged.

#### FIRM CAPACITY

Michael Baker has worked across the United States on existing building renovation projects to create energy efficient improvement and revitalization plans; partnering with local governments, NGOs and nonprofits from planning through construction. We have thoroughly reviewed the EOI and are confident we can deliver the services requested.

Professionals from our local office in Charleston WV have worked on many of these nationwide projects as well as projects here at home. Michael Baker is a "single-stop resource" capable of providing comprehensive professional services, from Mechanical/Electrical and Structural Engineering to Architecture and Planning, to final design, and construction management. With the vast resources available from a large company, experts in many fields can be brought together seamlessly to develop innovative solutions for this challenging assignment. The local Michael Baker staff will provide the hands-on services needed for this project, from Client meetings to site surveys, design and Construction Administration/Inspection. With over 30 in house professionals' minutes away from the Capitol and only a 10-minute drive from the project site, Michael Baker can respond quickly and efficiently to the needs of your project.

Some of Michael Baker's local clients for facility design and renovation projects include, but are not limited to, colleges and universities, K-12 schools, counties, parishes, cities, townships, local municipalities, state department of

transportation, military facilities, airports, and private sector clients. Michael Baker's geographic location and experience enables us to respond seamlessly to a wide-ranging scope of services in order to meet our client's needs.

Over the past decade, Michael Baker was retained by WV General Service Division to develop a Master Plan for the State Capitol Complex and to provide a study and a renovation design for public restrooms at the historic West Virginia State Capitol Building. More recently, Michael Baker provided a comprehensive study of storm water flooding issues in the State Capitol Building.

### **For Michael Baker, no job is too large or too small locally or nationally!**

**Nationally**, Michael Baker, is a leading global provider of engineering and consulting services which includes planning, architectural, environmental, construction, program management, and full life cycle support services as well as information technology and communications services and solutions. Michael Baker provides its comprehensive range of services and solutions in support of U.S. federal, state, and municipal governments, foreign allied governments, and a wide range of commercial clients. Michael Baker seamlessly integrates architecture, planning, landscape architecture, engineering and management. Internationally recognized with a portfolio spanning over half a century, the team provides excellence in solutions: superior technical ability, creative design and collaborative integration.

The success of our multidisciplinary approach to the built environment results from the expertise of our design professionals. We solve challenges from multiple vantage points providing unsurpassed holistic, sustainable and innovative solutions that benefit our diverse clients, including institutions, governmental agencies, corporations, developers and builders.



Institute for Scientific Research, Fairmount WV

In summary, Michael Baker has the resources and the required qualifications to provide planning, architecture, engineering and design services for GSD on this important project. We have local and nationally recognized experts with the technical experience necessary for this assignment. In addition, Michael Baker's team of experienced professionals have an established record of delivering quality work products to our clients, on schedule and within budget.

Michael Baker's staff can provide documentation of our vast experience in the following areas for this project:

- Nationally recognized expertise in Architecture, Assessment, Programming and Planning
- Facilities Engineering (Civil, Structural, Mechanical, Fire Protection, Plumbing and Electrical)
- Construction Administration and Construction Monitoring
- Coordination with State and Federal Agencies, as required

From major new or renovated building facilities, infrastructure and aviation, to oil and gas pipeline design, bridges and roadway designs, and water resource projects, Michael Baker has evolved into one of the leading engineering and energy services firms by consistently providing targeted solutions for its client's most complex challenges.

## DEMONSTRATED EXPERIENCE IN COMPLETING PROJECTS OF A SIMILAR SIZE AND SCOPE FOLLOWS IN SECTION II

### PROJECT TEAM

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The Principal-In-Charge will ensure that all required resources including staff and equipment are available to the project manager to execute the project successfully. Team resumes, and project profiles provide a brief discussion of team member's experience base relevant to this project.

Michael Baker International, Inc.  
Russell Hall, Vice President | 400 Washington Street, Suite 301, Charleston WV 25301  
304-769-0821 | [RHall@mbakerintl.com](mailto:RHall@mbakerintl.com)

#### Management and Staffing

The project team will be staffed mainly out of the Charleston West Virginia office, with other professionals working from other offices on an as need basis. Patrick Fogarty will directly manage and coordinate efforts of the design team, overseeing design quality, budget and schedule. The selected Project Manager and primary client contact for this Project will be **David Hilliard, PE**; he will also lead the design team, with **Dennis Myer, PE** as the technical expert. Senior Architect Joseph Chaffin have design oversight of any building related work and will be serving as the Architect of Record. David Hilliard will lead the Mechanical/Electrical/Plumbing/Fire Protection portion. They will be coordinating extensively with design engineers and architectural designers to provide the most efficient and practical solutions for the project. These professionals have worked together on numerous projects and bring a high degree of competency, understanding and experience for schedule and budget challenges such as those presented in this EOI.

#### Key Personnel Assigned to the Project

We are a nationwide firm. As such, we can draw from additional staff of designers and technical experts, providing you with a team that has the resources available to meet your deadlines. We are a diverse team. Our group of architects, designers, engineers and construction management specialists can address any technical issue that may be encountered during all project phases. Unlike most firms, we have in-house personnel specializing in energy efficient and sustainable designs, and successful construction management.

Mr. Hilliard, as Lead Engineer, has a wide range of "hands on" design, engineering, and construction experience. From his beginnings as a carpenter he has expanded his professional abilities to a senior engineer for Michael Baker. His recent design experience has included the design and project management of the West Virginia State University IDIQ, various Higher Education facilities, the complex mechanical design of such projects as a large Charleston, West Virginia hospital, a Bus Maintenance Garage and office building for the West Virginia Department of Transportation, various Army National Guard Armories and Department of Defense projects, numerous HVAC/Electrical renovations, Master Planning and engineering at the West Virginia Capitol Complex including plumbing and HVAC renovation design on the

historic State Capitol Building. His resume covers over 30 years of real world work in engineering, design, fabrication and construction in the mechanical, electrical and general trades.

Mr. Myer has worked on numerous projects of his 22 years at Michael Baker. Many of these projects included the design of chiller plants not unlike what is present at the Capitol. He has personally worked on the design of an Ice Storage system and will lead the technical team through any design that comes out of the Chiller Plant assessment.

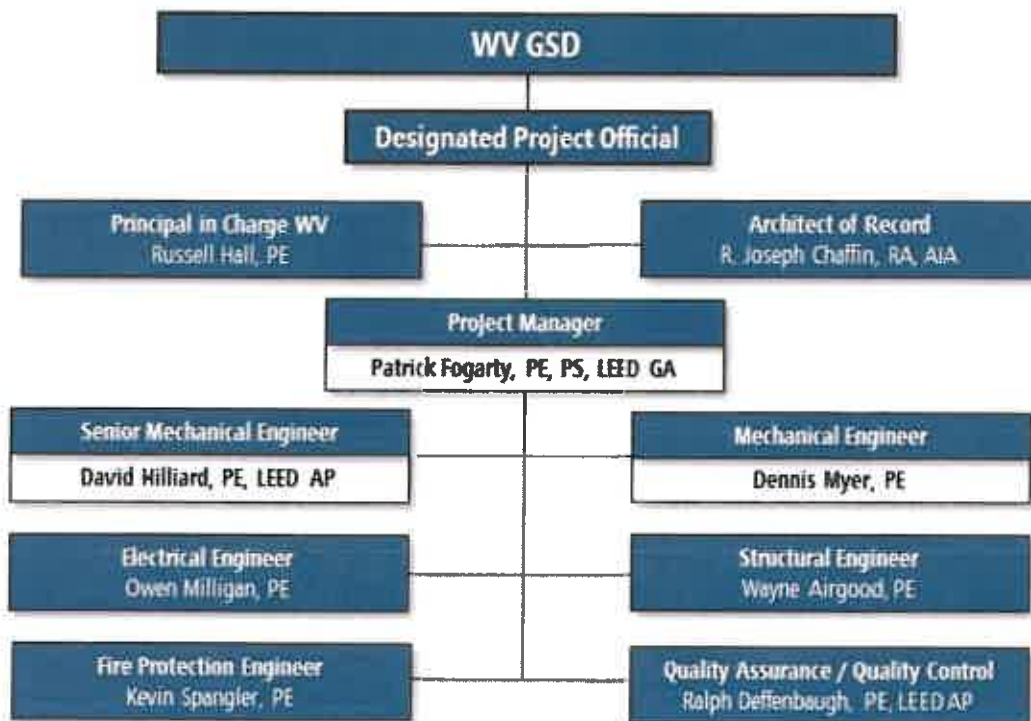
The team pledges our firm-wide resources to provide the GSD with the highest quality product and excellent client service that will exceed your expectations. We truly appreciate your consideration and would be delighted to further discuss our proposal upon request and stand ready to assist at your direction.

In summary, Michael Baker's knowledge of the project building and site, vast building design and inspection expertise, LEED accreditations and sustainable design expertise, and local relationships with GSD staff make us uniquely qualified firm for this important project. Our team is structured around key personnel that have successfully delivered many similar projects and are committed to the quality and schedule required by the GSD.

**STATEMENT OR EVIDENCE OF THE FIRM OR TEAM'S ABILITY TO PROVIDE SERVICES**

This team member in **GREEN** blocks were selected based on the current Project understanding. Additional team support members or specialists in **BLUE** block will be engaged on an as need basis. The process is part of the normal working procedure and is seamless in execution.

**MANAGEMENT**



**RESUMES OF TEAM MEMBERS ARE INCLUDED IN SECTION III**



## IMPLEMENTATION & METHODOLOGY

### GOAL ONE: CHILLER PLANT EVALUATION AND REPORT

Provide a **thorough** evaluation of the Capitol Complex cooling load, the existing Chiller plant, the building itself, and existing control systems, as well as stand-by generator capacity. The reduction of electrical will be the primary focus. Also, Life Cycle Costing Analyses (LCCA) for providing an Ice Plant can be included in the evaluation. Site preparation, infrastructure of utilities, back-up power and new Ice Farm building envelope protection will be considered. Results will be provided in a report with recommendations and associated costs.

It is Michael Baker’s understanding that the Central Chiller Plant in Building 11 located at the West Virginia Capitol Complex in Charleston West Virginia requires an Upgrade and that a new Central Chiller Plant Ice Farm is desired. It is also understood that the layout of the plant will be in an area adjacent to building 11 in the East Lot. A generator service to the Ice Farm will need to be provided as a key component of the central plant in the event of a total loss of commercial power. The generator load capacity for the Plant will be analyzed and sized for an additional duty load option to serve as the Emergency Generator for the Building 4.



114 California Avenue, Charleston, WV

The approach of the entire project would be holistic in nature. A kick off meeting would be held to help us understand the complete project requirements and to tour the existing facility. The first step of the project would be to acquire all existing perinate available information and begin to prioritize work and develop time schedules for the project tasks. The perinate data could include:

- Cooling loads
- Utility rates
- kW charges
- On-Peak/Off-Peak—kW and/or KWh
- Real time pricing
- Up front or on-going incentives from the electric utility

Additional processes could include:

- As built Plans will be reviewed.
- Identification of the condition of existing systems through information obtained by onsite investigations and interviews with system operators. Michael Baker will plan for site visits during the first weeks of the project and begin evaluating of the Plant to determine its current performance.
- The Ice Plant equipment manufacturers could be contacted to discuss any interfacing issue with their equipment with the existing facility.
- Ice plant system types would be reviewed and evaluated.
- An energy model could be developed to help Life Cycle Cost Analyses if one is desired by GSD. The data generated from the building model can be used to compared to the current energy usage to schematic design options to help determine the best approach and to estimate emergency or stand-by power design requirements.
- Preliminary Construction Cost Opinions would be developed for budgeting considerations.



Two Types of Ice Plants

The projects will be studied in a systematic way to analyze the existing conditions, client needs, affected system demands, phasing, budget and construction time frame. Owner Design Requirements will be established first before the report is started.

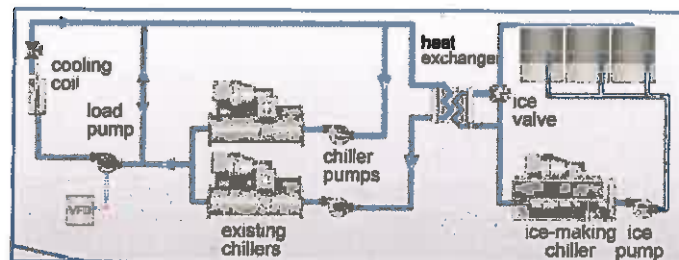
Design and desired construction schedules, and budget considerations will be addressed in the Report. While developing the report, Michael Baker will offer to hold On-Site Session Stake-Holder meetings, if desired, to discuss current issues, identify key criteria and look at some design options prior to the final report. It is important to achieve early consensus to reduce changes during the design process.

The final Report will include system recommendation, design options, and corrective maintenance suggestions. Cost Opinions will also be included in the report.

