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February 1, 2018
Project E180027.00

Mr. Guy Nisbet
State of West Virginia
Department of Administration, Purchasing Division
2019 Washington Street East
Charleston, WV 25305

2/01/18 11:47 AM
Purchasing Division

**Expression of Interest
Architect-Engineering Services
West Virginia Department of Agriculture
Cedar Lakes Dam Restoration/Warehouse Stabilization Project
Ripley, West Virginia**

Dear Mr. Nisbet:

GAI Consultants, Inc. (GAI) appreciates the opportunity to provide the West Virginia Department of Agriculture (WVDA) with our Expression of Interest for Architect-Engineering (A-E) Services for the Cedar Lakes Dam Restoration/Warehouse Stabilization Project (Project), located in Ripley, West Virginia for your review and consideration. We understand the importance of this Project to the WVDA and have assembled a proven Project Team with strong capabilities in successfully completing dam rehabilitation and repair engineering services and engineering services for foundation repairs. We believe our Team is exceptionally qualified to meet the needs of this Project based on the following considerations:

- **Our Key Staff:** GAI's Project Manager, Charles F. Straley, is a registered Professional Engineer and Professional Licensed Surveyor in West Virginia (WV) with over 30 years of experience specializing in project management and geotechnical engineering for numerous dam and foundation stabilization projects located throughout West Virginia. Additionally, many of our key personnel have experience working at private and public dams and foundation stabilization projects in WV, including the City of Thomas Dam in Tucker County, WV; Lake Chaweva Dam Replacement Project in Kanawha County, WV; Spruce Island Sand Run Dams in Tucker County, WV; and the Tomlinson Run Dam in Hancock County, WV.
- **Expertise in Dam Rehabilitation, and Foundation Stabilization Projects:** Since 1958, GAI has been providing design, rehabilitation, and inspection services for hundreds of dams and levee projects and geotechnical engineering for foundation stabilization projects. GAI's in-house team of approximately 900 engineers and technical staff has the ability to see projects through all project phases to final completion, including: conceptual design, detailed design, procurement, construction, and close-out.

GAI looks forward to working with the WVDA on this important Project. Should you have any questions or concerns pursuant to our Proposal, please contact Mr. Charles F. Straley, PE, at 412.399.5460, or via email at C.Straley@gaiconsultants.com.

Sincerely,

GAI Consultants, Inc.

Charles F. Straley
Charles F. Straley, PE, PLS
Senior Engineering Manager

Bruce L. Roth
Bruce L. Roth, PE
Engineering Director

CFS:BLR/kea

Attachment: EOI (A-E Services for WVDA Cedar Lakes Dam Restoration/Warehouse Stabilization Project)

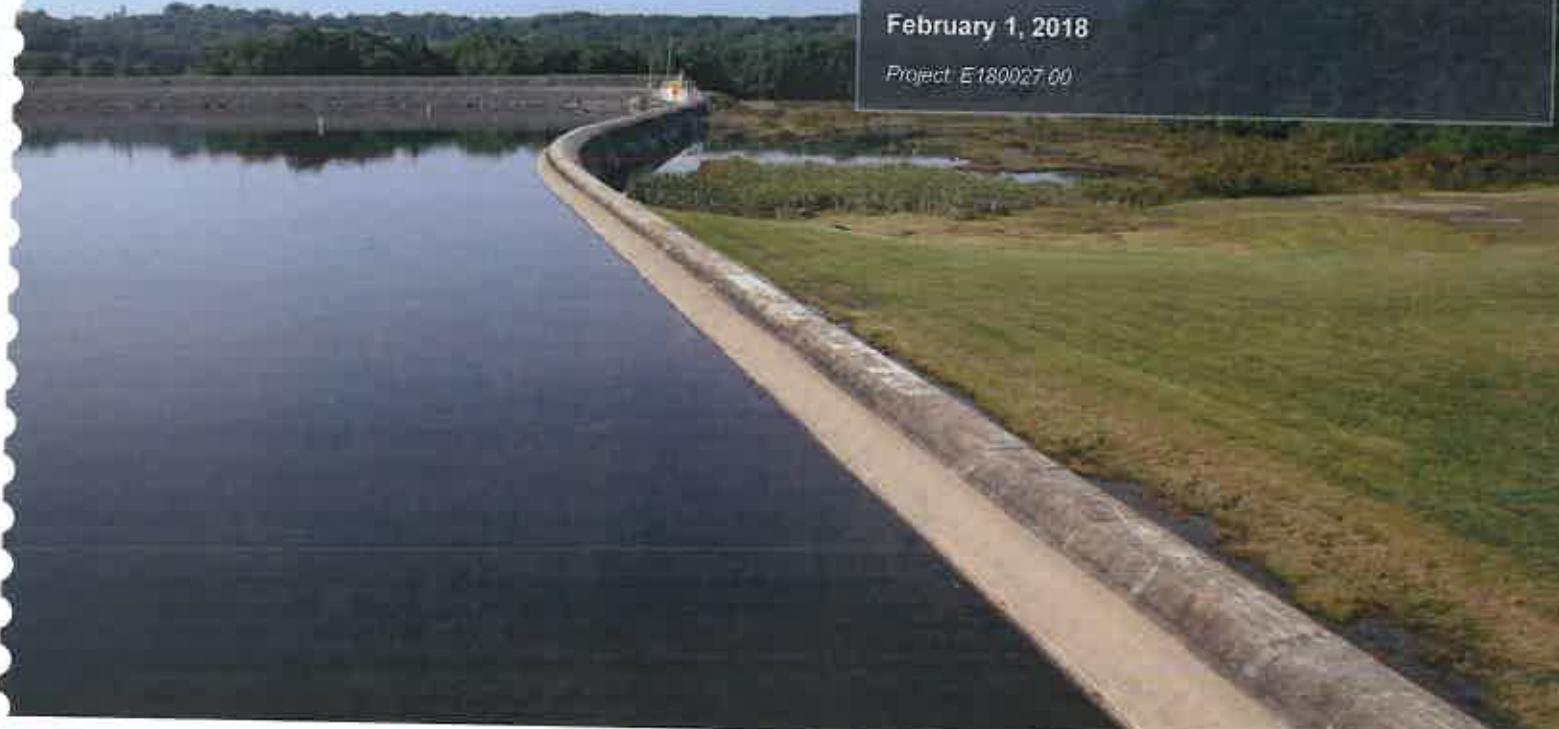
EXPRESSION OF INTEREST

WVDA Cedar Lakes Dam Restoration/
Warehouse Stabilization Project
Ripley, West Virginia

Solicitation No: CEOI 1400 AGR1800000001

February 1, 2018

Project: E18002700



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gai consultants

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Corporate Experience

GAI Consultants Introduction

GAI Consultants, Inc. (GAI) is pleased to present our Expression of Interest (EOI) to the West Virginia Department of Agriculture (WVDA) to provide Engineering Services for the Cedar Lakes Dam Restoration/Warehouse Slope Stabilization Project (Project), located in Ripley, Jackson County, West Virginia (WV).

Established in 1958, GAI is an award-winning, 900-person, full-service engineering consulting firm headquartered out of Pittsburgh, Pennsylvania (PA) with 24 office locations, including offices in Charleston and Bridgeport, WV. **GAI's Charleston office opened in 1986, and we have been providing engineering services to the State of WV, and other local and municipal government agencies, and private clients for over 30 years.**

GAI is a highly focused firm specializing in all aspects of impounding dams, including design, administration, monitoring, inspection, structural integrity analysis and repair design, rehabilitation and repair engineering, permitting, preparation of bid documents and specifications, bid phase services, contract administration, and construction administration. We are intimately familiar with the geology, topography, water resources, soils, and natural resources of WV.

Additionally, GAI provides engineering services for a wide array of civil and construction monitoring projects. These projects vary from landslide stabilization and restoration, to building foundation design and evaluations, to site development and restoration, including subsurface investigations and design, surveying and related activities, and utility relocation.

GAI is currently ranked 111 out of Engineering News-Record's Top 500 Design Firms. GAI's multi-disciplined staff of engineers, environmental specialists, archaeologists, historians, biologists, soil scientists, geologists, GIS specialists, and planners enable us to complete many projects in-house, from initiation through construction, facilitating communication and the timely completion of projects in a cost-efficient manner. GAI is capable of providing the WVDA with all of the geotechnical engineering and investigation services, design, permitting, and construction support services required for this Project. Our experience in civil, structural, geotechnical, hydraulic, and water-related engineering services provides the right blend of expertise to successfully perform the engineering services required for this Project.

For more information on GAI's Corporate Experience, please see our supplemental Service Briefs located in **Appendix D**.

Proposed Project Manager and Contact Information

Charles F. Straley, PE, PLS – Project Manager
GAI Charleston Office, 300 Summers Street, Suite 1100, Charleston, WV 25301
Telephone: 681.245.8866 / Cell: 304.541.0854 / Fax: 304.926.8180



Project Understanding and Proposed Project Management Plan

Project Understanding

GAI understands that the two Projects (Project A and Project B) will be completed at Cedar Lakes Camp and Conference Center (Project A); located at 82 FFA Drive, Ripley, WV; and the Food Distribution Warehouse (Project B), located at 4496 Cedar Lakes Drive, Ripley, WV.

Project A Background

Project A consists of Cedar Lakes Dam No. 1 (WVDEP ID No. 03501) and Cedar Lakes Dam No. 2 (WVDEP ID No. 03502), located on Cedar Lakes Camp and Conference Center, near Ripley, in Jackson County, WV. The dams are in a series with No. 1 (lower) approximately 32 feet with a maximum storage volume of approximately 40 acre-feet. Dam No. 2 (upper) is approximately 32 feet with a maximum storage of 31 acre-feet.

As a result of the dam height and maximum storage volume, both dams are under the jurisdiction of the WV Dam Control and Safety Act (WV State Code 22-14) and Dam Safety Rule (42CSR34). Engineering services are required to reduce the risk of failure and become compliant with appropriate regulations.

Project B Background

Project B includes engineering services required for slip mitigation and repair of the WVDA's Food Distribution Program Warehouse, located on Cedar Lakes Drive, near Ripley, in Jackson County, WV. The slip is approximately 30 feet long by 60 feet wide.

Project Goals and Objectives

GAI understands that the WVDA is trying to meet the following goals and objectives for Projects A and B:

- **Goal/Objective 1 (Projects A and B):** Preparation of construction contract drawings and specifications suitable for letting of construction bids with the request for quotation and bidding process. All applicable permit applications, right-of-ways, realty appraisal work – if needed off of permit boundaries, right-of-entries, and approvals shall also be a part of the work to be performed.
- **Goal/Objective 2 (Project A):** Evaluate the dams for compliance with WV Dam Control and Safety Act, Dam Safety Rule, and the WVDEP Compliance Order to develop a plan for compliance and facilitate the Project.
- **Goal/Objective 3 (Project A):** Perform evaluation of current dam site, including inspection history, hydrologic analysis of the potential failure, and geotechnical analysis in order to identify and recommend solutions for channel restoration, principle spillways design and replacement, riser repairs, auxiliary spillway repair, outlet repair, and other dam maintenance and repair needs.
- **Goal/Objective 4 (Project A):** Develop alternative strategies for dam repair, modification, or decommissioning, including assessment on the impact of alternatives on adjacent dam structure (Dam No. 1).
- **Goal/Objective 5 (Project A):** Based on the needs and alternatives described in Goal/Objective 1, prepare appropriate cost estimates, plans, site drawings, and related specifications for all alternatives, including repair, modification, or decommissioning, in order for the dam site to attain and continue compliance with WVDEP regulations.



- **Goal/Objective 6 (Project B):** Evaluate the Food Distribution Warehouse site and perform appropriate soil analysis to determine cause of slip so a permanent solution can be designed which may involve the excavation of area, stabilization, and overhead water diversion.
- **Goal/Objective 7 (Project B):** Provide engineering assistance to evaluate site, development alternatives, design a solution, and assist with implementation. Identify the problem with the slip and install a permanent repair to reduce potential hazards to the warehouse facility.
- **Goal/Objective 8 (Projects A & B):** Develop comprehensive construction plans and bid specifications for the Alternative chosen by WVDA. Design a solution for contracting and assist in applications and permits.
- **Goal/Objective 9:** Provide all necessary services to design the Project in a manner that is consistent with the WV Division of Natural Resources (WVDNR) needs, objectives, current code, and budget and that complements the design and layout of the associated areas.
- **Goal/Objective 10:** Prepare bidding packages in accordance with the procedures of the West Virginia Purchasing Division of the Administration Section.
- **Goal/Objective 11:** Provide Construction Contract Administration Services that ensure that each task is constructed and functions as designed.
- **Project Completion:** August 2018.

Proposed Project Management Plan

GAI's Proposed Project Management Plan and Project Approach is based upon the WVDA's EOI, dated January 2, 2018, Solicitation No. CEOI 1400 AGR1800000001, which GAI is using as the basis of our Statement of Qualifications. GAI will perform these Projects pursuant to our Project Management System, which is based upon the Project Management Institute's (PMI's) *Project Management Body of Knowledge*. GAI project managers are trained in PMI principles and use project management tools available to them to initiate, plan, execute, monitor and control, and close out projects. Below is GAI's approach to these important Projects for the WVDA.

GAI's extensive staff of qualified and specialized in-house engineers and technical personnel, enables a quick response and provides flexibility and expertise for complex multi-disciplinary projects. Our staffing approach to working with the WVDA is to assign a Project Team with total responsibility for completing Projects A and B to the WVDA's satisfaction and budget.

Project Team Coordination and Scheduling

Project Initiation

Upon receipt of the Contract from the WVDA, GAI's Project Manager, Charles Straley, will visit the site, plan the investigation, respond with a task implementation plan and cost estimate to perform the required work, and assign a Task Manager. When the task contract is awarded, the required personnel will be mobilized.

At that point, GAI's Project Manager, Task Manager, and Key Personnel will either meet or teleconference with the WVDA Project Manager to kick off the Project and establish investigation and design criteria. We will then collect background data from published sources, the WVDA, and knowledgeable individuals. A site reconnaissance will be conducted as part of the data collection process.

GAI will perform the associated field investigations, including sampling and testing. Using the results of the field investigation, GAI will evaluate potential solutions and make recommendations in terms and anticipated construction and operating cost, effectiveness, constructability, maintenance requirements, public acceptability, and ability to be permitted. Once an approach is agreed upon, GAI will proceed systematically through the preliminary and final design processes, will prepare permit applications, and will provide construction support.