Michael Baker can provide a variety of services with professionals that have extensive experience in many fields of expertise. This allows the core team members access to expertise in all areas of study. Our Engineers and Architects will be involved in all aspects of the existing condition assessment and project design. Depending on the final contracted scope of work, this may include: Architectural, Structural, Mechanical, Electrical, Plumbing, Fire Protection, Communication and Life Safety engineering. As needed Client design coordination meetings and/or site visits can be provided as a normal part of the design development process. This will help to ensure that GSD is receiving the system and facility that they need to provide the most energy efficient and cost-effective solution possible.

To gain a thorough understanding of the existing system and its usage, the following reviews or inspections could be performed prior to developing the Schematic Design options.

- Building code, ADA and life safety issues
- Mechanical systems
- Project related electrical demands
- Determine the least disruptive approach for the design of a multi-phase construction project



Independent Ice Plant Schematic

## GOAL TWO: DESIGN AND CONSTRUCTION DOCUMENTS

*Provide Construction Documents and construction phase services based on the results of the evaluation and report. And their experience working with the Agency.*

Based on the information established in the Report, the Michael Baker staff will develop schematic design concepts required to provide the designs of the most cost-effective systems to achieve the GSD project requirements. An Ice Plant is not much different than a standard Chiller Plant. Many of the components are the same or similar. The main difference is the ice storage system, which is a manufactured item that interfaces with the chillers. There are a number of different approaches that could be taken in the design of an ice plant for this project. On first review, the Independent Ice plant may be a good option. This plant could be built almost independent of to the existing Chiller plant and could be connected with minimal system shutdowns. However, all options would want to be explored to determine the best option after the initial plant evaluation is concluded.

A general code review would also be undertaken to determine the State/Local Codes and any special requirement that would affect concept selection. Only then will the appropriate solutions to meet all those requirements be determined. Analyzing multiple solutions provides the client the ability to choose the most cost-effective approach for the project. Regular communication with the Client will be maintained throughout the entire process. Depending upon the desires of GSD, a minimum of two potential design approaches will be presented. When various design concept options are developed, and the approach is identified from a technical standpoint, the cost estimating group would be engaged to

provide the financial feasibility of each option. Based on discussions and approvals from GSD, the approved schematic design will be brought into design development (DD) to produce 65% complete plans. DD level technical specifications and construction cost estimates will be provided at this submission.

Once the DD level documents have been approved, the plans will be further developed to provide a 95% set of documents for review by GSD. These plans could be used to submit to the State Fire Marshal, as well as to the Capitol Building Commission for review and comment. A formal presentation to the CBC can be provided if desired by GSD.

**QUALITY CONTROL**

Michael Baker performs an Internal Technical Review (ITR) as part of our normal design process. This process is done on every project before it goes out the door and is part of "The Michael Baker Way of Project Management". This ITR is performed by professionals that are not part of the design team but are experts in the prospective fields that they review. This ensures a nonbiased and critical review of the project documents. This process helps to minimize small errors and omissions and yields a smoother bidding process.

**PROJECT DRAWINGS**

The drawings will be prepared in AutoCAD 19 format and will have copyright protection. All files will be provided to the client upon completion of the project for future use. The drawings will be 'bound', such that the files will not require external references and allows for easy future use and alteration.

**GOAL THREE: DESIGN AND CONSTRUCTION OF MULTI-PHASE PROJECT**

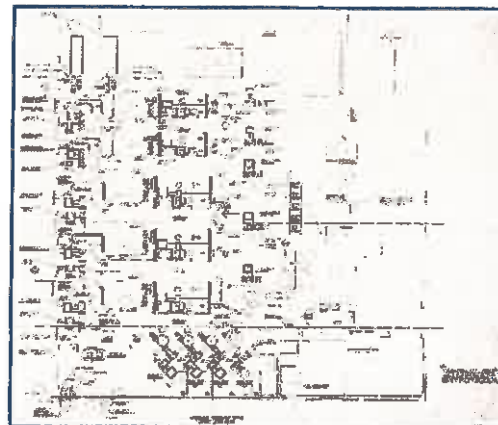
*Provide construction phase services for a multi-phase construction project in which the Chiller plant will remain in operation. Maintenance based improvements will require separate bid document from the new construction.*

**CONSTRUCTION DOCUMENTS**

Regular progress submissions for review will be made to GSD as determined in the project schedule developed at the beginning of the project. **Michael Baker will work with GSD to develop an efficient and practical project phasing plan.** The least disruptive Multi-Phase approach will be determined, and this plan will be included within the construction documents for a multi-phase construction process to maintain ongoing operation of the Plant.



Existing Chiller at Plant



Existing Chiller Plant Layout Plan

Michael Baker is well versed in providing Phasing Plans of many different applications. These plans will be reviewed and approved by the effected agencies prior to the project going out to bid, so the staff could prepare for the disruption well in advance of actual construction.

Also included will be plans to show the limitations and requirements for the demolition and removal of the existing components and systems to facilitate the new work. Documentation will include site and civil plan with the location of "affected" existing utilities or service lines as needed for renovation efforts. Cost estimates will be updated upon the completion of the 100% Construction Documents plans and specifications. The Architect / Engineer designer of record will be providing final sealed drawings and specifications for the entire project. Multiple bid packages could be utilized if existing equipment needs upgraded or replaced. Plans and specifications could be provided as one project with multiple phases or split at the discretion of GSD.

#### CONSTRUCTION ADMINISTRATION

Site visits and construction inspection serves are part of Michael Baker's holistic project services. The team members that started the project will be the same professionals providing the regular onsite inspections during construction. All products intended to be installed on the project shall be submitted to and approved by the A/E of record. The shop drawings provided by the awarded contractor will be reviewed by the A/E of record to ensure that they meet all code requirements, specification criteria and are appropriate for the project and will be approved based on meeting those requirements.

After the system installations are complete, Michael Baker will perform a final inspection and develop a corrective measure punch list and will coordinate with contractors for start-up and commissioning. Once the systems is fully operational and the staff has been trained on the equipment and system controls a final approval will be generated with the acceptance from GSD.

#### GOAL FOUR: BIDDING AND PROCUREMENT

*Provide approach in performing the Procurement Phase and working with State Agencies.*

In the past Michael Baker has had large projects with the WV GSD and is familiar with presenting to the Capitol Building Commission (CBC). This can be done with this project if desired by GSD.

#### BIDDING DOCUMENTS

Michael Baker is well aware of West Virginia State Purchasing Guidelines and has worked though the process many times. We will provide all necessary design and bidding documents for all aspects of the design. Specifications for the installation of all required products or components will be provided as part of the bid package. Michael Baker will provide Bidding support and assistance as needed.

### COST CONTROL

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#### GENERAL

Michael baker has broad experience in sensitive and partially occupied renovations as well as "from the ground up" design and construction. The scope of this project, as presented, poses challenges that are exciting for our team of problem solvers.

### DEMONSTRATED EXPERIENCE IN COMPLETING PROJECTS OF A SIMILAR SIZE AND SCOPE FOLLOWS IN SECTION II

### ADDITIONAL REFERENCES ARE PROVIDED IN SECTION IV



SECTION II

# Las Vegas Medical Center, Central Utility Plant

*North Las Vegas, Nevada*

Michael Baker International and JMA Architects, Inc. provided architectural and engineering design services for the three-building central utility plant for the new Las Vegas Medical Center. Services included site design, exterior and interior design, and space planning for the 43,553-square-foot central utility plant complex.

The new 936,468-square-foot veterans' medical center complex occupies 160-acres, and includes a 90-bed hospital, a 120-bed community living center, an inpatient behavioral health facility, an administration and education building, four outpatient clinics, and the central utility plant. The medical center opened in August 2012.

Delivered as an early construction package, the 43,553-square-foot central utility plant was the first building of the hospital complex to be constructed, so that it could supply heating and air conditioning, electrical power, and water for the construction of the rest of the complex. MBI provided design services for central utility plant as a member of a joint venture that was formed for the design of the entire medical center complex.

The team carefully planned, sited, and developed the three buildings of the central utility plant to maximize efficiency and safety. Building 1 houses the boiler and steam generator rooms and offices for the staff who administer and maintain the equipment. Building 2 houses the emergency generator, and Building 3 is the fuel pump building. A cooling tower yard for water and fuel tank storage is located adjacent to the central utility plant. An early construction package for the central utility plant was developed to fast-track the design and construction, and then modified the design to accommodate several value-engineering initiatives.

## Description

A security control center provides a remote display-only terminal that indicates status and alarm conditions reported by the energy center, environmental control systems, medical gas and vacuum system, emergency generators and other systems. A reinforced concrete utility tunnel, approximately 1,000 feet long for routing of utility piping and conduit for mechanical, plumbing, and electrical services, leads from the central to plant to the other buildings on the complex. The utility tunnel is constructed to resist catastrophic failure and meet blast-resistance requirements as a primary structure. The facility was designed to sustain all utility services for a minimum of four days.

### Client

U.S. Department of Veterans Affairs  
6900 North Pecos Road  
North Las Vegas, Nevada 89086

### Completion Date

Estimated: 2019

### Project Costs

\$42,764,000 (Construction)  
\$11,227,304 (Fee)

### MBI's Role

- Project management
- Architectural design
- Interior design
- Structural engineering
- Mechanical engineering
- Electrical engineering
- Communications engineering
- Plumbing design
- Fire protection engineering
- Site design

### **Interior Design and Space Planning**

In Building 1 of the central utility plant, the interior height of the boiler and steam generator rooms is 30 feet, to accommodate the size of the equipment. A mezzanine floor that is 15 feet above the first floor establishes a horizontal structural-steel grid that can support equipment from below and supports catwalks to access ceiling-hung mechanical units, pipe valves, and general maintenance of overhead piping.

The height of the electrical switchgear room is approximately 22 feet. The electrical conduits run up from the switchgear and stack on racks that run horizontally through and into connection panels within the boiler and steam generator rooms. The Building 2 emergency generator room and emergency switchgear room have an interior height of 22 feet. Building 3 is a small pump house for pumping fuel oil to the heating boilers and the emergency generators.

### **Heating, Ventilation, and Air Conditioning Systems**

The steam capacity is 67,800 pounds per hour from three boilers that each produce 22,600 pounds per hour. Nine underground fuel storage tanks hold 20,000 gallons each.

Medical air handling units and exhaust fans are manifolded. The medical air capacity, from four compressors, is 235 standard cubic feet per minute (SCFM). Medical vacuum from four pumps is 166 SCFM. **Four 1,200-ton chillers provide air conditioning at a capacity of 4,800 tons.**

### **Plumbing and Sanitary Systems**

The domestic water system consists of four 70-foot in diameter, nine-and-a-half-foot-high steel tanks that hold 280,000-gallons each, to supply the complex for four days in an emergency; 100,000 gallons for domestic water, 180,000 gallons for fire, and 840,000 gallons for support of mechanical systems. An eight-inch water main connected from the site water main provides potable water to the tank. The industrial water system consists of three 360,000-gallon, 12-foot steel tanks.

### **Electrical Systems**

The medical center electrical system is a radial system that is fed from the central utility plant. Electrical service enters the site at two points of service to the main normal power switchgear located in the central plant. All site distribution from the switchgear in the central utility plant is in underground concrete-encased conduit duct banks.

The central utility plant houses five emergency generators of two megawatts each, which use 155 gallons of fuel per hour.

The main service from the power company consists of two shared services at a voltage of 12.47 kilovolts that are fed to the site underground, and terminate at a main switchgear located in the central utility plant electrical equipment room. The main service at the central utility plant is approximately 800 feet from the hospital building. The voltage is reduced at each unit substation to 480 volts for distribution through the facility. The two separate utility services tie into the switchgear to two main vacuum circuit breakers rated at 1200A each.

Each of the unit substations in the central utility plant consists of a duplex-selective primary disconnect switch with current-limiting fuses, a step-down transformer to 480 and 277 volts, and a secondary switchboard consisting of low-voltage power circuit breakers in a single-ended configuration.

**Michael Baker**

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## Repair/Replace Chillers, Towers, and Pumps in Building 891

*Hill Air Force Base, Utah*

Michael Baker provided multidiscipline consulting management and engineering services for a 500-ton chiller replacement upgrade project.

This project consisted of the design and construction of a chilled water cooling system to accommodate Building 891, which is used for high security computer operations and has 24 hour/7 days per week operations that are critical to the national security operations of the U.S. Air Force. The contractor evaluated the capacity of the existing chilled water cooling system and all peripheral equipment (pumps, air handlers, cooling towers, chillers, etc.) and upgraded the system (electrical, mechanical, plumbing, structural pads, etc.). The upgrade consolidated cooling support needs for both occupant space and Defense Information System Agency (DISA) computer systems/units at the east and west sides of the building.

Michael Baker provided mechanical and electrical systems modifications design and structural design including architectural detailing of the new cooling tower screen wall. Fire protection specification was included but limited to modifying existing components that were affected by the new mechanical and electrical system installations.