Project Communication

GAI's Project Manager will be the Prime Point-of-Contact with the WVDA. GAI's Project Task Manager will oversee the day-to-day work activities, review technical products and reports, and be responsible for the Project budget and schedule. During Project execution, and particularly as the Project nears completion, meetings with the WVDA will be scheduled to discuss alternatives and discuss past experiences in similar situations.



GAI will participate in routine (typically weekly) conference calls with the WVDA, as required. GAI's Project Manager can lead the calls if requested by WVDA. GAI will provide a conference call phone number to support the conference calls, typically via Skype. During the calls, GAI will update the WVDA regarding the status of the Project details and deliverables, and any proposed engineering changes that could result in changes to the schedule timelines. GAI will discuss implications of design changes with WVDA's team to develop strategy adjustments, as necessary.

Scheduling and Resource Allocation

GAI understands that the WVDA wants both Projects to be completed by August 2018. GAI is well aware of demanding schedules in order to meet permit deadlines and to keep the Project on track for ultimate construction. To coordinate, forecast, and manage the Project schedule, GAI proposes to utilize Microsoft Project or Primavera scheduling and resource allocation software to track Project milestones. The proposed schedule is our initial estimate, which can be adjusted to meet WVDA expectations. GAI will work with the WVDA to develop the initial baseline schedule, including setting milestone dates, at the initiation of the Projects. Weekly Project updates will be provided to the WVDA throughout the life of the Project.

Program Management Tasks:

Coordination and Meetings with Regulatory Agencies

GAI will coordinate the dates of meetings with the attendees, invite the participants, and prepare an agenda for distribution to attendees ahead of the meeting. At the meeting, GAI will facilitate the meeting, note the names and contact information of the attendees, and keep notes. After the meeting, GAI will document the meeting with written minutes to capture important decisions and direction, action items, open and unresolved items, and identify the potential next meeting date. Minutes will be distributed to all attendees, the project file, and WVDA within five business days of the meeting. If there are corrections to the minutes, they will be incorporated and the corrected minutes redistributed.

Meetings with Summary Presentations to the WVDA Staff

Similar to above, GAI will schedule, coordinate, and provide an agenda for the meetings. GAI will document the meeting in minutes which will be the official record of the meeting. Minutes will be distributed within five business days of the meeting. Summary presentation slides presented at the meeting will be attached to the meeting minutes for reference.

Coordination, Contracting and Oversight of Subconsultants

Currently, GAI is only anticipating a subconsultant for subsurface drilling services. GAI will select and contract with a reputable subsurface drilling company. We will administer that contract, which will be between GAI and the subsurface drilling company. GAI will have on-site oversight of the Contractor at any time when they have personnel on site. Payment of the subconsultant will be in accordance with GAI's standard contract with subcontractors, or as negotiated with them.

Program Scheduling, Including Development of Required Construction Contract Sequencing

GAI prepares project schedules using Primavera P6 as its preferred software, but can prepare schedules in Microsoft Project. In addition to the detailed Engineer's Opinion of Probable Construction Schedule, GAI will maintain an overall Project schedule showing design, permitting, construction and close out activities. GAI will baseline the schedule at the beginning of the Project and, potentially, at various points during the Project when changes in information makes it appropriate to do so. Progress will be measured against the current baseline as a means of identifying the need for action to meet projected schedule milestones. The overall schedule will be coordinated with appropriate construction seasons to assure its practicality.

Preliminary and Final Design Approach

GAI will review the existing plans and conditions, as well as the operation of the facility to determine a plan that can be implemented that will minimize disruption to facility operations, and provide a final design approach for each Project.

Detailed Design and Permitting

An initial set of drawings will be prepared for the repairs and rehabilitation. The drawings will be prepared using AutoCAD software on GAI standard title blocks, unless the WVDA provides its standard title block. The preliminary



submittal will include outline level technical specifications for materials and methods of construction. GAI uses the Construction Specification Institute's Master Spec format for its technical specifications, but these can be revised to suit the client's preference. An initial engineer's opinion of probable construction cost and engineer's opinion of probable construction schedule for the construction effort will be prepared in some detail for this submittal as well. The preliminary (60 percent level) submittal will be substantially complete and peer reviewed, but may not yet be fully subject to GAI's detailed engineering checking procedure. The primary intent of the preliminary submittal is to provide WVDA with the first review of the complete package for comment and input.

Pre-final design and permitting drawings (90 percent design submittal) will be prepared upon receipt of comments on the 60 percent submittal. The pre-final design package will be a complete, fully checked and peer reviewed set of detailed design drawings and technical specifications for the Project. The engineer's opinion of probable construction cost and engineer's opinion of probable schedule will be updated to reflect the pre-final state of design.

The pre-final design drawings are intended to be reviewed by the WVDA for final acceptance of the design and to be submitted to the WVDEP's, Dam Safety Section. Once the permitting agency has provided comments and these comments, if any, have been resolved, the bid package will be assembled.

Construction Administration

Upon awarding of the construction contract, GAI will move to the construction administration phase of the Project.

Prior to the contractor mobilizing to the site, GAI anticipates that there will be a pre-construction meeting with the Contractor, WVDA, and GAI representatives. The purpose of the pre-construction meeting is to get oriented with the Contractor's staff, fully review the scope of work, the Contractor's approach to completing that work, any hold or inspection points, and any restrictions that must be followed.

GAI will review shop drawings, submittals, and material tests as submitted by the Contractor for compliance and conformance with the construction drawings and technical specifications. GAI will work with the Contractor to review requests for information in a timely manner.

GAI will review request for change orders as submitted by the Contractor to check for valid work not already under contract and for reasonableness of the Contractor's cost and time. GAI will not prepare any change orders unless authorized by the WVDA.

GAI will review contractor pay applications for correctness and coordinate with field personnel to make sure work has been completed properly in accordance with the construction drawings and specifications.

Certificate of Final Completion and Final Certificate for Payment

GAI will issue a certificate of final completion and final certification for payment after a detailed review of the site with the Contractor and the WVDA. All contract paperwork must be obtained by GAI prior to issuance of the certificates.

Quality Assurance/Quality Control

Project Controls Group

GAI has established a Project Controls Group to monitor cost and manage reporting in our Energy Business Unit. GAI has several systems used by project managers to monitor and control projects. GAI costs, invoicing, and procurement functions are managed using our Deltek enterprise software system. Scheduling is performed using either Microsoft Project or Primavera P6, depending upon project complexity and/or client preference. GAI utilizes the Newforma Project Information Management software for document management and file transfers. GAI also has developed project management templates for typical project management activities, such as documenting meetings, telephone conversations, and scope changes.

Quality Management System

GAI understands the importance of providing our clients with on-time, cost-effective, high-quality professional services. The continued success of our firm is directly related to our ability to continue to meet the cost, quality, and schedule requirements of our projects. We achieve this goal through our experienced professional staff and by utilizing our Quality Management System (QMS). GAI's QMS is based upon a continuously improving project delivery strategy that reflects our client's needs and utilizes current technology. The Project Delivery System provides the quality assurance and quality control functions from project inception through project closeout. The Project Delivery System incorporates processes and procedures that describe how professional services are planned, executed,



checked, verified, and delivered to our clients. The system is flexible so that it allows GAI to meet the needs of individual clients. **Mr. Bruce Roth, GAI's Technical Advisor, will review all work products for consistency with GAI's Quality Assurance Manual.**

Invoice Management

To track and manage the Project budgets, GAI proposes to use a Cost Tracking Spreadsheet. GAI will update the Cost Tracking Spreadsheet on a weekly basis, which includes the earned value for each task, approved change order amounts, current invoice amount, amount invoiced to date, remaining amounts approved, and physical percent complete.

To manage and document the Projects' scope, if activities are determined to be required that are not part of this scope (change orders), GAI will provide work plans to the WVDA to be approved. GAI will incorporate these change orders into the Cost Tracking Spreadsheet as they are approved. GAI's proposed weekly conference calls will include a review of the Project budget and change orders, as needed.

Data Management

GAI will store digital information on corporate servers, including Microsoft Office documents, AutoCAD drawing files, GIS shape files, and PDF documents. GAI will provide a means to share large files with the WVDNR through the use of a password protected FX site or by providing direct links to files on the server through the use of GAI's Newforma or SharePoint System. Hard copies may also be stored in GAI's library for future reference.

Project Closure

As standard protocol for this Project, our daily work logs, digital files, and technical information are collected through daily activities. This information is shared with the GAI's Team's library and at the closure of the Project, and can be provided to the WVDA for facilities records.

Emergency Preparedness

The absence of Project staff associated with this Contract due to illness is a contingency which requires pre-planning and consideration for the potential impact on operations. The information provided in this section provides details regarding how this will be accomplished in light of the requirements of this Contract.

GAI relies on the staff assigned to each Project to be knowledgeable about the Project tasks and activities at a level of detail that enables the Project to be completed as designed. When a key member of the Project Team is unable to perform their tasks due to illness, a potential gap occurs that may impact the ability of the remaining members of the Team to complete the work on time and within the necessary level of technical expertise.

Health and Safety Plans

Before initiating any field work, all GAI projects require that a site-specific Health and Safety Plan (HASP) be developed by the Project Manager in conjunction with critical Team Members (i.e., Task Managers, Field Supervisors). All HASPs require review and approval by a member of GAI's Health and Safety Department, and must be reviewed and signed off by all members of the Project Team prior to the start of field work.

Employee Training

All of the components of GAI's Health and Safety Program require initial and ongoing training. The organization's onboarding program includes a specific health and safety component, provided to all new staff at the time of hire. This includes important information regarding emergency response for a comprehensive set of scenarios. Revision of any Health and Safety Program or procedure includes a notification process to all affected staff, posting on the company intranet, and training, as needed, by job function. All HASPs address any Project-specific training needs and a plan for provisions to Project staff, as needed. The GAI Health and Safety Department maintains all records related to health and safety training, as dictated by the GAI Records Retention matrix.

Staffing Issues due to illness

GAI has over 500 engineering and support staff spread out over nine offices in WV and PA. The depth of this staffing pattern provides the ability to rapidly ramp up and deploy additional Project staff where needed, to assure that the Project tasks can continue with limited interruptions. Staffing depth is available for technical Project staff and support staff in the Project Controls, Accounting, and Business Support functions of the organization.



Key Project Personnel

The GAI Team has extensive experience in dam and geotechnical engineering projects. This section presents our key staff biographies and their areas of experience, specialization, and responsibilities for this Project. Our experience encompasses evaluation and rehabilitation of existing dams, levees, and associated structures, geotechnical investigations, construction design, permitting, bidding, specification, and construction documents. Many of our key staff have over 20 years of experience in related projects. Additionally, we have the ability to pull from over 500 engineering and technical personnel from our WV and Western PA offices for this Project. A Project Organizational Chart and Key Personnel Resumes are provided in **Appendix A**.

Charles F. Straley, PE, PLS – Project Manager and Lead Surveyor

Mr. Straley will be GAI's Project Manager. He is a registered Professional Engineer (PE) and Professional Land Surveyor (PLS) in WV with over 30 years of experience specializing in geotechnical engineering, including all aspects of subsurface exploration; laboratory testing; foundation and embankment design; slope stability; material and construction specifications; and construction administration, management, and monitoring. In the role of Project Manager, he will serve the WVDA's interest by coordinating and managing all fiscal and personnel aspects of the Projects. He will also serve as the Lead Surveyor. He has managed numerous geotechnical investigations and construction support services for impoundment dams and foundation projects located in WV and other states. Additionally, he has performed dam inspections for numerous dams throughout WV, PA, IN, and KY. He was the Project Manager for the WVDEP's Ned's Branch Impoundment Dam Project, which was awarded the National Award for Most Outstanding Abandoned Mine Lands Reclamation Project. Mr. Straley has a working relationship with WVDEP's Dam Safety Section. Mr. Straley received his MS in Geotechnical Engineering, and BS in Civil Engineering, from the University of Akron.



Kenneth W. Kinder, PE, CFM – Construction Administration

Mr. Kinder will provide Construction Administration and Civil Engineering Support for this Project. He is a registered Professional Engineer in WV, and is a Certified Floodplain Manager (CFM) with over 15 years of engineering experience. Mr. Kinder specializes in construction oversight and management, site inspections, landfill inspections, levee and dam inspections, hydrology and hydraulics, hydraulic modeling and floodplain permitting, stormwater design, erosion and sedimentation control, and general civil engineering. He has completed inspections and provided civil engineering services for numerous impoundment dams located in WV and VA. Mr. Kinder recently prepared permit modification applications for the altering and/or decommissioning of five impoundment dams in VA. He also has experience with construction administration and construction management. Mr. Kinder received his BS in Civil Engineering from West Virginia University Institute of Technology.



Bruce L. Roth, PE – Project Advisor

Mr. Roth will be the Project Advisor for this Project. He has more than 30 years of engineering experience and is a registered PE in WV. He specializes in foundation analysis and design, rock and soil mechanics, slope stability analysis and design, subsurface exploration and investigation, geophysical investigations, and geosynthetic engineering and design. He has worked on numerous dam and water-related projects, providing Project Management and Geotechnical Engineering services for various dams, including: Bradford Dams Nos. 2 and 3; Colver Dam; H.B. Norton Dam; and the Warren Ohl Dam. Mr. Roth recently performed the tower inspection for the Colver Dam. Mr. Roth was also the Lead Geotechnical Engineer for a confidential fly ash dam project located in Winfield, WV (dam monitoring and emergency action plan update); and numerous annual inspections for dams located in WV. Additionally, Mr. Roth has experience providing geotechnical engineering for structure foundations, and has investigated and was responsible for the foundation stabilization and reparation for numerous projects located in WV and PA. He received his MS in Civil and Environmental Engineering from Cornell University and his BS in Geological Engineering from the University of Arizona.



Samuel G. Mazzella, PE –Geotechnical and Foundation Engineer

Mr. Mazzella will be the Geotechnical and Foundation Engineer for this Project. He is a registered PE in PA with over 35 years of experience, specializing in dam design and inspections, foundation engineering, subsurface exploration and investigations, slope stability analysis and design, retaining wall systems design, construction monitoring, and soil sampling and testing. His experience includes providing 124 dam inspections, including annual dam inspections for numerous dams in WV. He also provided inspection, stability analysis, and engineering cost estimates for repair options for the City of Thomas Dam, located in Tucker County, WV. Additionally, he received his certification in Landslide Recognition and Investigation by the ASCE. Mr. Mazzella received his BS in Civil Engineering from the University of Pittsburgh.