Michael Baker provided electrical design and coordination, which included sizing new electrical panel boards, providing power for all new mechanical equipment, and coordinating the sequence of operations for minimal downtime of equipment during installation.

The project goal was to run the two mechanical rooms together to deliver up to minimum of 1000 tons of cooling for the building, as if it were one system, in a 2N configuration; therefore, total cooling load in the 2N will be minimum of 2,000 tons. The 2N configuration utilizes three existing 500-ton chillers from mechanical room 152 (which previously serviced the west side of the building), and one new minimum 500-ton chiller was installed in mechanical room 242. Utilizing one of the existing 500-ton chillers along with the new 500-ton chiller provided 1,000-ton capacity for the East side of the building. The total cooling load for the building was 907 tons based off the amount of IT equipment that the UPS supported plus the administrative load. With inefficiencies added in, the estimated cooling load was 1,000 tons.

Previously, there had been three 100-ton chillers that serviced the east side of the building. In addition to mechanical and electrical features of the work, touch-up painting was required both inside and outside the building. All painting of the mechanical systems matched the existing colors.

This project included modifying the grounds outside the building to accommodate a new cooling tower pad along with chilled

### *Client*

U.S. Army Corps of Engineers, Hill AFB  
7227 6th Street Building 366  
Hill AFB, Utah 84056

### *Additional References*

U.S. Army Corps of Engineers,  
Sacramento District  
1325 J Street  
Sacramento, California 95814-2922

### *Completion Date*

2012

### *Project Costs*

\$2,054,470 (Construction)  
\$122,806 (Fee)

### *Michael Baker's Role*

- Mechanical and electrical systems modifications design
- Structural design
- Architectural detailing
- Fire protection specification

water pipe framing. The new tower required updated utilities be extended and connected. Inside the mechanical room,

HVAC systems were modified to accommodate the additional equipment. In addition to the new operational features and redundancy, the users will see a reduced energy bill because efficient systems were selected and implemented. All of this was accomplished with full facility uptime.

# WVARNG Charleston Armory HVAC & Architectural Renovations

*Charleston, West Virginia*

The existing building/facility started as the Coonskin Armory constructed in 1961. The Headquarters Building was constructed simultaneously with the Coonskin Armory and occupied the second floor. Also in 1961, as a separate structure, the Adjutant General's Wing (TAG Wing) was constructed nearby. Later, in 1984 the Coonskin Armory/Headquarters Building was physically connected to the TAG Wing with an area of administrative offices. This final major construction project connected all the buildings into one major facility of over 50,000 square feet, referred to as the Charleston Armory.

The West Virginia Army National Guard (WVARNG) Construction and Facilities Management Office (C&FMO) requested a study be conducted of the consolidated mechanical and electrical components of the consolidated facility known as the Charleston Armory. Such items were considered as the condition of existing HVAC/MEP systems and design improvements or upgrades to those systems and examination of the existing building envelope and recommend possible improvements to the Envelope, HVAC, Electrical and Plumbing systems.

A loop pipe water source heat pump system determined the most cost effective for this situation, with fewer pipes, smaller space requirements and a lower installation cost. Various HVAC components included a Fluid Cooler, Boilers, Pumps, Wall Consoles, above ceiling HPs, along with some Rooftop Units and Energy Recovery Units.

During the renovation process, mold was discovered growing in certain areas of the building. An investigation was undertaken, building humidity was logged and measures were implemented to install dehumidification in existing equipment in the building, building leaks were sealed and existing mold was remediated.

Baker's design also addressed the repair of the existing roofing system, addition and repairs of roof curbs for HVAC equipment, repositioning of blocking and walk pads around the roof, and installation, repair and patching of the existing EDPM roofing system and maintaining the existing warranty.

**Client**

West Virginia Army National Guard  
Division of Engineering and  
Facilities  
1703 Coonskin Drive  
Charleston, WV 25311-1085

*Major Michael J. Beckner*  
304-561-6333

**Contract Completion Date**

2013

**Baker's Role**

- Architecture
- Mechanical Engineering
- Feasibility studies
- Cost estimates
- Civil engineering
- Electrical Engineering
- Structural engineering
- Environmental Permitting





# Design of U.S. Army Reserve Center Renovation and Expansion

*Homewood, Illinois*

As designer of record, Michael Baker provided architectural and engineering services for the renovation of a 400-member U.S. Army Reserve Center (ARC) and construction of two single-story additions totaling 35,694 square feet—a 34,294-square-foot Training Building and a 1,400-square-foot ancillary structure—along with a 3,500-square-foot Unheated Storage Building. The project also includes parking spaces for 140 privately owned vehicles (POV) and approximately 22,000 square yards for military equipment parking (MEP).

Tasks were performed under an indefinite quantity-indefinite delivery engineering agreement.

The project involved complete renovation of the 24,680-square-foot, single-story Vietnam Veterans' Memorial ARC, which was erected in 1985, using the existing footprint. While the ARC had reliably served south Chicago, the structure's building systems were nearing the end of their design life. Replacement was required to enable the facility to accommodate growing U.S. Army Reserve Unit Brigade Combat Team training needs, optimize operations, and achieve mission goals. The client chose renovation as it was a much more cost-effective alternative than replacement.

The 34,294-single-story Training Building addition accommodates core training functions and establishes the main point of entry for the ARC. This new structure includes offices and administrative areas, an assembly hall, classrooms, a library, a learning center, and an assembly hall with a kitchen. The approximately 1,400-square-foot ancillary addition houses a mail room and staging area. The renovated portion of the ARC houses utilitarian areas, including unit storage and heated storage spaces, a physical readiness room that features a 1,643-square-foot fitness center with a full complement of athletic equipment and is served by adjacent showers and locker rooms, a weapons simulator room, an arms vault, mechanical and electrical rooms, and a janitor's closet. A free-standing wash rack is provided near the Unheated Storage Building to meet vehicle cleaning needs.

The Unheated Storage Building provides space for storage of user operational equipment that requires no temperature or humidity control.

## **Client**

U.S. Army Corps of Engineers,  
Louisville District  
Room 972  
600 Dr. Martin Luther King, Jr.  
Place  
P.O. Box 59  
Louisville, Kentucky 40202

## **Completion Date**

2015

## **Michael Baker's Role**

- Planning
- Environmental investigation
- Hazardous materials surveys
- Sustainable design
- Site and civil engineering
- Geotechnical investigation
- Architecture
- Interior design
- Structural engineering
- Mechanical engineering
- Plumbing design
- Fire protection engineering
- Electrical engineering
- Communications design
- Cost estimation
- LEED® credit template documentation



Supporting project elements include environmental investigation prior to renovation of the existing ARC; grading, paving, fencing, and signage; force protection measures; exterior lighting; utility and storm drainage system connections; fire protection and fire alarm and mass notification systems; and security lighting. Structures provide access for disabled individuals. The project expanded existing parking facilities by approximately 68,800 square feet to accommodate equipment and serve reservists and visitors.

Michael Baker designed the ARC reconfiguration to meet LEED® NC 2009 Silver certification. Tasks for which Michael Baker was responsible include engineering feasibility evaluation, architecture, surveys, hazardous waste investigation of the existing ARC and remediation recommendation, geotechnical investigation oversight, all site and building engineering, cost estimating, value engineering, and LEED® credit template documentation. Michael Baker convened a design charrette and collaborated with the client in identifying needs and preferences and preferred design alternatives.

Designs comply with applicable federal, state, and local codes and standards, including the following: Unified Facilities Criteria (UFC) 4-171-05; International Building Code; International Plumbing Code; International Mechanical Code; National Fire Protection Association (NFPA) standards; Uniform Federal Accessibility Standards; the Americans with Disabilities Act; the Environmental Protection Agency Clean Water and Clean Air acts; and the requirements of ASHRAE, American National Standards Institute, American Society for Testing and Materials, and OSHA.

#### **Site Reconnaissance and Geotechnical Investigation**

Before work commenced, the Michael Baker team evaluated and documented existing surface and subsurface conditions, which entailed making several visits to the site.

Michael Baker also conducted an environmental building survey of the existing ARC. Michael Baker performed a hazardous material investigation, prepared an environmental report, and developed designs to remediate issues.

To evaluate geologic conditions, Michael Baker oversaw a geophysical survey, which involved time-domain electromagnetic technology, ground-penetrating radar, and radio detection. The team identified underground utilities and excavated test pits to expose unmarked utilities, which helped to avoid project schedule delays and complications during construction. Geotechnical evaluations confirmed that shallow spread footings would be an acceptable foundation type for the Training Building and Unheated Storage Building.

#### **Overall Building Construction**

The Training Building addition is of permanent construction and includes reinforced concrete foundations, concrete masonry load-bearing walls and concrete floor slabs; structural steel framing; mechanical, electrical, information, security, and fire suppression sprinkler systems; automated building HVAC mechanical and lighting system controls; energy-efficient lighting; interior finishes; window systems; standing-seam metal roofing; and exterior finishes consisting of attractive masonry facades.

The Unheated Storage Building is a pre-engineered metal building supported by a reinforced concrete foundation with a cast-in-place concrete on-grade floor and sloped roof.

The vehicle wash rack also has a sloped roof supported by a pre-engineered metal building with steel purlins spanning between steel girders. The girders form steel rigid frames with the building columns.

## **Exterior Systems**

### *Building Envelope*

A structural steel framing system supported by load-bearing concrete masonry walls and steel columns, beams, and joists forms the exterior envelope of the Training Building additions and supports gravity loads. The exterior wall system of the building additions is brick masonry veneer with rigid cavity wall insulation and concrete masonry backup, and the foundation system is slab-on-grade concrete.

A concrete masonry shear wall system will resist lateral loads imposed by wind and seismic forces. The exterior walls are designed to distribute lateral forces to the roof diaphragms and then to the shear walls and foundation system.

The roofing system of each building addition consists of a modified bitumen membrane roof with one-inch-in-12 pitch, sloped towards roof drains that are connected to the site stormwater system. Each roofing system is supported on a one-inch galvanized metal roof deck spanning between open-web joists. Joist members are supported by steel girders and masonry load-bearing walls.

An expansion joint separates the existing ARC from the primary building addition; the smaller addition is directly attached to the existing ARC.

The roofing system and underlying insulation on the low-slope roof of the existing ARC were replaced with new polyisocyanurate insulation with an R-28 value and a low-slope, modified bitumen roofing system. The roofing system over the primary building addition is a low-slope roof with a modified bitumen membrane. The roof sections of the primary and ancillary building additions have integrally manufactured white reflective coating to minimize the heat island effect. The new ARC roof light monitors have standing-seam metal roofs.

The Training Building additions incorporate thermally broken, anodized aluminum, fixed windows with aluminum storefront assemblies for large expanses of glazing and light at the major building entry point. Insulated, painted metal doors in hollow metal frames serve all utilitarian areas.

The Unheated Storage Building is a pre-engineered metal building with insulated metal wall and roof panels, non-insulated exterior walls, and a slab-on-grade concrete floor.

## **Interior Systems**

The interior design of the reconfigured ARC supports the client's functional and aesthetic needs. Painted gypsum wallboard is used for the majority of interior partitions in the Training Building. Exceptions are the vault, which consists of painted reinforced concrete walls in accordance with UFC, and the unit storage, kitchen, and mail screening room, which incorporate painted concrete masonry units. Wall color and floor coverings comply with UFC 4-171-05.

## **HVAC**

The HVAC systems reflect an array of design solutions to serve a variety of spaces and building functions.

The Training Building is served by a central, modular, water-to-water heat pump plant, which is tied to a closed-loop geothermal wellfield, along with a closed-circuit fluid cooler for loop-heat rejection; high-efficiency, natural gas-fired boilers; variable-flow hydronics; an HW/CHW VAV air handling system; and a Unit Storage area ventilation unit

featuring direct-fired gas heating. Carbon dioxide and occupancy sensors vary the outside air quantities based on real-time occupancies for energy savings.

The design also features an antiterrorism and force protection-rated mail processing area, humidified TERs, and direct digital controls, which will regulate and monitor all building HVAC systems and monitor all building utilities.



### *Electrical Design*

The electrical system includes power, lighting, fire alarm and mass notification, structured cabling raceway, public address, cable television distribution, telecommunications, and security systems. Michael Baker selected the main switchboard, distribution panelboards, and lighting and appliance panelboards for the Training Building for high reliability, low maintenance, efficiency, and maximum flexibility. As well, Michael Baker selected the step-down transformers for low-energy loss and short-term overload capability.

Electrical service is also provided from the reconfigured Training Building to the existing Organizational Maintenance Shop via a 480v feeder circuit and a 480v feeder circuit to the new Unheated Storage Building.