Fatma Ciloglu, PhD, PE –Geotechnical and Foundation Engineer

Dr. Ciloglu specializes in foundation analysis and design, geotechnical earthquake engineering analysis, including seismic hazard and seismic response for various earthen and tailings dams, slope stability analysis, and finite element seepage analysis for natural slopes earth structures, design of slope stabilization, and excavation support for deep foundation systems. She is a registered PE in Michigan and has worked on numerous dam projects, including the Emsworth Lock and Dam Back Channel Abutment Stabilization Project, located in Pittsburgh, PA, for the USACE; and the Wisecarver Reservoir Dam Rehabilitation and Improvements Project, located in Greene County, PA. Dr. Ciloglu received her PhD in Civil engineering from Drexel University.



Jason R. Truckenbrod, PE – Lead Structural Engineer

Mr. Truckenbrod will be the Lead Structural Engineer for this Project. He is a registered PE in WV with 25 years of experience, specializing in structural design from the selection of structural systems and definition of design basis to the preparation of detailed calculations, specifications, and construction drawings. His experience includes structural assessments, forensic evaluations, and construction administration. Mr. Truckenbrod was the Project Engineer for the Bradford Dam No. 2 Rehabilitation, where he was responsible for the assessment and rehabilitation design of the structural components of the existing earthen dam, including the rehabilitation of the reinforced concrete gatehouse, steel beam pedestrian bridge from the embankment to the gatehouse, and the concrete spillway. He also has a working knowledge of the latest design manuals for steel, concrete, masonry, and timber, as well as the International Building Code. Mr. Truckenbrod received his BS in Civil Engineering from the University of Buffalo.



Kerry L. Frech, PE – Civil Engineering Lead

Mr. Frech will be GAI's Lead Civil Engineer for this Project. He is a registered PE in WV with over 35 years of experience specializing in applying hydrologic and hydraulic principles to the development of water and land-related resources. His project experience ranges from planning and feasibility-level studies to design and the preparation of construction documents. His hydrologic and hydraulic modeling experience includes HEC-RAS, HEC-HMS, HEC 1, HEC 2, DAMBRK, PSRM, SCS TR 20, and TR 55, RIVER2, WSPRO, and the Water Resources Council's Bulletin 17B. He has also provided civil engineering services for numerous impoundment dams in WV and rehabilitation projects. Mr. Frech received his MEng in Environmental Engineering and his BS in Civil Engineering from Cornell University.



Kevin M. Bortz, PE – Hydrology and Hydraulics

Mr. Bortz specializes in hydrology and hydraulics, natural stream restoration, erosion and sedimentation (E&S) control, and stormwater management, as well as general civil engineering and surveying. He is a registered PE in PA and provides hydrologic and hydraulic design and analysis for dams, natural stream restorations, culverts, channels, ponds, stream encroachments, and impoundments in WV, PA, MD, OH, IN, and VA. His experience includes being the project engineer responsible for complete hydrologic and hydraulic design, analysis, and report preparation as part of a successful dam permit application process for expansion of a site sediment pond located in Shinnston, WV. He also provided impoundment dam conceptual design for the Leetown Science Center, located in Kearneysville, WV. Mr. Bortz received his MS and BS in Civil Engineering from the University of Pittsburgh.



Richard M. Ruffolo, PG – Lead Geologist

Mr. Ruffolo will be GAI's Lead Geologist for this Project. He is a registered Professional Geologist in PA, Kentucky, and North Carolina, with over 15 years of experience specializing in site characterization, subsurface investigations for foundations, landslides, and analysis of slope stability, foundation designs, and geotechnical report writing. Mr. Ruffolo has experience in rock strength studies, drilling, and micropile installation monitoring, foundation construction monitoring, and monitoring core logging. He has worked on numerous impoundment dams for confidential energy clients in WV. He has also provided geological engineering services for the Warren Ohi Dam, located in Clinton County, PA; Tamarack Lake Dam A and B in Crawford County; Bradford Dam No. 2 in McKean County; Coiver Dam in Cambria County; and Indian Lake Dam in Somerset County. Mr. Ruffolo received his MS in Geology from Kent State University, and his BS in Environmental Geology from the University of Pittsburgh.



Terry W. Queen – Lead Construction Technician

Mr. Queen specializes in construction monitoring for impoundment, site closure, infrastructure, and municipal projects. He provides drafting for site planning, earthwork detailing, and pre-mining and pre-blast surveys. Mr. Queen develops preliminary and final designs for mine reclamation sites and mining permits, and site development, and prepares construction drawings for highway and bridge projects. He compiles engineering data from a variety of sources; processes data using well-defined methods and presents data in prescribed formats. Mr. Queen recently monitored drilling activities, daily boring logs, concrete core, and rock core sampling for a dam located in Gauley Bridge, WV for a Confidential Client. He also provided Construction Monitoring for the Tomlinson Run State Park Dam, located in Hancock County, WV. Mr. Queen received his AA in Drafting and Design from West Virginia Institute of Technology.



Relevant Project Experience

GAI works on various projects for numerous energy clients, and many of our projects are confidential in nature; therefore, we have reflected this confidentiality in our project descriptions by not giving out project names, locations, and confidential client information. If deemed essential, GAI may be able to discuss with our respective clients with whom there are confidentiality obligations and request written permission to make further disclosure.

Dam and Water-Related Engineering Projects

Since 1958, GAI has been providing dam and water-related engineering services. We are experienced with the condition assessment, repair design, and new design for structures that are related to dams. We have worked with numerous owners and agencies to provide the necessary modifications and repairs to bring dams into compliance with Dam Safety Requirements.

Confidential Dam Wave Erosion Protection Design *Pleasants County, West Virginia*

GAI provided design drawings and specifications for the riprap slope protection at a Confidential Impoundment. Erosion issues were observed on the upstream embankment on the embankment dam at a Confidential Power Station in Pleasants County, WV. **The WVDEP, Division of Dam Safety, recommended the embankment be armored for protection against wave action to help prevent further erosion issues.**

In April 2005, a Draft Slope Protection Alternatives Analysis Report was prepared by GAI. The alternatives provided in this draft report included Riprap Stone; Fabric-form Concrete; Articulating Concrete Block; Permanent Turf Reinforcement Mat; and Geosynthetic Cellular Confinement System. GAI's Client selected Riprap Stone as the preferred method of slope protection for the embankment. GAI reviewed the results of the 2005 Draft Slope Protection Alternative Analysis and provided drawings and specifications for the materials required for the Riprap Slope Protection. Design was based on the assumptions in the Draft Report that the erosion protection is sized for waves resulting from 30 mph winds.

GAI has been providing support to this Confidential Impoundment Dam since 1981, performing Annual Dam Inspections, Surveys, Geotechnical Engineering, Piezometer Replacement, Slope Stability Analysis, Construction Quality Assurance Monitoring, Impoundment Closure, and Landfill Expansion Design

Project Status: Completed 2015

Work Tasks:

- Reviewed Draft Report
- Prepared Impoundment Erosion Drawing and Specifications
- Miscellaneous Fossil Engineering Services

Client Contract: Confidential



Ned's Branch Impoundment Dam *Mingo County, West Virginia*

Ned's Branch Impoundment is an approximate five-acre abandoned coal refuse slurry dam near Gilbert, WV, that failed due to heavy rains. The failure sent approximately one million cubic yards of slurry, coal refuse, and debris into the Right Fork of Ned's Branch. The displaced material blocked main Ned's Branch and Ned's Branch Road, stranding numerous families in a nearby hollow. Divided into two phases, the project encompassed removing the debris to clear the roadway and Ned's Branch, and reconstructing the slurry embankment. Work on both phases followed a 24-hour, seven-day week work schedule.

GAI met with the WVDEP two days after the event to discuss a Work Directive from the Department, issued under their Emergency Guidelines. Within a month, GAI completed the challenging task of developing engineering plans, drawings, and specifications for emergency stabilization of the embankment. The plans addressed excavating and regarding the refuse to establish stable slopes, locating mine portals on the site, and demolishing any remaining structures and foundations. GAI also provided periodic construction monitoring and the project was successfully completed within eight months.

Awards: This Project was awarded the National Award for Most Outstanding Abandoned Mine Lands Reclamation.

Value Added Innovations: GAI completed the investigation and planning process for the second phase of the project while the first phase of the project was underway. GAI embraced the urgency requested by the WVDEP, providing salutations that reestablished the integrity of the impoundment and restored the natural beauty of the site under an accelerated work schedule.

Project Status: Completed 2003

Key GAI Staff: Charles F. Straley, PE, PLS, Project Manager

Work Tasks:

- Reclamation Plan for Impoundment Stabilization
- Survey and Topographic Mapping
- Site Reconnaissance
- Subsurface Investigation Plan
- Slope Stability Analysis
- Stream Relocation Design
- County Road Design
- Construction Monitoring and Testing

Client Contact: Mr. Michael Richardson
Office of Surface Mine Reclamation and Enforcement, Charleston
formerly of WVDEP, Division of Land Restoration
1027 Virginia Street, East
Charleston, WV 25301
Phone: 304.747.7162, ext. 3010



Confidential Dam Impoundment Design and Inspection

Pleasants County, West Virginia

The project is a slurry impoundment with a downstream dry landfill disposal area. The slurry impoundment consists of a 215-foot high zoned earth and ash embankment dam that creates a lake for slurry disposal of Coal Combustion Residuals (CCRs). The embankment (dam) was progressively built over many years to increase storage to its ultimate design capacity. GAI monitored dam construction and permitted, designed, and monitored construction of an emergency spillway and the immediately adjacent downstream CCR landfill. The disposal area provides long-term storage for CCR from the adjacent Power Station.



Development of the site required significant geotechnical investigations and design modifications due to site geology and the presence of weak, landslide-prone soils. GAI incorporated design features that provide adequate slope stability, including increasing soil strength with augercast grout columns using cement, fly ash, sand, and gravel. GAI continues to perform annual dam inspections and provide reports, and has designed the slurry pipelines, a temperature blending station, the treatment ponds, and a submerged river discharge diffuser. Disposal area construction began in 1981 and is ongoing.

GAI provided professional geologist and geotechnical engineers who addressed critical site features that threatened the stability of the impoundment. GAI's Quality Assurance/Quality Control (QA/QC) activities during construction documented that the liners were installed properly, resulting in a stable facility that has had minimal impact on the local environment.

Project Status: Ongoing

Work Tasks:

- ▣ Groundwater Studies
- ▣ Geotechnical Evaluations
- ▣ Laboratory Testing and Stability Evaluations
- ▣ QA/QC Documentation
- ▣ Emergency Action Plan Preparation
- ▣ Construction Monitoring
- ▣ Annual Inspections
- ▣ Liner and Leachate System Design
- ▣ Slurry Pipeline Design
- ▣ Treatment Pond Design

Client Contract: Confidential

Confidential Dam Inspections, Emergency Action Plans, and Construction Support Services

Harrison County, West Virginia

GAI has performed numerous engineering and construction support services for two Embankment Dams located in Harrison County, WV for a Confidential Client. GAI has been working at this Confidential Power Station since 1990 and has performed annual dam inspections since 1996.

Project Status: Ongoing

Work Tasks:

- Annual inspections, including: assessing conditions of dams and ancillary facilities; identifying current or potential areas requiring maintenance; review and report piezometer readings; inspect principal spillway pipe; evaluate the survey monitoring data; and provide annual inspection reports for each dam
- Emergency spillway evaluation
- Design and permitting for construction of a pond qualifying as a dam under the WV Dam Safety Regulations, including studies and preparation of an Emergency Action Plan
- Preparation of construction documents, including an Erosion and Sedimentation Control Plan
- Construction monitoring

Client Contract: Confidential

Confidential Dam Stability Evaluation

Fayette County, West Virginia

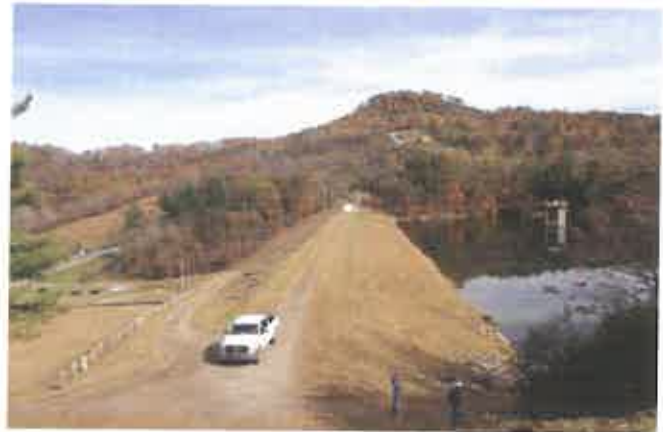
GAI is performing a stability evaluation of this Confidential Dam, located in Fayette County, WV. As part of the analysis, a subsurface exploration and testing program is required to define the depth, extent, dip, condition, and strength of the various rock layers within the foundation. GAI is also provided surveying of the horizontal and vertical locations of the two original reference points that established the axis of the dam, and is surveying previously established monitoring points within the surge basin and spillway. GAI also performed field surveys with construction activity, foundation exploration, drilling, and instrumenting.

Project Status: Ongoing

Work Tasks:

- Subsurface Exploration
- Foundation Exploration
- Testing Program
- Drilling
- Instrumenting
- Survey

Client Contract: Confidential



USGS Leetown Science Center Impoundment Conceptual Design

Jefferson County, West Virginia

The Leetown Science Center is a fishery/biological research facility owned and operated by the United States Geological Survey (USGS) and located in Kearneysville, Jefferson County, WV. GAI provided Engineering and Environmental services for a Conceptual Design for Impoundment Construction to Enhance Spring Flow at the facility.

Cold-water fishery research is performed at the facility, and the cold water is supplied to the facility through collection of ground water into infiltration galleries. The cold-water collection system was designed and built to convey the historical cold-water demand of the facility, but the recent construction of a United States Department of Agriculture (USDA) facility upgradient of the Leetown site, and accompanying use of portions of the collected ground water by the USDA facility, has potentially exceeded the ability of the collected ground water to meet all demands.