Conserving energy in interior and exterior lighting was Michael Baker's design priority for the Training Building. Interior lighting design incorporates low-maintenance fluorescent fixtures with energy-efficient electronic ballasts and T8 lamps. Interior systems include occupancy sensors and lighting control panels to turn off lights and conserve energy in office areas, corridors, and restrooms. Exterior lighting included building-mounted and site pole security lighting with energy-efficient, long-life LED lamp sources. The parking area hardstand and roadways include pole-mounted security lighting.

Michael Baker designed a photovoltaic energy system consisting of ground-mounted solar panels and DC-to-AC inverter to produce equivalent annual kilowatt hours (kWh) consumed by the site lighting system. The photovoltaic system was designed to produce a nominal peak output power of 15 kW. This "green power" was connected to backfeed the building power distribution system and supplement the utility grid power source to the site, thereby reducing peak power demand from the utility.

Michael Baker also prepared specifications for a complete building lightning protection system with UL master labeling for the Training Building. The system consists of air terminals located at the roofline with grounding cables and down-conductors and a ground loop buried below grade and routed along the building exterior. Building grounding is accomplished by an underground perimeter grounding loop with bonding of the lightning protection

system, metal underground utilities, building steel, and additional code-required items with a single neutral-ground connection point at the main switchboard grounding busbar.

#### *Security and Communication Systems Design*

Michael Baker designed separate intrusion detection systems for the arms vault and SIPRNET Caf, including raceways, junction boxes, device boxes, electrical power, and communications infrastructure. The project design included an access control system with head-end server, work station, local control panels, card readers at the site security gate and building entrances, and door contacts at all entrances and exits for the Training Building. The building entrances with card readers include electric strike and request-to-exit devices. Michael Baker designed the infrastructure for four telecommunication networks, including voice, within the Training Building, Organizational Maintenance Shop, and Unheated Storage Building and three data networks: ARNET, CAPOC, and SIPRNET. Each network involved the design of raceways, including cable tray, ladder racks and conduits, backbone cabling consisting of single-mode fiber and multi-pair copper, horizontal cabling consisting of CAT 6, outlets with RJ-45 jacks, consolidation points, racks, cabinets, protected entrance terminals, patch panels, 110 blocks, and grounding. The design of the telecommunications systems included outside-plant and inside-plant systems. A CATV system, including amplifiers, taps, splitters, RG-11 and RG-6 cabling, and outlets, was designed for the Training Building and Organizational Maintenance Shop.

#### *Plumbing and Fire Protection*

Tankless, high-efficiency, natural gas-fired water heaters located in the Training Building mechanical room and manifold provide the flow rate required for the fixtures served. The water heaters incorporate multiple controllers, a temperature and pressure-relief valve, pressure regulators, shut-off valves, and drain valves. In compliance with manufacturer instructions, a small, electrically fired water heater was installed in the re-circulating water line to maintain loop water temperature at 120 degrees F. An in-line circulating pump controlled by a time clock and aqua stat maintains water temperature in the loop to the fixtures.

To fully protect the Training Building in the event of fire, an automatic wet-pipe sprinkler system was installed in accordance with UFC 3-600-01, NFPA 72, and UFC 4-021-01. Michael Baker specified a fully addressable, intelligent fire alarm and mass notification system to serve each of the primary facilities. The annunciated system is configured for manual as well as automatic operation and electronic supervision. The signaling, initiating, and notification circuits are served by a Class B looped system. Fire alarm circuit wiring is installed in conduit.

#### **Antiterrorism and Force Protection**

Michael Baker integrated protective measures into the ARC renovation design that meet U.S. Department of Defense antiterrorism and force protection setback requirements. These include locating the ARC on the site to achieve the maximum feasible standoff distance from roads, parking areas, and vehicle loading areas; the use of blast-resistant doors and windows; and the incorporation of an emergency shutdown switch to disable all HVAC air distribution systems.

#### **Sustainable Design**

Sustainability initiatives were implemented throughout building design. Building design incorporates materials and features to reduce environmental effects, save energy, and minimize costs. Materials that are locally available and products with 20-percent recyclable content were used. Occupancy sensors reduce lighting energy consumption.

Interior building water-saving features, such as low-flow plumbing fixtures to reduce water consumption, will be used. Ozone-friendly refrigerants and refrigerant quantities will minimize ozone depletion.

Michael Baker coordinated the installation of a solar photovoltaic array and inverter system, which provides electrical energy to supplement utility provider-supplied electricity. The solar panels will offset the annual energy consumed by the new exterior lighting.

Landscaping includes native, low-maintenance, drought-tolerant plants and preserves existing trees. The landscaping design minimizes the use of potable water.

Michael Baker specified the use of measures during construction to prevent soil loss, sedimentation, and air pollution. In addition, construction waste was diverted from landfills to meet LEED® requirements. This project has achieved LEED certification.





# WVU Institute of Technology, Classroom Building

*Beckley, West Virginia*

Baker provided general Architectural and Engineering services to the West Virginia University Institute of Technology, Beckley Campus. The client requested a feasibility study, which laid the groundwork for the ambitious renovation of two buildings concurrently. The first was the Classroom building, the facility will house engineering labs, computer classrooms, psychological observation and Rat laboratories as well as some administrative services.

The Classroom Building required extensive coordination between generations of building engineering systems as well as selective demolition of architectural interior systems to allow for update use. The 31,000 SF facility was designed originally as a junior high school on the 1940's and was renovated to house technically advanced mechanical, hydraulic and computer engineering laboratories. To bring the facility to the 21<sup>st</sup> century, a student lounge, student rest and study spaces- where electronics can be utilized and charged- were devised from a former kitchen and corridor locker areas, respectively. A modern mechanical distribution system was designed to support air conditioning while a new, building-wide fire suppression system, complete with a larger water supply line, was engineered. The Classroom Building also included the design of a psychological observation laboratory that requires national accreditation and necessitated special design considerations.

The facility also received exterior upgrades and a completely new EPDM roof to shore up existing water problems. A large energy recovery unit was installed on the roof to provide fresh air to the classrooms throughout the building. The Classroom Building also required technical coordination of the existing door hardware to interface with existing products as appropriate and necessary. These hardware considerations also had to align with campus wide standards. Lastly, both facilities received interior upgrades to emphasize University branding elements and bring renewed life to a defunct campus.

Additionally, all portions- feasibility study to design and cost proposals- of this traditional design, bid, and build project were performed under a compressed and confined time constraint, allowing the client to successfully move one campus to another in one short year.

## **Client**

West Virginia University  
Beckley Campus  
400 Kanawha Street  
Beckley, WV 25801

Rob Moyer Facilities Director

## **Completion Date**

July 2017

## **Michael Baker's Role**

- Feasibility studies
- Architecture
- Mechanical engineering
- Fire Protection Engineering
- Electrical engineering
- Plumbing engineering
- Cost estimates
- Construction Administration



## Bachelor Enlisted Quarters

### *Camp Johnson, Marine Corps Base Camp Lejeune, North Carolina*

Michael Baker was the designer of record on a design-build project to construct a 102,173-square-foot combined three-story bachelor enlisted quarters, with a parking lot for 245 privately owned vehicles, including seven handicapped-access and 17 motorcycle spaces; an approximately 1,800-foot-long extension of the base access road; and an additional 66 parking spaces for privately owned vehicles along Neuse Road to serve a regulation-sized baseball field. The building has achieved LEED® Gold certification.

Constructed in the Camp Johnson segment of the base, the building, which includes 170 residential units, was needed to provide adequate bachelor barracks space and living amenities for Marine and assigned Navy bachelor enlisted personnel. The project included all necessary supporting utility and base infrastructure.

The design intent was to create functional, comfortable, sustainable, durable, and energy- and cost-efficient living quarters that reflect a high-end residential appearance and promote quality of life while achieving consistency with other base Marine Corps buildings. The team's design approach connected two housing wings via an expansive 2,274-square-foot multipurpose area with varying ceiling heights that optimizes the square footage of common space and creates a sense of community and cohesion. The building reflects classical Georgian architecture in a campus-like setting, with a main drive entry and an additional entry from Company Street B that provides access for vehicles and pedestrians. The aesthetically pleasing appearance of the building exterior is further reinforced by warm, earth-tone interior finishes.

The building provides double-occupancy bedroom-living areas with a latrine and shower, closet, sink and refrigerator, and microwave. Each wing includes air-conditioned interior corridors, operable windows, an entry vestibule, a kitchen, a dining room, an Internet cafe, a theater, a duty office and a duty bunk room, a laundry room, multipurpose rooms, a gear wash area near the building wings and entrances, a janitor's closet, utility support rooms, a material storage room, stair towers, an elevator, and vending areas.

Michael Baker's inclusive services ranged from planning to architectural and facility design, including structural, mechanical, plumbing, fire protection, and electrical systems design and LEED® certification administration. The project required the demolition of two one-story concrete masonry unit (CMU) structures of approximately 8,600 and 4,500 square feet each.

#### **Client**

Naval Facilities Engineering  
Command, Mid-Atlantic  
9742 Maryland Avenue  
Building N-26  
Norfolk, Virginia 23511-3095

#### **Completion Date**

2012

#### **Project Costs**

\$40,949,693 (Construction)  
\$2,470,486 (Fee)

#### **Michael Baker's Role**

- Design-build project delivery
- Planning
- Building information modeling
- Sustainable design
- Architecture
- Interior design
- Structural engineering
- Mechanical, electrical, and plumbing (MEP) engineering
- Fire protection engineering
- LEED® administration
- Surveying, landscape architecture, civil, and geotechnical subcontractor oversight

Michael Baker developed the design plans in compliance with Unified Facilities Criteria ([UFC] 4-721-10) standards and the base's exterior architectural plan, U.S. Department of Defense standards, Americans with Disabilities Act requirements, and low-impact design principles. The buildings and the site design blend seamlessly with the surrounding architectural environment.

### *Structural Systems*

The roof system consists of prefinished standing-seam metal panels with a 5:12 pitch over water-resistant cover-board and R-30 rigid insulation with a vapor barrier over a metal deck. The high-reflectance finish achieves the LEED® credit for a heat-island-effect roof and ENERGY STAR® compliance. Roof insulation complies with the Energy Policy Act of 2005 and consists of a continuous, 2-inch, bio-based polyurethane spray applied to the inside face of the building's eave fascia, eave overhang, and CMU wall structure to form a closed-cell rigid foam layer that provides continuous insulation and functions as a radiant, thermal, and air barrier.

### *Heating, Ventilation, and Air Conditioning*

Michael Baker performed a life-cycle cost analysis of heat recovery for domestic hot water and radiant barriers on heat exchanges, tanks, and mechanical equipment and systems to identify benefits versus costs. Michael Baker designed a complete HVAC system for the building in accordance with ASHRAE 90.1 and ASHRAE 62 requirements and the 2009 Engineer's Guide for ENERGY STAR® Label. A year after construction, Michael Baker will collaborate with the contractor to obtain energy usage data and submit an application for the building to be registered as an ENERGY STAR® Label facility.

The HVAC system was selected based on the results of Michael Baker's life-cycle analysis and includes all piping, ductwork, equipment, and appurtenances. The HVAC system emphasizes reliable operation, energy efficiency, and ease of maintenance, and includes an array of design solutions to serve a variety of spaces and building functions.

The east and west wings of the building primarily contain room modules. The wings are served with their own variable air volume (VAV) handling unit, coupled with a dedicated outdoor air system (DOAS) with energy recovery. The DOAS total enthalpy energy recovery wheels extract energy from the toilet room and the bathroom exhaust air to preheat or precool the outdoor ventilation air. The central VAV air handlers in each wing use direct-drive-type plenum fans that are controlled by variable-speed motor drives to vary the primary supply air to the rooms based on actual demand. This minimizes fan energy consumption by pushing only the required amounts of dehumidified air to the living spaces. The design provides each room module with its own series-type fan-powered VAV box with hydronic heating coil, so that each has its own thermostatic control, ensuring a complete range of heating and cooling. The VAV box modulates central supply air from the VAV air handlers as needed to cool the space and modulate the hydronic heating coil as needed for heating. The room modules are equipped with occupancy sensors to de-energize the fan-powered VAV box when the room is unoccupied. The central chiller is equipped with a condenser heat-recovery option to provide the required hot water for the terminal VAV boxes during the cooling season without having to energize the multiple central boilers.

The multipurpose area is designed with a dedicated VAV air-handling unit to enable separation of unique thermostatic zones and reduce fan energy consumption.

Reduced-pressure principle-type backflow preventers are installed for all makeup water lines inside the mechanical room.



Michael Baker also specified the use of insulation on heating and hot water lines and chilled water lines that is one inch thicker than ASHRAE 90.1 recommendations, and insulation on supply ductwork that is 1 inches thicker than ASHRAE 90.1 recommendations.

### *Electrical System Design*

The building electrical system includes power, lighting, fire alarm and mass notification, structured cabling raceway, public address, cable television distribution, telecommunications, and security systems. The main switchboard, distribution panelboards, and lighting and appliance panelboards were selected for high reliability, low maintenance, efficiency, and maximum flexibility. Step-down transformers were selected for low-energy loss and short-term overload capability.