In the past few years, two beaver dams were established at the Leetown facility. When the beaver dams were present, the Leetown facility reported that ground water levels and associated flow rates were higher than during the periods prior to the presence of the beaver dams. A corresponding reduction in ground water levels and flows was observed after the beaver dams were no longer in service. An evaluation of the hydrogeologic features of the site led the USGS to conclude that the presence of the pools behind the beaver dams acted to inundate naturally occurring seep locations, preventing the surface discharge of ground water, and enabling more efficient capture of the ground water in the infiltration galleries.

The Leetown Science Center was interested in increasing the amount of ground water available for use at the facility. The preferred method selected to increase the water supply was to recreate the hydrogeologic effect of the beaver dams through controlled design and construction of low-level impoundments. Such design would meet state and federal regulations for impoundments, would address inundation of critical areas of the facility, and would account for any off-site flooding. GAI prepared a report to present various alternative methods considered to increase water supply, and conceptual-level design and cost estimate for impoundments replicating the two beaver dams. Two structural alternatives, an earthen embankment and a sheet pile levee, were evaluated for each location. GAI provided conceptual design plans and cost estimates for final design and construction.

GAI also prepared an Environmental Assessment (EA), in compliance with the National Environmental Policy Act, to address the projected impacts from the proposed construction of an impoundment. The EA described the proposed action, the purpose and need for the proposed action, and reasonable alternatives to accomplish the project.

Project Status: Completed 2010

Work Tasks:

- Conceptual Design Report, including: Conceptual Solutions and Design Alternatives, Design Requirements, Permitting Requirements, Structural Alternatives, Cost Estimates, and Hydraulic Calculations
- Environmental Assessment

Client Contact: Mr. Alfred E. Benton
Contract Specialist, Eastern Region Office
USGS
abenton@usgs.gov



Tamarack Lake Dam A and Dam B

Crawford County, Pennsylvania

Tamarack Lake is a 1,000-acre flood control lake located near Meadville, PA. There are two high hazard dams associated with this lake. GAI worked with the PA Department of General Services and the PA Fish and Boat Commission to redesign the dams, concrete risers, outfall structures, auxiliary spillways, diversion dam, and saddle dike. Additionally, GAI is completely replacing both of the cast-in-place concrete towers. A significant geotechnical investigation was completed by GAI in 2014, involving a drilling program, lab testing, ground penetrating radar, in-situ testing, stability analyses and settlement calculations. GAI also completed a hydrologic and hydraulic study of the two dams utilizing HEC-RAS and HEC-HMS for a five-square mile drainage area. Multiple permit applications have been submitted, including: Pennsylvania Department of Environmental Protection (PaDEP) Dam Safety, National Pollutant Discharge Elimination System, United States Army Corps of Engineers, and township stormwater management.

Project Status: Ongoing

Work Tasks:

- Engineering Design of Spillway Riser and Pedestrian Bridge
- Geotechnical Investigation
- ▣ Laboratory Testing
- ▣ Subsurface Investigation
- ▣ Drilling Program
- Ground Penetrating Radar
- ▣ In-Situ Testing
- ▣ Hydrologic and Hydraulic Study
- ▣ Land Surveying
- ▣ Permitting and Agency Correspondence
- ▣ Final Design Plans and Specifications

Client Contact: Mr. Bryan Anthony
Pennsylvania Department of General Services
Bureau of Engineering and Architecture
717.787.5616
branthony@pa.gov



Bradford Dam No. 2 Rehabilitation

McKean County, Pennsylvania

GAI was contracted by the Bradford City Water Authority to develop alternatives for achieving compliance and design rehabilitation measures; prepare permit applications; prepare bid and construction documents; and monitor and certify construction for Bradford Dam No. 2. Bradford Dam No. 2 is used as a water supply impoundment by the City of Bradford, PA. The dam's spillway was considered to be inadequate for a Probable Maximum Flood (PMF) event.

GAI conducted a subsurface investigation for the dam, consisting of soil borings, piezometer installation, and Cone Penetrometer and Dilatometer Testing. Selected soil samples were submitted for laboratory analysis. Engineering analyses consisted of stability runs, seepage models, settlement analysis, and bearing capacity. A geotechnical report was prepared which consisted of background information, site descriptions, findings, and recommendations. The report presented the results of engineering and geologic studies conducted by GAI to evaluate the stability of the existing Dam No. 2 and design rehabilitation measures to upgrade the dam to current standards.

The rehabilitation for the dam included the renovation of the dam outfall tower, the pedestrian bridge, and installing roller compacted concrete overtopping protection to provide for dam stability under a PMF event. The energy dissipater for the spillway was extended to achieve compliance with its 100-year design flow, and water supply pipes from the reservoir were slip-lined to prevent leakage. Mitigation wetlands were installed at the downstream toe of the dam, and a public access road was constructed to allow access for fishing.

Project Status: Ongoing

Work Tasks:

- Engineering Design and Renovations of Dam Outfall Tower, Pedestrian Bridge, and Emergency Spillway
- Geotechnical Investigation and Reporting
- Cone Penetrometer and Dilatometer Testing
- Subsurface Investigation
- Laboratory Testing
- Hydrologic and Hydraulic Study
- Land Surveying
- Permitting and Agency Correspondence
- Final Design Plans and Specifications

Client Contact: Mr. Kim Benjamin
Executive Director
Bradford Water Authority
814.362.3004
kim@bradfordwater.com



Warren Ohl Dam

Clinton County, Pennsylvania

GAI was contracted by our Client in 1995 to evaluate a sinkhole that was found along the outside of the east wall of the dam's emergency spillway. GAI evaluated the sinkhole based on site observations and the historical data for the dam, and concluded that concentrated seepage along the base of the spillway, originating from the rock below and from cracks in the spillway floor, had eroded soil from below the base of the concrete spillway.

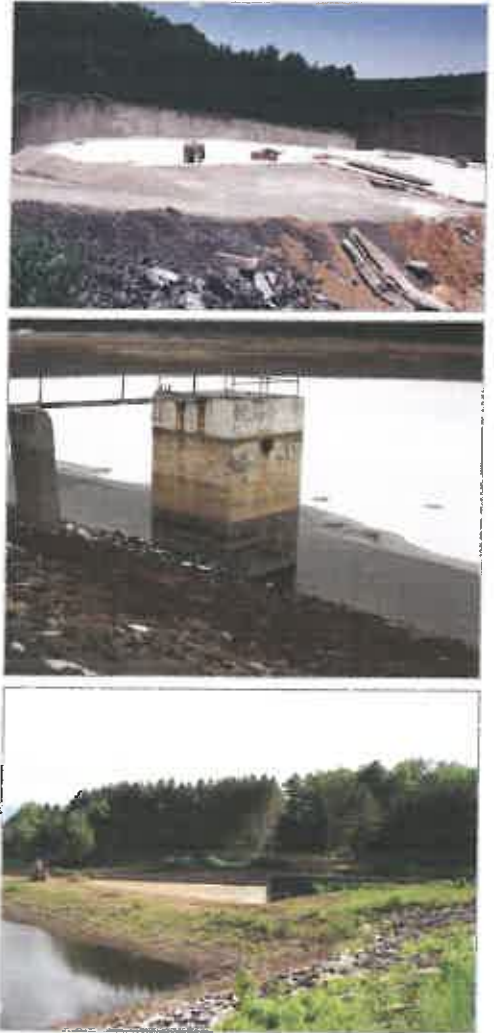
GAI prepared a design in 1996 for removal of the base of the spillway and installation of a filtered underdrain to collect and safely discharge seepage from the soil or rock subgrade below the spillway. Although total seepage flows did not increase, significant concentrated flows from springs encountered in the newly exposed rock during the repairs in 1997 required increased drainage capacity to be included in the construction. The concrete base slab of the spillway was then replaced. Water began to flow over the repaired spillway on January 11, 1998, and the completed repair of the spillway performed satisfactorily. The City recorded flow rates from the various discharge pipes around the spillway. The flow rates initially were fairly constant, however, the flow from the 15-inch diameter pipe and corrugated plastic drain later increased through the summer of 1998 to peaks in September. During this same period, the pool level was dropping. On October 2, 1998, leakage was reported to be existing the base of the repaired spillway along joints near the lower end. Thus, there was an apparent anomaly because the rates of flow from the 15-inch pipe and corrugated pipe were increasing when the pool level was dropping. By November 1998, the leakage through the joints in the slab ceased and the flows from the 15-inch pipe and the corrugated pipe returned to the lower flow rates. A similar pattern of behavior occurred in subsequent years.

After the spillway was repaired, the PaDEP requested that the City make plans for a grouting program to reduce the seepage below the dam. GAI conducted an exploration to obtain data to design the grouting program in October 2000. GAI prepared preliminary plans and specifications for the grouting in August 2002, and the plans were reviewed by the PaDEP. In January 2004, the updated plans were submitted for final review by the PaDEP. The grouting plans were approved with minor modification in February 2004. The grouting program was then inactive while the City was pursuing loans to perform the grouting.

Once the grouting program was finally in place, the entire process took about six months, and was completed by March 2008. The total cost was \$3.4 Million, with 2,100,000 lineal feet of drilling and 54,000 cubic feet of grout place. Final restoration of the site was completed in the summer of 2008. The normal pool level of the dam had been restored, and the seepage at the toe of the dam had been reduced substantially from the pre-grouting condition. The grouting program was successful in significantly reducing the seepage through the rock below the dam and that the stability of the embankment had been improved significantly, and that the risk of piping failure due to erosion from seepage had been reduced.

Project Status: Completed 2009

Client Contact: Jason Dershem
City Engineer
City of Lock Haven
570.893.5904
jasond@kcnet.org



Colver Dam and Reservoir Design and Inspection *Cambria County, Pennsylvania*

Colver Dam and Reservoir are operated by the Cambria Township Water Authority, located in West-Central PA. The Colver Reservoir provides drinking water to the township, as well as cooling water to a nearby 110MW Co-Generation Power Plant.

The dam is a 51-foot high, 102-foot long earth embankment with 3H:1V upstream and 2.5H:1V downstream slopes. GAI designed the dam and appurtenances, performing all geotechnical, structural, hydrologic, and hydraulic design; prepared associated permit application documents; prepared the EAP; provided Construction Management services; monitored construction, and in the years following construction, has performed annual inspections of the facility, including the 2017 dam inspection.

The dam embankment is partially underlain by abandoned underground coal mine workings, for which the possibility of future trough subsidence could not be ruled out. A geosynthetic membrane was incorporated into the embankment to limit the potential for piping in the event of mine subsidence. The "new" dam incorporates a spillway with reinforced concrete overflow weir with an abutting reinforced concrete cantilevered retaining wall, a reinforced concrete chute and baffle blocks, a reinforced concrete intake with sluice gates and electrical operators, and a reinforced concrete box culvert low level outlet.

Project Status: Ongoing

Work Tasks:

- ▣ Annual Dam Inspections
- ▣ Geotechnical Engineering
- ▣ Hydrologic and Hydraulic Investigations
- ▣ Dam Engineering Design
- ▣ Structural Engineering
- ▣ Permitting and Agency Correspondence
- ▣ EAP Preparation
- ▣ Construction Management Services

Client Contact: Mr. Ken Taylor
Cambria Township Water Authority
814.533.1358
ctwa_77@yahoo.com



H.B. Norton Dam and Ridgeway Water Treatment Plant Rehabilitation

Elk County, Pennsylvania

GAI performed a geotechnical exploration for water treatment plant additions in 1987, and discovered unusual artesian waters below the plant and the toe of the adjacent H.B. Norton Dam. Our subsequent geotechnical exploration defined the artesian pressures, installed piezometers in the dam, and analyzed the effects of artesian water pressures on dam stability. GAI recommended and monitored installation of a deep well dewatering system to lower artesian pressures during construction of the treatment plant additions, and testing and installation of rock anchors to prevent flotation of empty tanks.

When treatment plant additions were completed in 1993, artesian pressures were low and dam stability met state-required safety factors; however, in 2004, the piezometers indicated that a rise in artesian pressures required mitigation. GAI concluded that installing a compacted buttress fill on the downstream slope of the dam to flatten it from 2H:1V to 3H:1V would achieve a satisfactory safety factor for the range of anticipated artesian pressures. A leak along the back of the concrete emergency spillway was sealed by grouting in 2009. Buttress fill was added to the dam in 2010 to improve facility stability and ease maintenance of the face of the dam.

Project Status: Completed 2011

Work Tasks:

- ▣ Geotechnical Exploration
- Drilling/Sampling of Rock and Soil
- ▣ Laboratory Testing of Soil for Parameters
- ▣ Piezometer Installation, Monitoring, and Evaluation
- Evaluation of Artesian Pressures
- ▣ Dewatering and Foundation Design Recommendations
- ▣ Rock Anchor Design Recommendations, Monitoring, and Testing
- ▣ Deep Well Pump Testing and Dewatering Monitoring
- ▣ Seepage and Stability Analyses
- ▣ Buttress Design
- ▣ Grout Monitoring
- ▣ Earthwork Construction Testing and Monitoring

Client Contact: Mr. Timothy P. Wells, PE
Senior Project Engineer
Hill Engineering, Inc.
814.725.8659
twells@heiengr.com



Indian Lake Dam Assessment and Remediation
Somerset County, Pennsylvania

GAI was retained by Indian Lake Borough to assess the condition of Indian Lake Dam and to develop subsurface and soil testing investigations. The acquired information and technical data was used to rehabilitate and update the 45 year old facility. Maintenance work included a new Outlet Works pipe; a downstream embankment buttress to control seepage and improve overall stability; and an enlarged emergency spillway discharge capacity to comply with new regulatory standards. GAI also conducted annual dam inspections required by the PaDEP.

Project Status: Completed 2009

Work Tasks:

- ▣ Bi-Annual Dam Embankment Inspection
- ▣ Technical Specifications for Remediation
- ▣ Construction Monitoring Services
- ▣ Remediation of Outlet Works Control Pipe
- ▣ Remediation of Downstream Dam Embankment Buttress
- ▣ Remediation of Embankment Inverted Filter
- ▣ Remediation of Labyrinth Emergency Spillway
- ▣ Installation of Piezometers, Slope Indicators, and Weirs for Monitoring

Client Contact: Ms. Theresa L. Weyant
Borough Manager
Indian Lake Borough
814.754.8161
Theresa@indianlakepa.us



Cross Creek Dam Sluice Gate Replacement *Washington County, Pennsylvania*

GAI provided a site visit and assessment, engineering design, and bid and construction period services for the sluice gate repair at Cross Creek Dam for the Washington County Planning Commission. The Dam is an approximately 80 foot tall earth embankment dam that was constructed in 1977 under the Watershed Protection and Flood Prevention Act. A reservoir drain pipe at the base of the dam controls flow through the dam. The main reservoir drain consists of a 24 inch inside diameter precast concrete pipe, a reinforced concrete junction box with a 70 foot tall riser, and a 42 inch inside diameter precast concrete pipe, downstream of the riser. A 24-inch square cast-iron sluice gate is located on the upstream side of the junction box and controls flow from the 24 inch upstream drain pipe. The 3.5 foot by 10.5 foot (inside dimensions) reinforced concrete riser on the upstream side of the dam, serves as a high-water level drain. The sluice gate is manually operated and the valve stem extends up through the top of the concrete riser.