Energy conservation was also Michael Baker's design priority for interior and exterior building lighting. Michael Baker conducted a study to evaluate daylighting opportunities. The building floor plan maximizes the use of natural lighting in the multipurpose areas and corridors through the use of light shelves that increase the reflection of ambient light.

Lighting control systems include occupancy sensors to turn off lights and conserve energy in bedroom modules, office areas, corridors, common areas, and restrooms. Lighting design included fluorescent fixtures with energy-efficient electronic ballasts and T8 lamps. Each stairwell includes bi-level switching; one lamp is controlled by occupancy sensors to conserve energy, and one lamp remains on for safety and security.

The telecommunications and electrical rooms are centrally located and vertically stacked to achieve design and cost efficiencies.

Security system features include a programmable electronic key-card access system for corridor doors and room modules.

### **LEED® and Sustainability**

Michael Baker incorporated a variety of amenities and features to achieve LEED® Gold certification and promote sustainability. The construction documents specified the use of pollution prevention measures during construction, including erosion and sediment control, stormwater pollution prevention, and the use of low-emitting, fuel-efficient construction vehicles.



SECTION III

# Patrick W. Fogarty, P.E., P.S., LEED®GA

## Civil Engineer , Facilities Practice Manager

### General Qualifications

Mr. Fogarty has over 29 years of civil engineering project design and management experience. He is responsible for the technical and management aspects of civil design and surveying projects within Baker's Charleston, West Virginia office. Mr. Fogarty has designed and managed projects in numerous disciplines including civil, structural, and transportation engineering; site development planning; and surveying. These projects have included retail/commercial site preparation, airports, streets/highways, bridges, parking lots, buildings, retaining walls/foundations, sanitary systems and structures, as well as boundary and topographic and photogrammetric surveys. Duties included field surveying, drawings and specification preparation, design, design drafting, construction inspection, quality control testing, shop drawing review, project management, contract administration and report preparation.

### Experience

**West Virginia State Capitol Restroom Renovations.** *State of WV General Services Division.* Project Manager. Responsible for the overall management of the project including the coordination of the subconsultant. 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.

**Nitro Bank Street Streetscape Improvements, Nitro, West Virginia.** *City of Nitro.* Project Manager. Responsible for concept planning, detailed design, construction document generation, and construction administration. Baker provided design, bid-phase support, and construction services for streetscape improvements to Bank Street, located in the city's business district. Baker's services include base mapping, background data collection, design plans, construction document preparation, bid-phase support, construction management, and construction inspection.

Years with Michael Baker: 10  
Years with Other Firms: 20

### Degrees

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

Diploma, 1993, Surveying and Mapping, International Correspondence Schools

Coursework, Business Administration, Heriot-Watt University, Edinburgh College of Art

### Licenses/Certifications

Professional Engineer - Civil/Structural, West Virginia, 1990  
Professional Surveyor, West Virginia, 1993

Construction Documents Technologist, 1996

**A/E Services for the Office of the Adjutant General, West Virginia Army National Guard, Division of Engineering and Facilities, Charleston, West Virginia.** *State Army National Guard Headquarters.* Project Manager. Responsible for the management and coordination of all activities. The Facilities Management Officer (FMO) for the State of West Virginia, Division of Engineering and Facilities (DEF), West Virginia Army National Guard (WVARNG) selected Baker for a lump sum/fix fee contract for architectural and engineering services. Baker was selected by the Division of Engineering and Facilities to provide complete design and construction administration services for the renovation of the first floor of the entire wing of the Office of the Adjutant General (TAG). The Owner requested the need for modernization of approximately 12,000 square feet of existing outdated office space - project elements included new acoustical ceilings, flooring, energy-saving light fixtures, duplex outlets, communications jacks, alterations to the existing floor plan, exterior door replacements, new interior doors and hardware, new wall finishes and asbestos removal.

**Lost Creek Train Depot Rehabilitation, Lost Creek, West Virginia.** *Town of Lost Creek.* Project Manager. Responsible for the management and coordination of all activities as well as all engineering design. The Town of Lost Creek retained Baker for the planning and design of the rehabilitation of a historic train depot adjacent to the Harrison County Rail Trail. Baker prepared a plan to raise the structure, make repairs to the deteriorated timber, excavate and place the concrete foundation system, then lower the structure to rest on the new foundation. Baker provided construction administration and inspection services as well as periodic site review during construction.

**Little Kanawha Bus Facility, Calhoun County, West Virginia.** *WV Division Of Public Transit.* Project Manager. Responsible for the civil, site and structural engineering components of the project. Baker is providing architectural and engineering services, landscape architecture, and construction-phase support for a new, 9,900-square foot, pre-engineered, metal and brick bus maintenance and transit operations facility. The 5,100-square-foot administrative area will include offices, a conference room, a money-counting room, and a driver-training room, and the 4,800-square-foot bus maintenance area will include storage for seven buses. The facility will be ADA-compliant and is being designed to achieve LEED® certification. Services include site survey and design, geotechnical testing, environmental compliance, utility coordination, bid documents, bid-phase support, and as-built drawings.

**West Virginia Army National Guard - TAG Wing Improvement, Charleston, West Virginia.** *State Army National Guard Headquarters.* Project Manager. Engineer of Record responsible for the coordination of all activities. Baker performed complete planning, design, and construction management services for renovations to the Office of the Adjutant General at the State Army National Guard Headquarters in Charleston, West Virginia. Project elements included new acoustical ceilings, flooring, energy-saving light fixtures, duplex outlets, communications jacks, several new wall partitions, exterior door replacements, new interior doors and hardware, new wall finishes and asbestos removal. Baker provided Construction Administration and inspection services as well as periodic site review during construction.

# David J. Hilliard, P.E., LEED AP BD+C

## **Mechanical Engineer**

### **General Qualifications**

Mr. Hilliard has a wide range of "hands on" design, engineering, and construction experience. From his beginnings as a carpenter he has expanded his professional abilities to become a senior mechanical engineer for Michael Baker. His recent design experience has included the complex mechanical design of such projects as a large Charleston, West Virginia hospital, a Bus Maintenance Garage and office building for the West Virginia Department of Transportation, an Army National Guard Armory HVAC/Electrical renovation, master planning and engineering at the West Virginia Capitol Complex including a design for a comprehensive restroom renovations at the historic State Capitol Building. His resume covers over 30 years of real world work in engineering, design, fabrication and construction, and covers the mechanical, electrical, plumbing and general trades.

Over the years, while practicing his profession, Mr. Hilliard continued his education by studying mathematics, civil and mechanical engineering, finally taking degrees in both mathematics and mechanical engineering. He has continued his professional development through his involvement with ASHRAE, ASME, ASPE, USGBC, and other pertinent organizations.

Mr. Hilliard is proficient with the following design programs: AutoCAD, Revit, Trane Trace 700 (HVAC load program), Cook Compute-a-Fan (equipment selection program), Greenheck CAPS (equipment selection program), Price, All-in-One (equipment selection program), Excel Spreadsheets, Bluebeam Revu (pdf editor), and Adobe Photoshop

### **Sample PROJECT Experience**

*West Virginia Schools for the Deaf & Blind, Various Building Renovation Projects, Romney WV.* Project Engineer and Engineer of Record. Responsible for project team coordination and management, mechanical engineering and electrical design in the renovation of various buildings on the WVSDDB campus, work included: HVAC, life safety, electrical, fire alarm, and fire sprinkler projects. One project includes HVAC renovations in one building and the installation of a campus wide Life Safety System for the deaf and blind. A second project includes new sprinkles in one building and sprinkler modifications in two other building. A third project includes complete HVAC renovation of the schools Physical Education Building, which includes a swimming pool, Gym, weight rooms, locker rooms. These projects are ongoing and include Construction Administration services which Mr. Hilliard oversees.

**Years with Michael Baker: 10**

**Years with Other Firms: 19**

### **Degrees**

B.S.M.E., 2005, Mechanical Engineering, West Virginia University Institute of Technology

B.S., 2002, Mathematics and Science, West Virginia State College

### **Licenses/Certifications**

Professional Engineer - Mechanical, West Virginia, 2011, 19488

LEED Accredited Professional BD+C, West Virginia, 2012, [REDACTED]

Professional Engineer - Mechanical, Louisiana, 2016, [REDACTED]

Professional Engineer - Mechanical, Mississippi, 2016, [REDACTED]

Professional Engineer - Mechanical, Kentucky, 2017, [REDACTED]



**Capitol Flood Study.** *State of WV General Services Division.* Project Engineer. Responsible for providing site evaluation, video of underground sanitary piping systems, research of rainfall events, corrective measure recommendations, and developed a report of the findings.

**West Virginia State Capitol Restroom Renovations.** *State of WV General Services Division.* Mechanical Electrical and Plumbing Engineer. Mr. Hilliard provided the State of West Virginia General Services Division a comprehensive MEP plan for the renovation and renovation of the 33 restrooms of the West Virginia State Capitol Building. He helped provide design, construction sequence, and scheduling recommendations. And will provide Construction Administration during construction

**Renovations of two existing buildings at the WVUTech Campus.** *West Virginia University.* Mechanical Engineer. Provided project management, mechanical, electrical, and plumbing engineering for the renovation of a 31,000 SF building for engineering labs and a 21,000 SF building for offices and student government.

**A/E Services for the Office of the Adjutant General, West Virginia Army National Guard, Division of Engineering and Facilities, Charleston, West Virginia.** *State Army National Guard Headquarters.* Mechanical Designer. Responsible for all mechanical design oversight and construction management. The Facilities Management Officer (FMO) for the State of West Virginia, Division of Engineering and Facilities (DEF), West Virginia Army National Guard (WVARNG) selected Michael Baker for a lump sum/fixed fee contract for architectural and engineering services. Michael Baker was selected by the Division of Engineering and Facilities to provide complete design and construction administration services for the renovation of the first floor of the entire wing of the Office of the Adjutant General (TAG). The Owner requested the need for modernization of approximately 12,000 square feet of existing outdated office space - project elements included new acoustical ceilings, flooring, energy-saving light fixtures, duplex outlets, communications jacks, alterations to the existing floor plan, exterior door replacements, new interior doors and hardware, new wall finishes and asbestos removal.

**Design of U.S. Army Reserve Center Renovation and Expansion, Homewood, Illinois.** *U.S. Army Corps of Engineers, Louisville District.* Mechanical Engineer. Responsible for field inspection and commissioning oversight. As designer of record, Michael Baker provided architectural and engineering services for the renovation of a 400-member U.S. Army Reserve Center (ARC) and construction of two single-story additions totaling 35,694 square feet—a 34,294-square-foot Training Building and a 1,400-square-foot ancillary structure—along with a 3,500-square-foot Unheated Storage Building. The new construction includes a 22,000-square-foot parking area for military equipment and 140 parking spaces for privately owned vehicles. Tasks were performed under an indefinite quantity-indefinite delivery engineering agreement. Michael Baker designed the training facility to meet LEED® Silver certification. Michael Baker's services included architecture, surveys, environmental and geotechnical investigation, all site and building engineering, cost estimating, value engineering, and LEED® credit template documentation. Administrative and training 60,500-square-foot building. This project has achieved LEED certification.

**Renovations to Building 5, Bay 1, Tobyhanna, Pennsylvania.** *Tobyhanna Army Depot.* HVAC Engineer. Designed HVAC systems for general offices, latrines, a large work room with humidification and a computer/office areas. Also detachable AC systems were designed for a number of removable Mobile Computer Control Shelters. Michael Baker served as the designer of record on a design-bid-build project to renovate Building 5, Bay 1 at the Tobyhanna Army Depot. Work was performed under a three-year indefinite delivery-indefinite quantity contract. The scope of work involves adding HVAC capacity, installing a drop-ceiling system, expanding existing restrooms, and enhancing door systems. Michael Baker prepared design and construction plans and construction cost estimates.

## **Dennis E. Myer, P.E.**

### **Mechanical Engineer**

#### **General Qualifications**

Mr. Myer is a mechanical engineer with extensive experience in designing HVAC systems for military, education, transit, aviation, industrial, commercial, and institutional applications. HVAC design experience includes hot and chilled water central plants, variable air volume (VAV) systems, as well as specialty HVAC applications such as maintenance garages, commercial kitchens, and vehicle tunnels. Mr. Myer has in depth expertise in public as well as military specific design standards including ASHRAE standards 90.1 and 62.1 as well as Military Unified Facilities Criteria (UFC's) including Anti-terrorism / Force Protection Standards (UFC 4-010-01).

Mr. Myer has experience with numerous U.S. Army Corps of Engineers, NAVFAC as well as USCG projects, and has on-site experience at dozens of bases, domestic and overseas. In addition to design responsibilities as Mechanical Engineer of Record, Mr. Myer has performed numerous site inspections, facilities assessments and other on-site construction activities to see projects from the design project through implementation and start-up.

#### **Experience**

**NATO-South Headquarters Complex, Naples, Italy. *Interplan Seconda*.** HVAC Designer. Responsible for the design of HVAC systems that utilize **thermal energy storage technology through ice storage** for full offsetting of electrical energy consumption to off-peak demand hours. Michael Baker provided conceptual mechanical engineering services for a new NATO-South Military Defense Headquarters and Administrative Facility that included a high-rise complex of three interconnected office buildings, sports and recreation facility, and a parking garage. Design features included state-of-the-art air filtration and recirculation systems to protect against chemical, bacteriological, and nuclear threats and also to reduce natural air particulate buildup. The reduction in the use of outside air also lessens the heating and cooling loads and translates into lower building operating costs.

**Airfield Pavement Design, King Khalid Air Base (KKAB), Khamis Mushayt, Saudi Arabia. *Department of the Air Force*.** Mechanical Engineer. Provided mechanical engineer design for the Maintenance Training Facility and Dormitory Facilities. HVAC Design included Inertial Sand Filtration systems, Variable Refrigerant Flow HVAC systems, a **central chiller plant for the MTF with chilled water distribution piping** and all related air handling equipment and distribution systems within the buildings. Michael Baker provided pavement design for roadway, parking, airfield, and sidewalk and plaza areas at King Khalid Air Base. Challenges included a lack of curve numbers and soil information to perform the UFC-preferred TR-55 method of calculating stormwater runoff; the inability to purchase precast concrete structures locally; and a former dump-site (partial landfill), which was not discovered until the construction phase. To meet these challenges, a modified rational method was used to analyze peak volumes and discharges for storm events; all concrete structures were designed as cast-in-place, including a perimeter wall, drainage, and sanitary structures; and adjustments were provided for the building foundations and grading plans to keep the project on schedule.

**Years with Michael Baker: 22**

**Years with Other Firms: 3**

#### **Degrees**

M.B.A., 2000, Business Administration, Robert Morris University

B.M.E., 1993, Mechanical Engineering, Gannon University

#### **Licenses/Certifications**

Professional Engineer, Pennsylvania, 1999, [REDACTED]

Professional Engineer, Illinois, 2013, [REDACTED]

**Military Instructional Facility Barracks, Fort Indiantown Gap, Annville, Pennsylvania. Pennsylvania Department of General Services.** Mechanical Engineer. Responsibilities included mechanical system designs for two dormitory buildings and a dining hall with kitchen. **The project included a four-pipe fan coil system with a central air-cooled chiller and boiler plant.** Rooftop equipment was designed for the dining hall and kitchen area. Michael Baker provided architecture and engineering services for the design of a new 100,000 square-foot barracks complex, which provides housing and dining for almost 600 students and structured parking for 264 cars. Michael Baker's services included planning; architecture; interior design; civil, geotechnical, structural, mechanical, and electrical engineering; and cost estimating.

**Armed Forces Reserve Center, Grand Prairie, Texas. U.S. Army Corps of Engineers, Louisville District.** Mechanical Engineer. Performed mechanical engineering design for multi building reserve center facilities including training building with high-efficiency boilers and central chiller plant serving VAV air distribution. Mechanical design of Organizational Maintenance Shop (garage facility) including CO/NOx purge systems, low-intensity overhead radiant heating, and specialty areas requiring explosion proof design including controlled waste, flammable storage and battery charging rooms. Michael Baker, serving as the designer of record on a design-build team, was selected to construct a new Armed Forces Reserve Center (AFRC) for units of the U.S. Army Reserve (USAR) and the Texas Army National Guard (TARNG) at the Grand Prairie Reserve Complex. The USAR uses the AFRC for administrative activities, to plan and support operations, and to train unit personnel in their engineering specialties. Four separate buildings were constructed on the Grand Prairie Reserve Complex, including a new 78,600-square-foot Administration building, 30,070-square-foot Storage building, 30,450-square-foot Facility Maintenance Storage (FMS) building, and a 4,900-square-foot Unheated Storage building.

**Edinboro Elementary School, Edinboro, Pennsylvania. General McLaine School District.** Project Designer. Performed load calculations, designed HVAC system, and generated construction documents for the additions and renovations to the existing elementary school. The system included a new central heating plant utilizing a modular boiler system. **An isolated central chiller plant, cooling tower, and chilled water piping distribution system** serving the entire new and existing building was designed. These plants served four-pipe unit ventilators for the classrooms as well as rooftop and indoor air handlers for the multipurpose, kitchen, and auditorium areas. Designed new kitchen/cafeteria HVAC system including an internally compensating kitchen hood and necessary controls for associated air handling systems.

**On-Call Multidiscipline Services, Pittsburgh International Airport (PIT) and, Allegheny County Airport (AGC), Pittsburgh, Pennsylvania. Allegheny County Airport Authority.** Mechanical Engineer. Responsibilities included a variety of services, including: performing site investigations and developing reports with suggested alternatives to correct a heat problem associated with baggage scanning machines; and providing mechanical upgrades to accommodate use changes to various areas of the Landside, Airside, and Central Services buildings at Pittsburgh International Airport, including duct and piping renovations and alterations, addition of a **new air-cooled chiller system** to provide off-season cooling to heat intensive spaces, smoking room design, and other miscellaneous tasks. Since 1989, Michael Baker has provided multidiscipline, on-call engineering services to the airport authority, which owns and operates Pittsburgh International Airport (PIT) and Allegheny County Airport (AGC). Michael Baker has acted as an extension of the airport authority's staff, providing the depth of resources and experience of the entire company when called upon. Michael Baker delivered a full range of services on an on-call, as-needed basis, including architecture, civil, structural, mechanical, electrical, plumbing, fire protection, and environmental services. Knowledge of the airports' current and historical conditions enables Michael Baker to coordinate very effectively with the airport authority.



## R. Joseph Chaffin, R.A., A.I.A.

### Lead Design Architect

#### General Qualifications

In balancing creative, organizational, and technical strengths, Joseph Chaffin's professional experience demonstrates a broad practice of architecture from residential through complex institutional projects. He challenges current capabilities, cultivates leadership, and develops new strengths through his position at Baker. As Director of Architecture, Mr. Chaffin is responsible for the daily operations, design quality, and project execution of the architectural and interior design staff. He performs interdisciplinary technical reviews for all designs and oversees coordination of related engineering disciplines. Ensuring the highest quality design services within budget and schedule parameters, he also emphasizes a "world view," or comprehensive perspective, within which professional services are delivered prioritizing and maintaining client expectations.

#### Experience

**Renovations to Classroom Building, Beckley, West Virginia.** *WVU Tech/ West Virginia University. Architect of Record.* Responsibilities included facilitating complete design package and collaboration with WVU Tech staff for the 31,000 S.F. facility. This fast track design and construction project stemmed from a feasibility study produced by request of the Client. The deficiencies found during the Study were remedied during the design phase with a compressed time frame in mind. Coordination of new and old HVAC designs were a large component of this project. University branding elements were incorporated into the interior design to bring new life to a defunct campus. Special consideration was given to coordination with the University's existing door hardware products as well as the design and product specifications for a nationally accredited psychological laboratory within the Project. This project is currently under construction.

**Renovations to the Benedum Center, Beckley, West Virginia.** *WVU Tech/ West Virginia University. Architect of Record.* A sister project to the above referenced Classroom Building, this 21,000 S.F. project ran concurrent and also stemmed from a Feasibility Study requested by the Owner. Primarily an interior design heavy project, this building required new retrofitted ADA toilet facilities as well as door hardware and HVAC systems coordination. This project is currently under construction.

**Aviation Science Center Renovation, Community College of Beaver County, Monaca, Pennsylvania.** *Architect of Record.* Responsible for design/technical quality and project execution provided by the architectural and interior design staff. The Project consisted of architecture, engineering, construction administration and cost estimates to design the auditorium renovations and replacement the HVAC system. Preliminary design services included research of applicable building codes; on site project assessment and verification, measurements, and documentation of the project areas, including a comprehensive field survey of the existing conditions, and the development and prioritization of preliminary scopes of work, schedule development, and oversight of estimates of probable cost. He directed the completion of pre-final 90 percent construction documents and the final construction and bid documents, including architectural, mechanical, electrical, and communications engineering drawings, and specifications. Mr. Chaffin also coordinated with the vendor of the air traffic control simulator throughout the design phase.

Years with Baker: 9

Years with Other Firms: 17

#### Education

B Arch, 1990, Architecture, University of Cincinnati

Certificate, 1988, Architecture, Ecole d'Art Americaines - Ecole des Beaux Arts

#### Licenses/Certifications

Registered Architect, West Virginia, 2011

NCARB, 1999

Registered Architect, Pennsylvania, 2001

**Nursing Simulation Renovation and Laboratory Design, Clarion University, Clarion, Pennsylvania.** Director.

Responsible for design/technical quality and project execution provided by the architectural and interior design staff. This state-of-the-art nursing education facility, included a simulation laboratory with four high-technology mannequins and a control room, related classrooms and skills lab spaces, offices, conference rooms, social lounge, and study lounge. His role also included interdisciplinary technical reviews for all design/construction documents. Baker's tasks included architectural design, building systems engineering, construction cost estimate development, and as-built plans development.

**Building 12 Defense Logistics Agency Headquarters Renovation Design, Tobyhanna, Pennsylvania.** *Tobyhanna Army Depot.* Director.

Responsible for design/technical quality and project execution provided by the architectural and interior design staff. Role also included interdisciplinary technical reviews for all design/construction documents. Baker prepared design documents for the partial renovation of Building 12 to serve as the new Defense Logistics Agency headquarters building. Work was performed under a three-year indefinite delivery-indefinite quantity contract. Baker's tasks included architectural design, building systems engineering, construction cost estimate development, and as-built plans development.

**Restroom Renovation Design, TISCOM, Alexandria, Virginia.** *U.S. Coast Guard, CEU Cleveland.* Director.

Responsible for design/technical quality and project execution provided by the architectural and interior design staff. Role also included interdisciplinary technical reviews for all design/construction documents. Baker is developing specifications, construction drawings, a detailed cost estimate, and a projected construction schedule to renovate two male and two female restroom areas in the Telecommunication and Information Systems Command Navigation Center. The renovated restrooms will be compliant with the Americans with Disabilities Act and will include new plumbing fixtures, toilet partitions, floor coverings, wall coverings, electrical fixtures, and exhaust fans.

**U.S. Armed Forces Reserve Center, Rutland, Vermont.** *U.S. Army Corps of Engineers, Louisville District.* Director.

Responsible for design/technical quality and project execution provided by the architectural and interior design staff. Responsibilities also included detailed interdisciplinary reviews of the RFP design criteria documents with an emphasis on architecture. Baker developed design-build RFP documents for a new 600-member Armed Forces Reserve Center meeting Silver LEED® standards. A 97,634-square-foot training building (AFRC), a 14,600-square-foot multi-use classroom, a 7,302-square-foot Organized Maintenance Shop (OMS), and a 3,113-square-foot unheated storage (UHS) building were included in the RFP package. The center accommodates training and mobilization, and provides for the storage, inspection, maintenance, and repair of combat and tactical vehicles and equipment associated with the regional deployment of Vermont Army National Guard and Army Reserve units. RFP development consisted of conducting a design charrette; providing a topographical survey and geotechnical investigation; performing a utility survey; developing conceptual site plans, floor plans, and building elevations; developing RFP specifications; preparing DD Form 1354 – Transfer of Real Property; and providing a PACES construction cost estimate.

**Design of U.S. Army Reserve Center Renovation and Expansion, Homewood, Illinois.** *U.S. Army Corps of Engineers, Louisville District.* Director.

Responsible for design/technical quality and project execution provided by the architectural and interior design staff. Role also included interdisciplinary technical reviews for all design/construction documents. As designer of record, Baker provided architectural and engineering services for the renovation and expansion of a 400-member U.S. Army Reserve Center to provide a 60,374-square-foot Training Building, including an approximately 3,500-square-foot Unheated Storage Building. The project also includes construction of a 22,300-square-foot parking area for military equipment, and 130 parking spaces for privately owned vehicles. Tasks were performed under an indefinite quantity-indefinite delivery engineering agreement. Baker designed the training facility to meet LEED® Silver certification. Baker's services included architectural design, surveys, environmental and geotechnical investigation, all site and building engineering, cost estimating, value engineering, and LEED® certification administration.

## Owen Milligan, P.E.

### Electrical Engineering Manager

#### General Qualifications

Mr. Milligan is an electrical engineer who is experienced working with consulting engineering firms in the study and design of electric distribution and control systems, emergency power for process plants and facilities, water/wastewater treatment plants, government and commercial projects, ASHRAE energy-efficient building design, coordination with vendor and contractors, and approval of vendor drawings. He has a strong knowledge of distribution equipment and designs, motor control center layouts and design, and start-up and services during construction. He is capable of handling multiple projects from conception to final design, working as a team member toward meeting project goals. His work includes management of Baker's electrical engineering department, supervising and providing technical advice to designers and coordinating design and construction work with engineers, contractors, vendors, and clients.