GAI observed and documented the condition of the dam and concrete riser; reviewed existing structural drawings and developed sluice gate repair drawings and specifications; provided bid specifications and drawings; and provided bid and construction period services.

Project Status: Completed 2016

Work Tasks:

- Site Visit and Assessment
- Documented and Photographed Dam and Concrete Riser
- ✱ Verified As-Built Drawings
- Reviewed Structural Drawings
- Developed Sluice Gate Repair Drawings and Specifications
- ✱ Agency Correspondence
- Created Bid Drawings and Specifications
- Reviewed Contractor Shop Drawings and Submittals
- Observed Construction Progress
- Prepared Punch List Items and Perform Final Site Inspection

Client Contact: Ms. Lisa L. Cessna
Executive Director
Washington County Planning Commission
724.228.7337
CessnaL@co.washington.pa.us



Lake Milton Dam Rehabilitation and Safety Restoration

Jackson County, Ohio

GAI provided professional engineering services to investigate and design the Lake Milton Reclamation Project, located within the Flint Run Tributary of Little Raccoon Creek Watershed in Jackson County, Ohio. The project included two large water impoundments, known as Lake Milton and Upper Lake Milton, with the watershed area covering approximately 155 acres. Lake Milton covers 16.7 acres and holds 72 million gallons of water.

GAI was the geotechnical engineer for this project and was tasked with providing a design of the repair for Lake Milton Dam and design modifications to the dam structure and outlet works to meet the stability requirements of the Ohio Department of Natural Resources (ODNR), Division of Water. GAI was also tasked with design of the treatment facilities within the impoundments to neutralize acidic water and remove metals. GAI assisted in evaluation and design of the passive acid mine drainage treatment systems, stability of embankments for treatment structures, and grading of the project area. GAI was also involved in the design and development of plans and technical specifications for the project.

Lasting benefits of the project included improving the water quality for Flint Run and producing a large recreational lake.

Project Status: Completed 2006

Work Tasks:

- ▣ Site Reconnaissance
- ▣ Subsurface Investigation
- ▣ Design and Analysis of Recommended Remediation Options for the Lake Milton Embankment
- ▣ Hydrologic and Hydraulic Analysis
- ▣ Environmental Assessment
- ▣ Construction Drawings
- ▣ Acid Mine Drainage Abatement

Client Contact: Mr. Scott Hindall
Ohio Department of Natural Resources,
Division of Mineral Resource Management
614.265.6716
scot.hindall@dnr.state.oh.us



Foundation Engineering and Landslide Investigation and Abatement Projects

Since 1958, GAI has established itself as a premier engineering and consulting firm specializing in foundation and soil mechanics engineering, and has been providing geotechnical and structural engineering-related engineering services for foundation engineering and landslide investigation and abatement projects. We are experienced in providing subsurface investigations, site reconnaissance, landslide restoration plans, geotechnical investigation, field survey, boundary and topographic survey, site mapping, hydraulic modeling, construction drawings and specifications, and construction modeling. Our list of clients include the West Virginia Department of Environmental Resources, Office of Abandoned Mine Lands and Reclamation, and the West Virginia Department of Protection.

Latrobe (Gibson) Landslide II

Logan County, West Virginia

GAI responded to an urgent request from the West Virginia Department of Environmental Protection to evaluate an unstable landslide area situated above private residences upstream of Man along Buffalo Creek near Latrobe, WV. The landslide caused by abandoned coal mining operations, and developed scarps, cracks, rolling, and seepage through the face that was encroaching on the property.

GAI was asked to reduce the slopes, eliminate the instability, and develop provisions for controlling the drainage. An alternative analysis was conducted based on the records research, subsurface investigation, and stability analysis. The alternatives that were evaluated included: primary rock buttress, lateral drainage controls, retaining wall system, and complete removal of slide material. The final design included the complete removal of the slide material, an emergency USACE permit for a valley fill, and various drainage control structures.

Value Added Innovations: GAI completed the design effort and generated a construction package within a one-month period, and three residences were saved from imminent danger.

Project Status: Completed 2005

Work Tasks:

- Survey
- Site Reconnaissance
- Subsurface Investigation
- Alternative Evaluation
- Construction Drawings and Specifications

Client Contact: Mr. Michael Richardson
Office of Surface Mine Reclamation and Enforcement, Charleston
formerly of WVDEP, Division of Land Restoration
1027 Virginia Street, East
Charleston, WV 25301
Phone: 304.747.7162, ext. 3010



Lodestar Energy Valley Fill Landslide

Raleigh County, West Virginia

The Lodestar Energy project site is located near Pax, WV, and involved a potentially unstable valley fill situated above a private residence. The valley fill had developed scarps, cracks, localized failures, and seepage throughout the face.

GAI received an urgent request to provide engineering plans, drawings, and specifications for emergency stabilization of the valley fill and periodic construction monitoring. The final design included a rock toe buttress, collection of drainage from a coal seam, and regrading the valley fill. GAI was also responsible for hydraulic modeling activities, including developing hydraulic models, generating diversion ditch options to direct flow around the private residence, and devising a plan to convey a 100-year, 24-hour flow through private property.

Project Status: Completed 2004

Work Tasks:

- ▣ Boundary and Topographic Survey
- ▣ Site Reconnaissance
- ▣ Subsurface Investigation
- ▣ Laboratory Testing
- ▣ Construction Monitoring
- ▣ Hydraulic Modeling

Client Contact: Mr. Michael Richardson
Office of Surface Mine Reclamation and Enforcement, Charleston
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Charleston, WV 25301
Phone: 304.747.7162, ext. 3010



Duck Creek (Jenkins) Landslide

Harrison County, West Virginia

GAI was selected by the West Virginia Department of Environmental Protection to prepare a restoration plan for a landslide located within the Duck Creek watershed that was encroaching upon the Jenkins residence. This seven-acre landslide was threatening the home, water well, and propane tank.

GAI performed site mapping and a detailed geotechnical exploration, and developed restoration designs for the landslide. In addition, an existing long culvert was replaced and a rock channel was designed to protect the residence from future 25-year storm events. Utilizing an innovative and sustainable design approach, GAI was able to minimize stream impacts so only a basic nationwide USACE permit was required. The design did not require simple excavation and called for spoil to be placed in an adjacent area where streams would not be impacted.

GA identified that the spoil causing the landslide came from a pre-law (prior to 1977) surface mine located uphill from the Jenkins residence. Our proactive approach included investigating an existing surface mine in the same vicinity. The mine owner identified a localized spot within their mine reclamation area that was having drainage issues and agreed to the placement of the landslide spoil at that location.

Value Added Innovations: GAI's proactive approach to the landslide identified an existing mine and linked the landslide to mine spoil. GAI's design will protect the Jenkins residence without impacting ephemeral streams, improve an adjacent mine reclamation area, and replace the landslide material to an elevation close to where it originated years ago.

Project Status: Completed 2008

Work Tasks:

- Landslide Restoration Plan
- Site Mapping
- Geotechnical Investigation
- Field Survey
- Drainage Channel Design

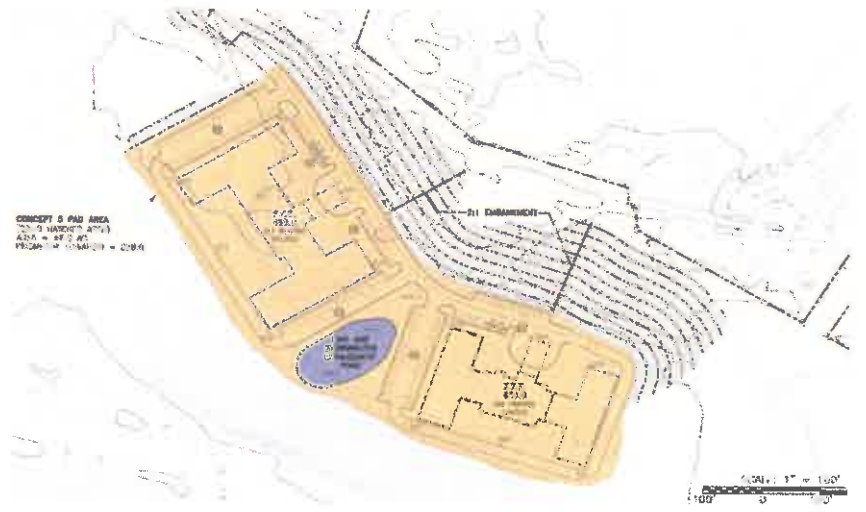
Client Contact: West Virginia Department of Environmental Protection,
Office of Special Reclamation
304.926.0499



Wheeling Hospital Site Development and Landslide Engineering

Wheeling, Ohio County, West Virginia

GAI provided engineering design and survey services for a proposed senior care facility, hospital expansion, and landslide stabilization project. The proposed senior care facilities included an independent and assisted living facilities that required a zone change from the City of Wheeling. GAI provided topographic, boundary, and ALTA/ACSM surveys for the 154.85 acres of land owned by the hospital. GAI conducted geotechnical explorations for senior care facilities on the northern portion of the property and for a landslide stabilization project on the southern portion of the property. Designs were developed to remediate a landslide which occurred periodically over five years and affected the southern parking lot of the hospital. GAI's design included a stream restoration that was under the jurisdiction of the USACE.



Lasting Benefits: GAI's abilities in geotechnical exploration, landslide remediation, and stream restoration brought resolution to an ongoing landslide problem on the property and stabilized a parking area.

Project Status: Completed 2009

Work Tasks:

- Geotechnical Exploration
- Landslide Stabilization
- Topographic, Property, and ALTA/ACSM Land Title Surveys
- Wetland and Stream Investigation
- Permitting
- Archaeological and Historical Site Determinations
- Coordination with Architects, Utility Agencies, City of Wheeling
- Conceptual Design for Senior Care Facilities
- Utility Investigation
- City of Wheeling Zone Change

Owner Contact: John Pastorius
Vice President
Wheeling Hospital, Inc.
304.243.3267



Soncini Landslide Stabilization

Allegheny County, Pennsylvania

GAI was retained by the U.S. Department of Interior, Office of Surface Mining, to conduct a geotechnical investigation, and to design measures to abate a 120-foot wide landslide behind the Soncini residence in Elizabeth Township, PA. The Office of Surface Mining concluded that water from abandoned mine workings in the Pittsburgh Coal seam above the landslide area caused the landslide. This event occurred adjacent to a soldier pile wall constructed in 1986 to correct a previous landslide.

GAI's investigation involved drilling, testing, and surveying to characterize the site, and designing abatement measures to stabilize the landslide. As a subcontractor to GAI, Pennsylvania Drilling Company performed four 20-to-30-foot test borings, and transferred samples to GAI for Standard Penetration Tests. A topographic survey of the landslide area was conducted by GAI to prepare a site plan and cross sections of ground support, and drainage system design. The final abatement design utilized a mechanically stabilized embankment wall with a toe drain.

Lasting Benefits: GAI's landslide abatement design was prepared within the Office of Surface Mining's time schedule, and the issue was resolved promptly. The stabilized slope no longer threatens the Soncini residence.

Project Status: Completed 2006

Work Tasks:

- ▣ Standard Penetration Tests
- ▣ Rock Core Testing
- ▣ Topographic Survey of Landslide Area
- ▣ Slope Stability Analysis
- ▣ Site Plan
- ▣ Drainage System Design
- ▣ Landslide Abatement Design
- ▣ Revegetation Recommendations
- ▣ Erosion and Sedimentation Control Plan

Client Contact: U.S. Department of Interior, Office of Surface Mining
412.937.2136



Morewood Point Landslide Retaining System Design Allegheny County, Pennsylvania

When ground surface settlements behind a series of occupied condominium units in the Shadyside area of Pittsburgh led to the discovery of a landslide, GAI was requested to investigate the situation and design a retaining system. Local underpinning was installed immediately to stabilize the condominium building foundations, which bordered a steep, 80-foot high downhill slope. The landslide had occurred on neighboring property, and only a narrow 10-foot corridor existed between the condominium units and the property boundary line. Steel bridging and cribbing were used to support construction equipment in the narrow work corridor, which became even more restricted as slope movement progressed.

In addition, the design review process to gain government agency approval lasted several months. Despite the challenges, the retaining system, a combination of vertical and battered micropiles and vertical reinforced augercast lagging piles, was successfully installed. This system was designed to protect the condominium units from possible future incursions of the landslide.

Lasting Benefits: Working within a 10-foot-wide corridor, project activities were confined to the condominium association property, eliminating the need to access adjacent property or disturb the landslide.

Project Status: Completed 2006

Work Tasks:

- Geotechnical Investigation
- Retaining System Design
- Construction Monitoring

Client Contact: Rich Ackerman
Sr. Vice President
Arnheim & Neely
412.316.1900



Proposed Subcontracted Firms

EnviroProbe Integrated Solutions – Subsurface Drilling Services

GAI is proposing to use EnviroProbe Integrated Solutions (EnviroProbe) for Subsurface Drilling Services. Founded in 2006, EnviroProbe is a woman-owned small business headquartered in Nitro WV with a branch office in Morgantown, WV. EnviroProbe's diverse staff includes engineers, environmental professionals, geologists, scientists, Licensed Remediation Specialists, certified well drillers Licensed Water Well Drillers, equipment operators, inspectors/field technicians, and laborers. EnviroProbe's experienced operators have provided direct-push, environmental drilling, and geotechnical drilling services since 1995.

EnviroProbe's staff values industry-leading safety practices holding high standards for both employee and jobsite safety 24/7. EnviroProbe's drillers are certified, and all of their team members undergo strict protocols – ensuring safety is a number one priority at all times. EnviroProbe is a member of ISNetwork, Avetta, PEC Safety, and SafeLandUSA.

EnviroProbe's operating region varies depending on the scope of work, but typically includes WV, PA, KY, OH, MD, IN, and NC. They operate three four track-mounted Geoprobe rigs (Models 8150LS, 3230DT, 7720DT, and 7822DT, and 8040DT), and one track mounted CME-45C, and one ATV mounted track-mounted CME-55, and a truck mounted Mobile Drilling rig.

Ronda J. Moore is the President and Co-Founder of EnviroProbe. She adds over 30 years of executive team management experience, with over 10 years in the environmental consulting/engineering arenas. Ms. Moore's experience and day-to-day management has directed the growth of EnviroProbe from a home-based two-person firm to a major player in the drilling, contracting, and engineering arena. Ms. Moore received her BS Degree in Business Administration from Glenville State College.

Roderick E. Moore, PE, CWS, LRS, is the Vice President and Co-Founder of EnviroProbe. Mr. Moore is a Registered PE in WV, OH, PA, and VA and is a Licensed Remediation Specialist with the WVDEP. He adds over 30 years of experience in environmental consulting and has directed the growth of EnviroProbe from a home-based two-person firm to a major player in the drilling, contracting, and engineering arena. Under Mr. Moore's tenure, EnviroProbe has provided solutions to a variety of complex engineering and environmental projects for various energy, private, retail/commercial, and industrial clients, as well as state and federal government agencies. Mr. Moore received his MS Degree in Civil Engineering from West Virginia University.



Health and Safety

GAI believes all employees should go home in the evening just as healthy and safe as they were when they arrived in the morning. GAI is committed to a culture of safety. At GAI, project tasks are completed in accordance with all applicable state and federal regulatory requirements including Occupational Health and Safety (OSHA) standards, client-specific health and safety requirements, and GAI policies and procedures. GAI employees are provided health and safety training as needed, particularly OSHA 10-hour and 30-hour construction awareness and/or SafeLand Training. New employees are introduced to GAI Health and Safety policies during the new employee orientation. GAI also provides OSHA 40-hour HAZWOPER training and the eight-hour HAZWOPER refresher classes as needed.



Completing project tasks safely and without injury is an achievable goal for all involved. As such, GAI field staff begins and ends each day with a safety discussion. Field staff wear proper personal protective equipment, including reflective vests, hard hats, safety glasses, and safety footwear. Field teams are provided a site-specific Health and Safety Plan before performing field activities.

Ms. Pamela J. Walaski, CSP, CHMM, is GAI's Director of Health and Safety with over 20 years of experience providing health and safety support. Ms. Walaski specializes in conducting safety and health management system assessments that assist organizations in improving bottom line performance, and assists with policy and procedure development and implementation. Ms. Walaski is skilled in risk management identification, evaluation, and treatment, OSHMS design, implementation and auditing; and training for curriculum development, implementation, and auditing.

Product Quality Assurance

GAI understands the importance of providing our clients with on-time, cost-effective, high-quality professional services. The continued success of our firm is directly related to our ability to continue to meet the cost, quality, and schedule requirements of our projects. We achieve this goal through our experienced professional staff and by utilizing our QMS. GAI's QMS is based upon a continuously improving project delivery strategy that reflects our client's needs and utilizes current technology. The Project Delivery System provides the quality assurance and quality control functions from project inception through project closeout. The Project Delivery System incorporates processes and procedures that describe how professional services are planned, executed, checked, verified, and delivered to our clients. The system is flexible so that it allows GAI to meet the needs of individual clients.

GAI is structured so that personnel whose function includes activities affecting quality have the necessary authority and organization freedom to control quality and especially to do the following: 1) initiate action to prevent occurrence of any nonconformance relating to service, process, and/or QMS; 2) Identify and record any service, process, and/or QMS problems; 3) Initiate, recommend, or provide solutions to those problems; 4) Verify the implementation of those solutions; and 5) Limit or control further processing or delivery of nonconforming services or deliverables until nonconforming conditions have been resolved; and implement corrective action to eliminate the causes of quality problems.

GAI's QMS verifies that activities which affect the quality of services are performed in a controlled manner and are documented to provide evidence of conformance to specified requirements. The Scope of the QMS includes project management, engineering, consulting, analysis, design, testing, construction monitoring, inspection, and purchasing.

Mr. Bradley F. Cellier, PE, is GAI's Director of Quality. He specializes in QMS maintenance and development, and has over 25 years of experience in engineering and quality assurance. He is responsible for overseeing the corporate-wide QMS and Quality Assurance (QA) Programs, including the ongoing implementation, success, development, and verification of compliance with the QMS initiative and GAI's QA Program.



Project Schedule and Cost Control

Project Schedule

GAI understands that the Projects are to be completed by August 2018. GAI's proposed Project Schedule is per the following table:

Activity	Dates	Duration
Notice to Proceed	March 1, 2018	
Kick-Off Meeting with WVDA	Week of March 5, 2018	1 day
Dam Safety Evaluation/Landslide Field Reconnaissance	Week of March 12, 2018	2 days
Dam Safety/Landslide Evaluation Reports	Week of March 19, 2018	1 week
Conference Call with WVDA on Evaluation	March 28, 2018	
Subsurface/Field Investigations	Week of April 2, 2018	2 weeks
Laboratory Testing	Week of April 16, 2018	2 weeks
Analysis and Conceptual Designs	Week of April 16, 2018	5 weeks
Conceptual Submittal to WVDA	May 17, 2018	
Conceptual Meeting with WVDA	May 24, 2018	
Production of Construction Documents/Permit Applications	May 28, 2018	8 weeks
Submittal to WVDA	July 26, 2018	
Meeting with WVDA	August 2, 2018	
Finalize Construction Documents and Permit Applications	Week of August 6, 2018	2 weeks
Finalized Documents to WVDA	August 17, 2018	

Cost Control

Before the start of each new project, the Project Manager must fill out a Project Plan, which includes a Project Description, Scope, Client Team, GAI Team, Contract History, Proposal/Supplement History, a detailed Scope of Work from the GAI Proposal, which details each task, and a Project Schedule with Milestone Dates.

GAI uses Primavera P6 for critical method scheduling and Deltek Vision 7.6 for Cost Reporting. These programs track deliverables and costing and keep the project on time and on budget. Scope and budget must be agreed to prior to the task budget entry in Deltek. The Task Budget creation is the end result of the development and distribution of final scope, fee, budget, and schedule with the Project Team. The Task Budget establishes the base line to monitor and measure project progress and financial performance. Task Budget creation includes: Obtaining external scope, budget, schedule, and fee commitments; and distribution of labor, subconsultant/subcontractor fees, and direct expenses for the purposes of establishing baseline or supplemental task budgets using the Deltek Project Planning Module. The baseline schedule is then updated on a periodic basis, typically weekly or monthly, depending on the pace of the project.

GAI runs a weekly cost report to monitor the actual spend rates compared to the planned spend rates, specifically focusing on man-hours and large purchases. GAI tracks milestones against the project schedule and any variance is noted and discussed with the Client Project Manager. GAI also tracks "Estimate at Completion" and "Estimate to Completion" for projects. GAI implements a change control process that monitors scope and initiates client contact if out-of-scope items are identified or if scope creep begins to occur.



Supplemental Information

WVDNR Signed Forms

Pursuant to the EOI, GAI has provided the following signed forms, attached and incorporated as part of this submission, as **Appendix B**:

- EOI Cover Page
- Designated Contact
- Addendum Acknowledgement Form
- State of West Virginia Purchasing Affidavit

Certificate of Authorization

GAI's Certificate of Authorization to perform Professional Engineering services in the State of West Virginia, is provided in **Appendix C**.

GAI's license number is C00208-00.

Supplemental Services

GAI is a full-service consulting engineering company. In addition to the services we are proposing to provide for the base scope of work, GAI has extensive dam safety, geotechnical, hydrology and hydraulics, structural, civil, and environmental capabilities and experience. In addition, GAI has mechanical and electrical engineering staff that can address issues that arise during construction. Please see **Appendix D** for select GAI Service Briefs for supplemental services that we have to offer for this important Project.

Closing

We look forward to working with the WVDA on these important Projects. Should you have any questions or require additional information regarding our Proposal, please feel free to contact Mr. Charles F. Straley at 681.245.8866, or via email at C.Straley@gaiconsultants.com.

Sincerely,
GAI Consultants, Inc.



Charles F. Straley, MS, PE, PLS
Senior Engineering Manager



Bruce L. Roth, MS, PE
Engineering Director

CFS:BLR/kea

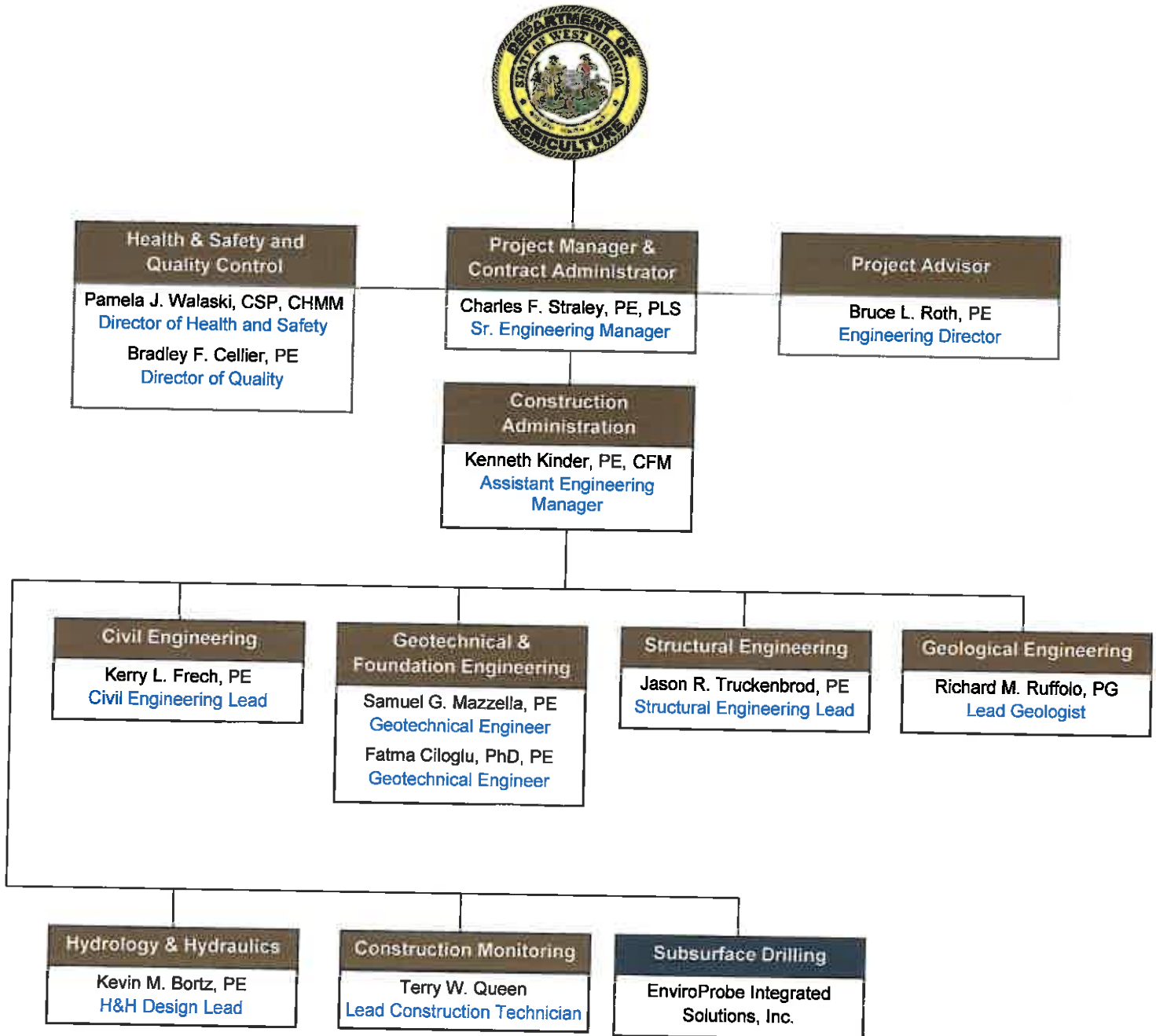
Attachments: Appendix A (Project Organizational Chart and Key Personnel Resumes)
Appendix B (WVDA Signed Forms)
Appendix C (Certificate of Authorization)
Appendix D (GAI Service Briefs)



APPENDIX A
Project Organizational Chart &
Key Personnel Resumes



PROJECT ORGANIZATIONAL CHART





Charles F. Straley, MS, PE, PLS

Senior Engineering Manager

Education

MS, Geotechnical Engineering, 1988,
University of Akron

BS, Civil Engineering, 1986, University of
Akron

Registrations

Professional Engineer (PE): KY, IN, OH,
WV

Professional Licensed Surveyor (PLS):
WV [REDACTED]

Skills

Subsurface Exploration

Foundation & Embankment Design

Slope Stability & Landslide Engineering

Landfill Planning & Design

Water Feasibility Studies

Acid Mine Drainage

Certifications / Training

Leaders to Watch, GAI Consultants, Inc.,
2011

Advanced Project Management Training,
GAI Consultants, Inc., 2009

Troxler Certified

40-hour Health and Safety Training

8-hour Supervisor Health and Safety
Training

Industry Experience

GAI Consultants, Inc., 1988-Present

University of Akron, Private Consulting and
Testing, 1986-1987

R&W Contracting and Excavating, Inc.,
Summers, 1982-1984

Professional Summary

Mr. Straley specializes in civil engineering with an emphasis in geotechnical engineering, including all aspects of subsurface exploration, laboratory testing, foundation and embankment design, slope stability, material and construction specifications, and construction administration, management and monitoring.