#### Experience

##### **Design/Build SATOC for Military Facilities in the Southwest Region, Various Locations in Southwestern U.S., AR,AZ, CA, LA, NM, NV, OK, TX. U.S. Army**

*Corps of Engineers, Tulsa District.* Electrical Engineer. Provided design assistance to the electrical engineering subconsultant, and performed a technical quality review of the construction documents for the TEMFs located at Fort Bliss. Electrical systems included lighting, lightning protection and grounding, power distribution, telecommunications, fire alarm, and unique voltage and frequency requirements. Designs were required to meet UFC and military design standards. Projects constructed under this contract include Brigade Combat Team (BCT) Tactical Equipment Maintenance Facilities (TEMF). TEMFs provide facilities for the purpose of maintaining and repairing vehicles, complete with equipment and parts storage, and administrative offices. Task orders awarded to date include the following: Two TEMFs at Fort Bliss in El Paso, Texas to be shared by five Battalions and one Company; and a Unit Operations Facilities consisting of a TEMF and an Organizational (Deployment) Storage facility, at Fort Bliss in El Paso, Texas. Facility designs are required to meet or exceed a Silver LEED® certification.

##### **Little Kanawha Bus, Calhoun County, West Virginia. WV Division of Public Transit.**

Electrical Engineer. Responsible for the Electrical Design, Electrical Document Preparation, and Construction inspection for electrical components for a new bus maintenance and office facility for Gilmer County. Duties include the design of the vehicle storage, cleaning and maintenance systems, as well as oil pumping and collection systems. The design of an energy efficient systems for the entire building is also part of his responsibilities. The facility was designed as a LEED® project.

**On-Call Multi-Discipline Services, Pittsburgh International, and Allegheny County Airports (PIT/AGC), Pittsburgh, Pennsylvania. Allegheny County Airport Authority.** Technical Advisor. Provided technical direction to electrical design staff and performed a technical quality review of the construction documents. Designs were required to meet NEC

**Years with Michael Baker: 7**

**Years with Other Firms: 20**

#### Degrees

B.S., 1988, Electrical Engineering,  
Gannon University

Computer Aided Drafting, Putnam  
County Technical Center, 1995

#### Licenses/Certifications

Professional Engineer, West  
Virginia, 2013

Professional Engineer,  
Pennsylvania, 1999

Professional Engineer, Kentucky,  
2005

Professional Engineer, Oklahoma,  
2008

standards. Since 1989, Baker has provided multidiscipline, on-call services to the Allegheny County Airport Authority (ACAA). The ACAA owns and operates Pittsburgh International Airport (PIT) and Allegheny County Airport (AGC). Baker acted as an extension to the ACAA's staff, providing the depth of resources and experience of the entire company when called upon by the ACAA. Baker provided a full range of services to ACAA on an "On-Call/As-Needed" basis, including architecture, civil, structural, mechanical, electrical and environmental engineering, general engineering administration, construction support, and other areas.

**Rescue Swimmer Training Facility, U.S. Coast Guard Support Center, Elizabeth City, North Carolina.** *U.S. Coast Guard, Facilities Design & Construction Center Atlantic.* QA/QC. Performed a technical quality review of the electrical design for this building renovation project, including lighting and electrical receptacles. Baker prepared Design/Build RFP Documents for a new Rescue Swimmer Training Facility (RSTF) for the Aviation Technical Training Center (ATTC), a tenant of and located on the SC Elizabeth City, NC. The \$13.3 million RSTF is a dedicated aquatic trainer for the purpose of supporting the Aviation Survival Technician (AST) School and recurrent water survival training requirements. Sized appropriately for the curriculum and student loading, the RSTF contained elevated platforms, pool temperature controls, adequate wet and dry storage, male and female locker/shower facilities, classrooms, and office space.

**Gymnasium Locker Room Rehabilitation, USCG Training Center Cape May, New Jersey.** *U.S. Coast Guard.* QA/QC. Performed a technical quality review of the electrical design for this building renovation project, including lighting and electrical receptacles. Baker prepared the design, construction documents, and cost estimate for the interior rehabilitation of an existing facility to combine two women's locker rooms into one large room.

**Relocation and Improvements to the Front Gate, USCG Training Center Cape May, New Jersey.** *U.S. Coast Guard.* QA/QC. Performed a technical quality review of the electrical design for this building renovation project, including lighting and electrical receptacles.

**Route 52, Contract - "B", Somers Point & Ocean City, New Jersey.** *New Jersey Department of Transportation.* Electrical Engineer. Responsible for the electrical systems design to meet NEC standards for a new Visitor's Center, bridge and site lighting, power distribution, and a supplemental photovoltaic solar system.

### **Non-Baker Project Experience**

**Siemens Government Services, Inc (formerly SD Engineers), Pittsburgh, Pennsylvania.** Senior Electrical Project Engineer. Responsibilities included Senior Electrical Engineer in charge of all electrical work at the Department of Energy's Naval Reactor Facility in West Mifflin, Pennsylvania. Duties included complete electrical design including multiple new office building designs and construction, light industrial type facilities for confidential DOE projects, retrofitting and relocation of existing laboratories, power studies, arc flash calculations, and site power distribution.

**Chester Engineers / US Filter Corporation, Pittsburgh, Pennsylvania.** Electrical Project Engineer. Responsibilities included the following:

- Lead electrical engineer for multiple site water and wastewater treatment projects for a large automobile manufacturer.
- Lead electrical engineer for design of water treatment plants for several large steel manufacturers.
- Lead electrical engineer on design of numerous remote cellular telephone communication sites for a large, wireless Telecommunications Company.
- Assisted a Senior Electrical Engineer on a Short Circuit and Coordination Study using CAPTOR/DAPPER analysis program.
- Responsible for several large detailed constructions cost estimates.



## Kevin Spangler, P.E.

### Fire Protection Engineering Manager

#### General Qualifications

Mr. Spangler is a registered fire protection engineer with an M.S. degree in Fire Protection Engineering and 9 years of experience in the fire and life safety consulting industry. He has been with Michael Baker International since 2009 and has been the fire protection engineering manager since 2014. He provides leadership to the fire protection group and performs project technical reviews of system designs. He also serves as the Designer of Record for his specific project designs. In his wide-ranging fire protection experience and education, he has an extensive technical background and knowledge in the design of fire protection engineering systems, code and life safety analysis, and the commissioning and testing of fire systems. The variety of projects have exposed Mr. Spangler to various types of facilities for military, government, commercial, public, and private clients.

#### Experience

**Renovations to Classroom Building, Beckley, West Virginia. WVU Tech/ West Virginia University.** Mr. Spangler was the fire protection engineer of record responsible for the design of the fire protection systems at the WVU Tech Beckley Classroom Building. The project consisted of a renovation of an existing building. A new wet-pipe sprinkler system was added to the building, and the existing fire alarm system was adjusted to account for the building renovation. Mr. Spangler provide drawings and specifications for the installing contractor, and reviewed the delegated design submittals for compliance with the project scope and construction codes. This project is currently under construction.

**Renovations to the Benedum Center, Beckley, West Virginia. WVU Tech/ West Virginia University. Designer.** A sister project to the above referenced Classroom Building, this 21,000 S.F. The existing sprinkler and fire alarm systems were adjusted to account for the building renovation.. This project is currently under construction.

#### **West Virginia School for the Deaf and Blind - Architectural/Engineering**

**Services for Multiple Projects, Romney, West Virginia. 3-year Contact.** Mr. Spangler is currently working as the project Fire Protection Engineer for multiple projects at the school including; a campus wide Life Safety System, HVAC upgrades in two buildings, fire alarm upgrades, new and upgraded sprinkler systems in multiple buildings, and a complete renovation of the campus Physical Education Building.

#### **Army Reserve Center, Full Facility Revitalization (FFR), Independence, MO.**

Mr. Spangler was the fire protection engineer for the renovation of the existing army reserve center located in Independence, Missouri. He was responsible for performing a field investigation of existing conditions, performing a fire

**Years with Michael Baker: 8**

**Years with Other Firms: 1**

#### **Degrees**

M.S., 2008, Fire Protection Engineering, University of Maryland, College Park Campus

B.S., 2006, Agricultural and Biological Engineering, The Pennsylvania State University

#### **Licenses/Certifications**

Professional Engineer, California, 2011, [REDACTED]

Professional Engineer, Virginia, 2012, [REDACTED]

Professional Engineer, Pennsylvania, 2012, [REDACTED]

Professional Engineer, Illinois, 2013, [REDACTED]

Professional Engineer, Idaho, 2014, [REDACTED]

Professional Engineer, Connecticut, 2015, [REDACTED]

Professional Engineer, South Carolina, 2016, [REDACTED]

Professional Engineer, Minnesota, 2016, [REDACTED]

Professional Engineer, Mississippi, 2017, [REDACTED]

hydrant flow test and preparing RFP specifications and design criteria documents. The building scope included a new wet pipe sprinkler system in the Reserve Center Building and also the Maintenance Facility. The existing fire alarm system was documented and determined to be removed and replaced with a new fire alarm and mass notification system. The new fire alarm system is designed to serve both buildings and an outdoor speaker system for parking lot notification.

**Shaw Headquarters Building Renovation, Shaw AFB, South Carolina**

Mr. Spangler was the Fire Protection Engineer of record for the renovation of the three story Headquarters Building at Shaw AFB in South Carolina. The building contained an existing fire alarm and existing sprinkler system. The fire alarm system was removed and installed with a new fire alarm and mass notification system. The existing sprinkler system was modified to account for the new building design. The existing sprinkler system was identified by field investigation and as much of the existing sprinkler system was re-used as possible to keep costs minimal for the client. A life safety analysis was performed according to NFPA 101 Life Safety Code and the IBC to ensure the new system design met all building and egress requirements. Mr. Spangler was responsible for the delegated design review and approval of shop drawings prepared by the installing contractor.

**Fire Pump Replacement. Allegheny County Airport Authority – Pittsburgh International Airport.**

Mr. Spangler was the fire protection engineer designer of record for the project. He completed detailed field measurements of the existing systems and finalized the design for the newly installed fire pumps. The project included the installation of 4 new, electric motor driven fire pumps in two (2) separate fire pump houses (2 pumps per fire pump house). The fire water tanks and existing water supply were analyzed to meet code requirements and the existing piping rerouted as necessary to provide appropriate pump recirculation. The challenges that were faced and solved during in the project included the installation of previously purchased fire pumps into an existing system. The project was successful due to the attention to detail in field measurements of the existing systems and the detailed design of the new system.

**Private Corporate Client. Hangar located at Allegheny County Airport.** Michael Baker was responsible for the building design for a renovation of a historic hangar located at the Allegheny County Airport. Mr. Spangler was the Fire Protection Engineer responsible for the design of fire protection systems throughout the building including sprinkler system, foam system, and fire alarm system. Two fire pumps were designed and retrofitted into the building to provide the adequate flow and pressure for the suppression systems. Detailed hydraulic calculations were performed and discussed with the local Authority Having Jurisdiction in order to remove the existing fire water storage tanks from the project. As part of the project, a site survey of existing building and final inspections of the final systems installations were performed.

**Camp Geiger East Infantry Training Complex, Marine Corps Base Camp Lejeune, North Carolina. Naval Facilities Engineering Command, Mid-Atlantic.** Mr. Spangler was the fire protection engineer of record for Academic Building, CIF and Warehouse buildings. He was responsible for fire protection design of protection systems including sprinklers, fire alarm and mass notification systems to meet the requirements of the RFP, UFC and NFPA codes. He performed life safety analysis for complete compliance with NFPA 101, IBC and the UFC criteria. This includes classifying occupancies, occupant load calculations, egress analysis and rated separations. He also performed an on-site fire hydrant flow test according to NFPA 291 to determine the available water supply. This information was used to perform detailed hydraulic calculations for the building sprinkler systems. He worked directly with the NAVFAC fire protection engineer to analyze the water system and remove the need for a fire pump for each of the buildings. Michael Baker served as the lead designer for the design-build delivery of a 137,850-square-foot infantry training complex on five acres at Camp Geiger. The project included the construction of a two-story headquarters and academic building, a warehouse, a consolidated issue facility, an armory building, and an emergency weather center, the demolition of five buildings and various electrical distribution upgrades. The project was designed to meet the requirements for LEED Silver certification.

## Wayne Airgood, P.E.

### Structural Engineer

#### General Qualifications

Mr. Airgood is a practicing structural engineer with experience in the design of commercial, institutional, light industrial building structure, and foundation systems.

#### Experience

**Design of Central Issue Facility, Fort McCoy, Wisconsin.** *U.S. Army Corps of Engineers, Louisville District.* Mr. Airgood was the senior structural engineer of record responsible for design of the building structure and foundation systems from concept through construction of an approximate 62,553-square-foot large-sized Central Issue Facility (CIF) to expedite the shipping and receiving, distribution, processing, and exchange of soldier equipment. The structural system consisted of steel joist and girder framing supported by interior steel columns and exterior precast, insulated concrete load-bearing walls. Foundations were soil supported, isolated and continuous, reinforced spread footings.