Select Professional Experience

- Performed periodic dam inspection and certification for three earthen dams at Blackwater Falls and Cacapon State Parks in WV for the West Virginia Department of Natural Resources (WVDNR), Parks and Recreation.
- Project Manager for the design, construction monitoring, and construction administration for two lake dredging projects for the WVDNR at Tomlinson Run State Park and Kanawha State Forest. Activities included subsurface investigation, regulatory approvals, construction drawings, technical specifications, construction troubleshooting, cost estimating, daily reports, and client interaction.
- Ned's Branch Impoundment Dam, Office of Surface Mine Reclamation and Enforcement (WVDEP), Mingo County, WV. Project Manager. Design of and preparation of construction documents for a 600,000 cubic yard failed coal slurry impoundment dam as an emergency reclamation project. Activities included site grading, subsurface investigation, hydraulics and hydrology analysis, road re-design, mine seals, preparation of drawings and technical specifications, engineering cost estimate and pre-bid meeting presentation.
- Assisted with the preparation of construction documents for an earthen dam for the Lake Chaweva Homeowners Association in Charleston, WV. Project included evaluation of existing drainage structures, stormwater routing analysis, design of earth embankment, and design of a principle and emergency spillway.
- Lead Inspector and Certifying Engineer. This confidential large, slurry impoundment consists of a 215-foot high zoned earth and ash embankment (dam) that creates a lake for slurry disposal of Coal Combustion Residuals (CCRs), located in Century, WV. The dam was progressively built over many years to increase storage to its ultimate design capacity. GAI monitored dam construction and permitted, designed, and monitored construction of an emergency spillway. Development required geotechnical investigations and design modifications due to site geology and the presence of weak, landslide-prone soils.

- Inspected, evaluated and designed repair alternatives for Spruce Island and Sand Run Dams in Tucker County, WV for Timberline Association. Design included evaluation and improvement of slope stability for both earthen embankments, improvements to inlet and outlet works, and the geometry of the spillways. Permit applications for both dams were prepared. Performed the construction administration and certification of the completed repairs.
- Project engineer for the modification of a slurry impoundment to a coal coarse refuse pile located in WV. Project consisted of an abandonment of a dam and extending the life of the pile in accordance with WV Surface Mining Regulations.
- Lake Milton Dam Rehabilitation and Safety Restoration, located in Jackson County, Ohio (OH) for the Ohio Department of Natural Resources (ODNR), Division of Mineral Resource Management. Project Manager responsible for professional engineering services to investigate and design the Lake Milton Reclamation Project, located within the Flint Run Tributary of Little Raccoon Creek Watershed. The project included two large water impoundments, known as Lake Milton and Upper Lake Milton, with the watershed area covering approximately 155 acres. Lake Milton covers 16.7 acres and holds 72 million gallons of water.
- Middleton Run Reclamation Project, located in Jackson County, OH, for the ODNR, Division of Mineral Resource Management. Project Manager responsible for geotechnical engineering and development of remediation measures for the Middleton Run Reclamation Project, an abandoned mine site in Ohio. The 80 acre site was the largest major acid mine drainage contributor degrading the Raccoon Creek Watershed, and contained four acidic strip-pit lakes, an abandoned deep mine, and large areas of toxic mine spoil and mine tailings.
- Confidential Dam Safety Inspections located in Ohio, Indiana, and Kentucky. Lead Geotechnical Engineer performing dam safety inspections and evaluations for compliance with CCR Rules of Impoundment Structures at eight power generations located in Ohio, Kentucky, and Indiana.
- Performed annual dam inspection and certification for a 15-foot high earthen dam in Monroeville, PA for Belmont Ridge Development.
- Performed inspection of galleys of the concrete Lake Lynn Dam in Lake Lynn, PA.
- Evaluated, inspected, and designed the rehabilitation for a concrete hydroelectric dam in Luray, VA. Rehabilitation included the replacement for a fish ladder.
- Confidential Impoundment CCR Inspection, located in Pleasants County, WV. Lead Inspector and Certifying Engineer performing for the annual Impoundment CCR landfill inspections.
- Confidential Generating Station, CCR Surface Impoundment Closures Project. Lead Geotechnical Engineer to obtain subsurface information relative to the design of the CCR surface impoundment closures project. This project included doing Cone Penetrometer Testing (CPT) testing off of a barge, to determine soil properties and site stratigraphy.
- Assisted with a Confidential Slurry Impoundment in Mingo County, WV. Design included grading channels, culverts, and roads.
- Assisted in reevaluated a plug and dike design to optimize construction by minimizing the number, length, and cross-sectional area without compromising structural integrity or limiting storage capacity for a Confidential Client.
- Godby Branch Water Supply Extension Project in Logan County, WV. Managed geotechnical investigation and foundation design for water supply structures. Project included subsurface investigation; surveying; design of water tank, booster station, and approximately 2.5 miles of water line; preparation of technical specifications, drawings, and engineer's cost estimate; and participation in pre-bid and pre-construction meetings. Bid construction cost was approximately \$680,000.
- Project Manager for the South Ruffner Phase I Drainage Project for the City of Charleston, WV. Evaluated storm water flows and identified problem areas. Contract plans and related documents were prepared to upgrade a portion of the drainage area.



Kenneth W. Kinder, PE, CFM
Engineering Manager

Education

BS, Civil Engineering, 2003, West Virginia University Institute of Technology

Registrations

Professional Engineer (PE): WV [REDACTED]

Certified Floodplain Manager (CFM)

Skills

Civil Engineering

CCR Landfill and Impoundment Design

Hydraulic Design and Floodplain Management

Construction Management

Certifications / Training

Troxler Nuclear Density Operator, 2001

MSHA 8-Hour Safety Refresher, 2011

HAZWOPER 40-Hour Safety Training, 2012

HEC-RAS Course, National Highway Institute

Industry Experience

GAI Consultants, Inc., 2014-Present

Potesta & Associates, Inc., 2000-2014

Eagle Surveying, Inc., 1996-2000

Professional Summary

Mr. Kinder specializes in civil engineering design for civil engineering projects including civil site design, erosion and sediment control, stormwater management, hydraulic modeling, floodplain permitting, coal permitting, limestone quarry permitting, and solid waste landfill design.

Mr. Kinder ensures accuracy of work, meets schedule requirements, and maintains excellent client relationships. He develops engineering calculations, prepares project drawings, generates contract documents and specifications, and completes engineering reports. He also has experience with construction oversight and construction management, site inspections, landfill inspections, and levee and dam inspections.

His software skills include AutoCAD, Flowmaster, Culvertmaster, StormCad, PondPack, SedCad, Win TR-55, HEC-HMS, and HEC-RAS.

Select Professional Experience

- City of Petersburg Lunice Creek Levee, Grant County, West Virginia (WV). Project Engineer. Performed services to assist the community with applying to Federal Emergency Management Agency (FEMA) for accreditation of a 4,500 linear feet levee system. The levee system provided flood protection several dozen homes. Tasks included an in-depth inspection of the current levee system to evaluate stability, evidence of erosion and scour, settlement, vegetation, available freeboard, seepage, and interior drainage design.
- Annual Confidential Coal Combustion Residual (CCR) Landfill and Dam Inspections located in WV. Performed annual CCR inspections for three CCR landfills and one CCR impoundment in WV to verify compliance with state and federal regulations.
- Staff Engineer responsible for performing construction oversight and construction management for a Confidential Resource Conservation and Recovery Act 120-acre environmental remediation site. Responsibilities included managing a team of Construction Quality Assurance (CQA)/Construction Quality Control (CQC) observers, tracking construction pay quantities and reviewing monthly invoices, ensuring construction is being performed according to the plans and specs and enforcing implementation of a site specific health and safety plan.

- Engineer responsible for preparing civil site design on numerous projects. Tasks included: preparing erosion and sediment control plans, designing utility systems, site layouts and grading plans, and designing surface drainage including storm sewer systems and stormwater detention and retention ponds. Prepared permit applications for the WV Department of Environmental Protection construction stormwater permits, WV Department of Transportation, Division of Highway MM-109 permits, and floodplain development permits as required.
- Staff Engineer responsible for preparing design and construction documents for municipal solid waste and industrial waste (coal combustion byproduct) landfill cells and caps. Work included developing stormwater control plans, design of leachate collection systems, design of liner systems for leachate collection and leak detection systems. Work also included preparing construction drawings, technical specifications, and an engineer's estimate of probable construction cost.
- Confidential CCR Landfill Design and Permitting, located in WV. Project Engineer. Assisted with the preparation of the design, permitting and construction documents for a 94-acre expansion of a Class F Industrial CCR Landfill Facility. The project included two additional sedimentation ponds and the expansion of a force main leachate pumping station. Design tasks included preparation of permitting documents, preparation of construction drawings for two separate phases of landfill construction, and preparing construction certifications for preparation of subgrade and placement of geosynthetics.
- CCR Surface Impoundment Closures, Confidential Client, Virginia (VA). Assistant Project Manager. Responsible for providing permitting and construction engineering support for the closure of multiple CCR Surface Impoundments. The ponds covered a combined area of more than 100 acres and are being closed by removing the CCR in most of the ponds and consolidating it into a single CCR Surface Impoundment. Developed Closure Plans, Post-Closure Care Plans, Groundwater Monitoring Plans, Construction Drawings, Technical Specifications and CQA Plans for the VA Solid Waste and CCR Rule permitting of the project. Prepared a dam alteration permit application that was approved by the VA Department of Conservation and Recreation to permit the modification of the dams that form the five surface impoundments. The dam alteration permits include design plans, technical specifications, geotechnical and hydrologic and hydraulic calculations required for the closure.
- Bottom Ash Settling Ponds Retrofit, Confidential Client, PA. Assistant Project Manager. Completed conceptual engineering, design and permitting for the power station to replace their existing bottom ash settling ponds for CCR Rule compliance. The ponds consist of three CCR surface impoundments that are approximately one-acre each. The design approach involved sequencing the construction to allow for two ponds to be functional at all times for plant operation. The design includes a PA Department of Environmental Protection (PaDEP) compliant Class 1 liner system and concrete protective cover system designed to facilitate future cleaning operations. The design included new leak detection manholes, new outlet structure with overflow weir troughs, new inlet flow splitter box, and new stainless steel piping to sluice bottom ash from the station's hydrobins. Completed a Water Quality Management Permit Modification that was approved by the PaDEP to modify the ponds. Completed construction drawings and bid documents for construction.
- Staff Engineer responsible for geotechnical work including developing boring layouts, coordinating geotechnical drilling, and using the gathered information to develop grading plans, design rock toe keys as needed for impoundments and valley fills, develop slope stability analyses, and to assist with foundation design for buildings, bridge abutments and retaining walls. Assisted with preparation of geotechnical reports, development of structural contour mapping, and preparation of subsidence control plans for underground mining.
- Staff Engineer responsible for hydraulic analyses and permit application preparation for developments proposed within the FEMA regulatory floodplain. Work included coordinating with community floodplain managers, preparation of HEC-RAS hydraulic analyses, adjusting proposed grading plans or bridge layouts as required to maintain compliance with the National Flood Insurance Program. Prepared elevation certificates and FEMA Letters of Map Amendments



Bruce L. Roth, MS, PE

Engineering Director

Education

MS, Civil and Environmental Engineering,
1991, Cornell University

BS, Geological Engineering, 1985,
University of Arizona

Registrations

Professional Engineer (PE): WV [REDACTED]

PA [REDACTED], NC [REDACTED]

VA [REDACTED], MD [REDACTED]

Skills

Foundation Analysis and Design

Rock and Soil Mechanics

Slope Stability Analysis and Design

Subsurface Exploration and Investigation

Geophysical Investigations

Geosynthetic Engineering and Design

Certifications / Training

Leaders to Watch Program, GAI
Consultants, Inc., 2009

Advanced Project Management Training,
GAI Consultants, Inc., 2009

High Performance Management Training,
GAI Consultants, Inc., 2008

ASFE Fundamentals of Professional
Practice, 2001

Troxler Moisture-Density Gauge Operation

Commonwealth of PA Drilling Inspector
Level 2

Industry Experience

GAI Consultants, Inc., 1990-Present

Cornell University, 1988-1990

Western Technologies, Inc., 1985-1988

Professional Summary

Mr. Roth has over 30 years of geotechnical experience, specializing in foundation and slope stability analysis and design, rock and soil mechanics, subsurface exploration, geophysical investigation techniques, and geosynthetics. He provides geotechnical engineering services for dam and building foundations, coal combustion residuals (CCR) facilities, electrical and gas transmission lines, and the geotechnical aspects of transportation projects. His geotechnical engineering experience for clients in both the public and private sectors includes 20 years of project management experience. He has prepared and presented papers on the Mt. Washington landslide in Pittsburgh, Pennsylvania (PA), a transmission line foundation design project in an environmentally sensitive area, and on foundations for a transmission line crossing at Albermarle Sound in North Carolina (NC).

Mr. Roth specializes in earthquake induced permanent ground deformations and the effects on lifeline facilities. His research work at Cornell University included evaluating earthquake induced ground failure from soil liquefaction and surface faulting, and assessing buried lifeline response to large soil deformation. Mr. Roth studied case histories of the 1971 San Fernando and 1979 Imperial Valley earthquakes. He participated in post-earthquake site investigations in San Francisco and the epicentral area after the 1989 Loma Prieta earthquake.

Select Professional Experience

- Confidential Power Station Impoundment Dam Project, Pleasants County, WV. Disposal site design project for a 250-high sludge disposal impoundment (dam) at the power station. Geotechnical engineer responsible for design and stability analysis for the spillway, including comparing costs between removing and relocating landslide soils and excavating a large rock cut.
- Bradford Dam No. 2 Rehabilitation Project, located in McKean County, Pennsylvania (PA) for the Bradford Water Authority. Project Director. Responsible for the subsurface investigation for the dam, consisting of soil borings, piezometers installation, and Cone Penetrometer and Dilatometer Testing. Selected soil samples were submitted for laboratory analysis. Engineering analyses consisted of stability runs, seepage models, settlement analysis, and bearing capacity. A geotechnical report consisting of background, site descriptions, findings, and recommendations was prepared.