**Container-Loading Facility Design, Fort McCoy, Wisconsin.** *U.S. Army Corps of Engineers, Louisville District.* Mr. Airgood was the senior structural engineer of record responsible for the design of a clear span steel roof framing system to achieve column-free interior warehouse space of a 30,862-square-foot Container-Loading Facility. Roof framing system is supported by interior steel columns and exterior precast, insulated concrete load-bearing walls. Foundations were soil supported, isolated and continuous, reinforced spread footings.

**Montgomery County Public Schools Foodservices Facility.** *Montgomery County, Department of General Services.* Mr. Airgood was the senior structural engineer of record responsible for the development and design of structural framing and foundation systems for 70,000-square-foot food production, warehouse and distribution facility. His responsibilities included coordination with owner/user and other engineering disciplines throughout design, performing and overseeing of production structural design calculations and documents and construction administration services such as review of structural product submittals and periodic site visits.

**West Haven Commuter Rail Station Engineering Design, West Haven, Connecticut.** *Connecticut Department of Transportation.* Mr. Airgood was the senior structural engineer responsible for the structural framing and foundation design of a two story passenger train station building. The station building featured a two story, glass curtain wall enclosed passenger waiting area with exposed to view curved roof structure. The design also included a 75 foot span, glass curtain wall enclosed pedestrian bridge spanning over the four rail line track bed to connect the station building with a new two story stair and elevator tower. His responsibilities included coordination with engineering and architectural disciplines during design, performing and overseeing of production structural design calculations and documents, and review of fabrication shop drawings and other construction administration services as related to the building structural systems.

**Years with Michael Baker:** 8

**Years with Other Firms:** 23

#### Degrees

B.S.C.E., 1984, Structural Engineering, Geneva College

#### Licenses/Certifications

Professional Engineer, Pennsylvania, 1999, [REDACTED]

Professional Engineer, Maryland, 2013, [REDACTED]

Professional Engineer, North Carolina, 2014, [REDACTED]

**Penn Hills Operations Center Addition, Penn Hills, Pennsylvania.** *Duquesne Light Company.* Mr. Airgood was the senior structural engineer of record responsible for the development, design, and detailing of a load bearing masonry wall and steel framing addition to an existing facility.

**Design-Build Tactical Equipment Maintenance Facilities, 31st ADA Brigade, Fort Sill, Oklahoma.** *U.S. Army Corps of Engineers, Tulsa District.* Mr. Airgood was the senior structural engineer responsible for the design of the foundation systems to support an 18,000-square-foot, 35,200-square-foot, and 57,031-square-foot pre-engineered steel Tactical Equipment Maintenance Facilities (TEMF), and a 20,000-square-foot Supply Support Activity facility supply support activity warehouse (SSA). Because of existing expansive soil conditions, the ground floors of each building were designed as reinforced concrete floor systems with a void space between the expansive soil and floors. The concrete floor system and PEMB structural columns were supported by a deep foundation system of drilled concrete piers extending to rock. His responsibilities included review of structural fabrication drawings, attending design coordination meetings and periodic site visits during construction.

**Buildings 200 & 250 of Imperial Business Park, Imperial, Pennsylvania.** Mr. Airgood was the lead structural engineer responsible for the development and design of the structure and foundation systems for two, 250,000-square-foot warehouse facilities. Responsibilities also included construction administration services such as review of structural product submittals and periodic site visits. Each building consisted of steel joist and joist girder roof framing supported by interior steel columns and exterior precast concrete bearing and shear walls. Foundations were soil supported, isolated and continuous, reinforced spread footings.

**ABB Manufacturing and Office Facility, Mt. Pleasant, Pennsylvania.** Mr. Airgood was the lead structural engineer of a high-bay manufacturing, testing and warehouse facility for electric transformer equipment, including an attached two-story office area. The structural systems consisted of precast concrete wall panels enclosing a steel framed interior column and roof structure, including the support of numerous under-hung crane systems throughout the facility ranging from 5- to 20-ton capacities. The lateral framing system was a combination of steel braced and moment frames, and foundations were soil supported isolated and continuous, reinforced spread footings.

**Fuel Cell Facility, Pittsburgh, Pennsylvania.** *Siemens Westinghouse.* Mr. Airgood was the lead structural engineer of a high-bay manufacturing facility, warehouse and two-story attached office area. The structural systems consisted of precast concrete wall panels enclosing a steel framed interior column and roof structure. The lateral framing system was a combination of steel braced and moment frames, and the structural design included support of various top running bridge crane systems ranging from 10- to 40-ton capacities. The foundations were soil supported isolated and continuous, reinforced spread footings.



## Ralph T. Deffenbaugh, P.E., LEED

### AP

#### Technical Manager

##### General Qualifications

Mr. Deffenbaugh provides leadership for project quality and interdisciplinary coordination for the architecture engineering group. In his wide-ranging experience, he has provided oversight of the engineering efforts focusing on integration of systems, development of energy reduction strategies, and detailed quality assurance reviews of various types of facilities for military, government, commercial, public, and private clients. His experience includes serving as project manager, lead structural engineer, resident structural engineer, or project/design engineer for various types of facilities, including tactical equipment maintenance facilities, vehicle maintenance facilities, barracks, military facilities, administrative/office buildings, bus maintenance facilities, manufacturing plants, fabrication facilities, utility buildings, clean rooms, administrative facilities, transit stations and park-n-rides, water storage, and water/wastewater treatment facilities. In 2007, Mr. Deffenbaugh received his LEED® accreditation from the U.S. Green Building Council.

##### Experience

**Campus Master Planning and Architectural and Engineering Services for State Capitol Complex, Charleston, West Virginia.** *State of WV General Services Division.* QA/QC. Responsibilities included quality assurance reviews for civil, structural, architectural, mechanical, and electrical drawings and specifications. Facilitated QC review process utilizing discipline review checklists, RFP scope checklists, and coordination of drawings. Michael Baker is providing comprehensive master planning services, plans and construction specifications, and construction administration for improvements to the historic West Virginia state capitol campus. Master planning services include plans for expansion, location of new buildings, pedestrian and traffic circulation, landscaping, utilities, and site security. Michael Baker is also providing construction plans and contract administration services for some of the security and landscaping improvements.

**A/E Services for the Office of the Adjutant General, West Virginia Army National Guard, Division of Engineering and Facilities, Charleston, West Virginia.** *State Army National Guard Headquarters.* QA/QC. Responsibilities included coordinating the quality assurance reviews for architectural, mechanical, and electrical drawings. Facilitated QC review process utilizing discipline review checklists, RFP scope checklists, and coordination of drawings. The Facilities Management Officer (FMO) for the State of West Virginia, Division of Engineering and Facilities (DEF), West Virginia Army National Guard (WVARNG) selected Michael Baker for a lump

**Years with Michael Baker:** 11

**Years with Other Firms:** 26

##### Degrees

B.A.E., 1980, Architectural Engineering (Structural Design Option), The Pennsylvania State University

##### Licenses/Certifications

LEED Accredited Professional, 2007, [REDACTED]

Professional Engineer, West Virginia, 2004, [REDACTED]

Professional Engineer, Kentucky, 2004, [REDACTED]

Professional Engineer, Louisiana, 2009, [REDACTED]

Professional Engineer, Massachusetts, 1992, [REDACTED]

Professional Engineer, Maryland, 1996, [REDACTED]

Professional Engineer, Michigan, 2012, [REDACTED]

Professional Engineer, Ohio, 2004, [REDACTED]

Professional Engineer, Pennsylvania, 1991, [REDACTED]

Professional Engineer, Virginia, 1991, [REDACTED]

sum/fixed fee contract for architectural and engineering services. Michael Baker was selected by the Division of Engineering and Facilities to provide complete design and construction administration services for the renovation of the first floor of the entire wing of the Office of the Adjutant General (TAG). The Owner requested the need for modernization of approximately 12,000 square feet of existing outdated office space - project elements included new acoustical ceilings, flooring, energy-saving light fixtures, duplex outlets, communications jacks, alterations to the existing floor plan, exterior door replacements, new interior doors and hardware, new wall finishes and asbestos removal.

**Little Kanawha Bus Facility, Calhoun County, West Virginia.** *West Virginia Division Of Public Transit. QA/QC.* Responsibilities included quality assurance reviews for civil, structural, architectural, mechanical, and electrical drawings and specifications. Facilitated QC review process utilizing discipline review checklists, RFP scope checklists, and coordination of drawings. Michael Baker is providing architectural and engineering services, landscape architecture, and construction-phase support for a new, 9,900-square foot, pre-engineered, metal and brick bus maintenance and transit operations facility. The 5,100-square-foot administrative area will include offices, a conference room, a money-counting room, and a driver-training room, and the 4,800-square-foot bus maintenance area will include storage for seven buses. The facility will be ADA-compliant and is being designed to achieve LEED® certification. Services include site survey and design, geotechnical testing, environmental compliance, utility coordination, bid documents, bid-phase support, and as-built drawings.

**Design-Build Community-Based Outpatient Clinic, Lake Charles, Louisiana.** *SDA, Inc. QA/QC.* Provided detailed review of VA clinic including challenges in duct and heat pump installation with roof trusses. Michael Baker provided architecture and engineering services for a new 32,000-square-foot, design-build, community-based outpatient clinic for military veterans. Michael Baker's services included design management; conceptual, preliminary, and final architectural design; structural design; landscape design; interior design; mechanical, electrical, plumbing, and fire protection engineering; and construction administration and inspection.

**Lancaster Station Renovations, Lancaster, Pennsylvania.** *Amtrak. QA/QC.* Provided detailed QA review for the contract documents. Michael Baker provided architectural and engineering services for renovations to the historic Lancaster Station. Michael Baker's services included architectural and interior design, mechanical and plumbing design, historic preservation, and construction administration.

**P-478 Navy Gateway Inn & Suites (NGIS), Naval Station Newport, Rhode Island.** *NAVFAC MIDLANT NEIPT. QA/QC.* As design quality manager, established the quality plan for this project. Michael Baker is the designer of record for the new 200 key, 104,000-square-foot Navy Gateway Inns & Suites hotel. Michael Baker's services included architecture, interior design, civil engineering, landscape architecture, mechanical engineering, plumbing design, fire protection design, and sustainable design.

**John F. Kennedy Center for the Performing Arts Pedestrian Access Design Review, Washington, D.C.** *Federal Highway Administration - Eastern Federal Lands Highway Division (EFLHD). QA/QC.* Responsibilities included quality assurance reviews for civil, structural, architectural, mechanical, and electrical drawings and specifications. Facilitated QC review process utilizing discipline review checklists, RFP scope checklists, and coordination of drawings. Michael Baker is performing an independent quality assurance-quality control review of plans for improvements to facilitate riverfront pedestrian access between the John F. Kennedy Center for the Performing Arts and the Rock Creek and Potomac Parkway (RCP) Trail. The project scope includes the addition of two continuous staircases with integral elevator towers centered on the Potomac River side of the building and extending from the River Terrace to the RCP Trail, along with various trail and site improvements.

SECTION IV

Each of the Project Profiles found in Appendix 2 lists Michael Baker's client and contact information for your use as a reference. Additionally, we offer the following diverse list of past or current clients and contact information:

- **West Virginia Schools for the Deaf and the Blind**  
301 East Main Street  
Romney, WV 26757  
Phone: 304-822-4810  
*Mr. Mark Gandolfi, Superintendent of Administration*
- **West Virginia University/ WVU Tech**  
410 Neville Street  
Beckley, WV 25801  
Phone: 304-929-0325  
*Mr. Robert Moyer, Director of Facilities and Planning  
(304) 550-2839*
- **130<sup>th</sup> Airlift Wing West Virginia Air National Guard**  
1679 Coonskin Drive, Unit 18  
Charleston, WV 25311-5005  
*Captain Harry Netzer, P.E., Deputy Base Civil Engineer  
(304) 341-6649*
- **West Virginia Army National Guard**  
1707 Coonskin Drive  
Charleston, WV 25311-1099  
*Mr. Joe McClung, Project Manager  
(304) 561-6548*
- **West Virginia State University**  
P.O. Box 1000  
Institute, WV 25112-1000  
*Mr. Dayton Wilson, Facilities Director  
(304) 550-2839*
- **City of Nitro**  
20<sup>th</sup> Street  
Nitro, WV 25143  
*Honorable David Casebolt, Mayor  
(304) 419-3322*
- **West Virginia Department of Transportation – Division of Highways**  
1900 Kanawha Boulevard East,  
Building 5, Room A 405  
Charleston, WV 25305  
*Mr. C. Elwood Penn, IV, PE, Director of Planning  
(304) 558-9269*