- Bradford Dam No. 3 (Marilla Dam), located in McKean County, PA, for the Bradford Water Authority. Project Director. On the basis of geotechnical, structural, hydrologic and hydraulic evaluations, GAI designed rehabilitation measures that satisfied dam safety standards of the Commonwealth of Pennsylvania. These included an earth buttress with chimney and blanket drains to satisfy embankment stability requirements, and a roller compacted concrete cap and downstream face to provide overtopping protection.
- Tamarack Lake Dam A and Dam B in Crawford County, PA, for the PA Department of General Services (PADGS), Bureau of Engineering and Architecture. Served as the Director of Engineering to the GAI project team. GAI is working with the PADGS and PA Fish and Boat Commission to redesign two high-hazard dams associated with Tamarack Lake, a 1,000-acre flood control lake located near Meadville, PA. In 2014, GAI completed a significant geotechnical investigation that involved a drilling program, lab testing, ground penetrating radar, in-situ testing, stability analyses, and settlement calculations. A hydrologic and hydraulic study of the two dams utilizing HEC-RAS and HEC-HMS for a five-square-mile drainage area was also completed. Multiple permits have been submitted, including PA Department of Environmental Protection (PaDEP) Dam Safety, National Pollutant Discharge Elimination System, USACE, and township stormwater management.
- West Newton Coal Logistics Refuse Embankment Stabilization Project, PaDEP, Westmoreland County, PA. GAI conducted subsurface exploration, including soil drilling and in-situ testing, laboratory testing program, and geotechnical engineering analyses. Embankments included three ponds. Stabilization of the embankments included regrading the embankment slopes; and fill placement over the pond areas. The engineering analyses for the proposed stabilization of the embankments included (a) evaluation of field and laboratory data to estimate soil design properties; (b) slope stability and seepage analyses of the regraded 3H:1V (18.5 degrees from the horizontal) embankment face slope; (c) settlement analyses of pond materials under proposed fill placement; (d) geosynthetic design analyses to enable fill placement upon pond material; (e) wick drain design for the drainage of pore water from the pond material to promote the consolidation and increase in shear strength of the pond material.
- Brookville Water Works Dam in Jefferson County, PA for Brookville Municipal Authority. Dam rehabilitation to repair damages incurred by flood-induced overtopping of the dam. Geotechnical engineer.
- Colver Dam in Cambria County, PA for Inter-Power/AhlCon Partners, LP. Geotechnical and hydrologic investigation projects to design and inspect a 53'-high embankment dam to provide a municipal water supply and cooling water for a cogeneration power plant. Design team senior geotechnical engineer responsible for coordinating laboratory soil tests, stability analysis, settlement calculations, seepage evaluation using finite element analysis, preparing specifications and construction drawings, technical supervision, field observation during the dam construction, and annual dam inspections.
- Warren Ohl Dam in Lock Haven, Clinton County, PA for the City of Lockhaven. Geotechnical engineer for emergency project to repair the 55'-high, 915'-long dam's 600'-long emergency spillway.
- H.B. Norton Dam in Ridgway, Elk County, PA for Hill Engineering, Inc. Stability analyses for a 30'-high earth dam to determine artesian groundwater pressures discovered during geotechnical studies for new water treatment plant facilities below the dam. Geotechnical engineer responsible for evaluating the stability of dam considering the effects of artesian ground water pressures.
- Clark Landfill, Indiana Harbor Works in East Chicago, Indiana for International Steel Group, Indiana Harbor. Landslide repair and closure project to determine the cause of a .5M c.y. landslide in a 130'-high fill slope and to design the repair and closure of the 2M c.y. disposal area for residual wastes. Geotechnical engineer.
- Keystone Station Dam, Two Lick Creek Dam, and Williamsburg Station Dam in PA. Dam inspection project for safety evaluations of the 100'-high earth and rockfill Keystone Station Dam, the 115'-high combination concrete gravity and earth and rockfill Two Lick Creek Dam, and the 27'-high earthfill with concrete gravity spillway Williamsburg Station Dam.



Samuel G. Mazzella, PE
Assistant Engineering Manager

Education

BS, Civil Engineering, 1979, University of Pittsburgh

Graduate Studies, Soil Mechanics and Foundation Engineering, University of Pittsburgh

Registrations

Professional Engineer (PE): PA – 1997

Skills

Transition Monopole Foundation Analysis and Design

Subsurface Exploration and Investigations

Slope Stability Analysis and Design

Retaining Wall Systems Design

Soil Characterization and Field Testing

Dam Inspections

Certifications / Training

Identification and Mitigation of Acid Bearing Rock, PennDOT, April 13, 2011

Hazardous Materials Incident Response Operations, April 1, 2010

Analysis and Design of Foundations on and in Rock, ASCE, Oct. 23, 2010

Westinghouse Training, 2008-2009

Landslide Recognition and Investigation, ASCE, 2009

Earth Retaining Structures, NHI Course No. [REDACTED], 2007

Industry Experience

GAI Consultants, Inc., 1984-Present

Ackenheil & Associates Geo Systems, Inc., 1979-1984

Professional Summary

Mr. Mazzella specializes in geotechnical and foundation engineering with emphasis on construction monitoring and applications for transmission line, bridge, highway, and earthwork projects. He joined GAI in 1984 and has gained professional experience through his work on an extensive variety of geotechnical and civil projects. Mr. Mazzella has over 36 years of geotechnical engineering experience including construction monitoring, site explorations, litigation investigations, analysis, and design recommendations for both public and private projects. In the past years, his experience has expanded to include project management of individual projects or task management of the geotechnical portions of larger multi-disciplined projects for GAI.

Select Professional Experience

- Concrete Gravity Dam Inspection for the City of Thomas, in Thomas, West Virginia (WV). Provided inspection, stability analysis with revised flood level estimates, and engineering cost estimate for repair options.
- Warren H. Ohi Dam, Lock Haven, PA. Developed the engineering technical specifications and plans for the foundation grouting of the embankment and spillway areas.
- Confidential Dam Project located in Monongalia, WV. Remediation of an existing 1,000' long, 125' high concrete gravity type, hydroelectric dam to meet FERC guidelines for the Probable Maximum Flood (PMF) Conditions by designing and installing 75 tendon anchors. Engineer field representative responsible for an 18-strand pre-production bond stress test to evaluate the acceptability of the bond stress used to adjust the planned anchor evaluation criteria and for the design of 75 anchors. Numerous cycled load steps were carried out, and the 24-hour load hold periods developed bond stresses ranging from 20 psi to 250 psi. Field representative during the tendon anchor tension testing for the 75 permanent rock anchors installed at the dam. Testing involved performance and proof creep testing and evaluating the anchors (ranging in design load capacity from 556 to 2040 kips; in number of 0.6-inch-diameter, 7-wire steel cable strands, from 16 to 58; in required bond lengths, from 61' to 131'; and in total length from 110' to 300'), an average length of over 200'.

- Bradford Dam No. 2 in McKean County, Pennsylvania (PA) for Bradford Water Authority. Geotechnical and construction consultation during planning phase for developing repair options. Rehabilitation for the dam included installing roller compacted concrete (RCC) overtopping protection to provide for dam stability under a PMF event. The energy dissipater for the spillway was extended to achieve compliance with its 100-year design flow, and water supply pipes from the reservoir were slip-lined to prevent leakage. Engineering analyses consisted of stability runs, seepage models, settlement analysis, and bearing capacity. A geotechnical report consisting of background, site descriptions, findings, and recommendations was prepared.
- Indian Lake Dam in Somerset County, PA for Indian Lake Borough. Evaluated piezometer, inclinometer and current and historic subsurface information in order to perform a stability analysis on the as-constructed embankment profile.
- H.B. Norton Dam, Ridgeway Water Treatment Plant in Elk County, PA. Developed details for the sand blanket drain. GAI performed a geotechnical exploration for water treatment plant additions in 1987, and discovered unusual artesian waters below the plant and the toe of the adjacent H.B. Norton Dam. Our subsequent geotechnical exploration defined the artesian pressures, installed piezometers in the dam, and analyzed the effects of artesian water pressures on dam stability. GAI recommended and monitored installation of a deep well dewatering system to lower artesian pressures during construction of the treatment plant additions, and testing and installation of rock anchors to prevent flotation of empty tanks.
- Webster Lake Dam Rehabilitation Project, located in Kosciusko County, Indiana, for the Indiana Department of Natural Resources. Provided geotechnical and structural engineering design and construction support services for a multiple spillway rehabilitation at the southwest corner of the Dam. Rehabilitation included repairing or replacing the existing deteriorated concrete and replacing six spillway gates and the existing steel catwalk and gate support structure in the east spillway. In the west spillway, the existing deteriorated concrete was repaired or replaced, and the single spillway gate was replaced.
- Colver Dam, for Inter-Power/AhlCon Partners, LP, in Colver, PA. Engineer responsible for stability analysis and design of an emergency spillway retaining wall structure for expansion of the existing earth dam.
- Confidential Dam Project located in Williamsburg, PA. Feasibility study as a part of the evaluation of the power station. Monitored the subsurface investigation for a concrete gravity dam (coring through the dam and in the reservoir), performed a reservoir sounding survey to develop sediment profiles at various cross-sections, performed stability analysis, and prepared a report for the short or long-term feasibility repairs, including the engineer's cost estimates.
- Morewood Point Retaining Wall System, Pittsburgh, PA. Ground surface settlements behind a series of occupied condominium units led to the discovery of a landslide on a steep, 80-foot high downhill slope on the neighboring property only ten feet behind the condos. While local underpinning of the condos was promptly undertaken, a retaining structure was designed for installation within the ten foot wide corridor entirely upon condominium association property, eliminating the need to access the adjacent property or disturb the landslide. Responsible for performing the subsurface investigation, slope stability analysis and in preparing the retaining wall repair concepts, details and cost estimates.
- West Liberty University Retaining Wall, West Liberty, WV. Performed the analysis and design for the drilled pier foundations as a part of a soldier pile and lagging retaining wall system. The retaining wall system was designed to resist the effects of lateral earth pressures from sloping backfill, surcharge loads and a potential layer of residual decomposed coal with low shear strength.
- Fort Steuben Mall located in Steubenville, OH. Construction and renovation activities spanning 15+ years at a shopping mall requiring extensive geotechnical and structural engineering services to repair problems with expansive shale. Engineer providing landslide site reconnaissance and subsurface exploration (SPT and rock coring); slope stability analysis (Simplified Bishop Method) for pre-slide and remediation of slope geometries; developing repair schemes, an engineer's cost estimate, and construction documents; and providing construction monitoring for the repairs.



Fatma Ciloglu, PhD, PE
Assistant Engineering Manager

Education

PhD, Civil Engineering 2009, Drexel University

MS, Civil Engineering 2004, Middle East Technical University, Ankara, Turkey

BS, Civil Engineering 2002

Registrations

Professional Engineer (PE):
MI [REDACTED]

Skills

Civil Engineering

Geotechnical Engineering and Studies

Earthquake Engineering

Seismic Stability Analysis

Slope Stability Analysis and Design

Foundation Analysis and Design

Mine Tailing Dams

Certifications / Training

Troxler Moisture-Density Gauge Operation Certificate, 2009

Enhanced In-Situ Testing for Geotechnical Analyses & Foundation Design, Georgia Institute of Technology, 2008

HAZMAT Certification, 2009

NEES 2nd Centrifuge Research and Training Workshop, Rensselaer Polytechnic Institute, New York

ASFE Fundamentals of Professional Practice, 2015

Introduction to Project Management Training, GAI Consultants, Inc., 2012

Project Management Optimization, Zweig White Information Services, LLC., 2010

Professional Summary

Dr. Ciloglu specializes in geotechnical earthquake engineering analyses including seismic hazard and seismic response analyses for various earthen and tailing dams, slope stability analysis and finite element seepage analysis for natural slopes earth structures, and design of foundation systems (shallow and deep), slope stabilization, and excavation support systems. Dr. Ciloglu also has an extensive experience in seismic stability analyses, steady-state liquefaction evaluations, and earthquake induced permanent deformation analyses for coal refuse and soil embankments and impoundments.

Select Professional Experience

- Wisecarver Reservoir Dam Rehabilitation and Improvements Project, located in Greene County, Pennsylvania (PA). Remediation of 35-foot high earthfill dam with 260-foot crest to include roller-compacted concrete (RCC) overtopping protection on downstream slope, spillway restoration, and seepage collection. Evaluated spillway walls for proposed load conditions and designed the proposed seepage collection system positioned under the RCC.
- Emsworth Lock and Dam Back Channel Abutment Stabilization, located in Pittsburgh, PA for the U.S. Army Corps of Engineers (USACE), Pittsburgh District. Designed and evaluated stabilization features for abutment walls. Evaluated micropiles, rock anchors, and drilled pipe pile retaining walls to support the abutment walls under loading associated with installation of scour protection. Performance of the proposed abutment combination wall system was evaluated for the resulting lateral force where the rock socket length, spacing, and section of king pile were optimized to provide sufficient lateral load resistance and moment capacity.
- 3-Dimensional Model Development and Evaluations for East Branch Dam, located in Elk County, PA for the USACE, Pittsburgh District. Involved in field investigation including test borings, cone penetration tests, pressure testing in rock, and laboratory tests. Compiled input data of soil and rock strata, water loss zones, and phreatic surfaces through the dam for 3D visualization model of the dam and foundations (EVS-Pro software). Developed seepage and internal erosion remediation plans including foundation grouting, cutoff wall within embankment and foundations, and upstream flexible membrane liner.

- Tamarack Lake Dam A and Dam B in Crawford County, PA, for the PA Department of General Services (PADGS), Bureau of Engineering and Architecture. Served as the Geotechnical Engineer. GAI worked with the PADGS and PA Fish and Boat Commission to redesign two high-hazard dams associated with Tamarack Lake, a 1,000-acre flood control lake located near Meadville, PA. In 2014, GAI completed a significant geotechnical investigation that involved a drilling program, lab testing, ground penetrating radar, in-situ testing, stability analyses, and settlement calculations. A hydrologic and hydraulic study of the two dams utilizing HEC-RAS and HEC-HMS for a five-square-mile drainage area was also completed. Multiple permits have been submitted, including PA Department of Environmental Protection (PaDEP) Dam Safety, National Pollutant Discharge Elimination System, USACE, and township stormwater management.
- West Newton Coal Logistics Refuse Embankment Stabilization Project, PADEP, Westmoreland County, PA. Developed subsurface exploration, including soil drilling and in-situ testing, laboratory testing program, and geotechnical engineering analyses. Embankments included three ponds. Stabilization of the embankments included regrading the embankment slopes; and fill placement over the pond areas. Performed engineering analyses for the proposed stabilization of the embankments included (a) evaluation of field and laboratory data to estimate soil design properties; (b) slope stability and seepage analyses of the regraded 3H:1V (18.5 degrees from the horizontal) embankment face slope; (c) settlement analyses of pond materials under proposed fill placement; (d) geosynthetic design analyses to enable fill placement upon pond material; (e) wick drain design for the drainage of porewater from the pond material to promote the consolidation and increase in shear strength of the pond material.
- Cumberland Mine CRDA No. 2 Expansion Geotechnical Design, Green County, PA. Performed seismic hazard assessment and triggering analyses to evaluate if design earthquake would trigger strength loss in tailing dam material, fine coal refuse material. Seismic hazard study was performed in accordance with the Engineering Design Manual for Coal Refuse Disposal Facilities. Design earthquake parameters were estimated based on USGS seismic hazard maps and earthquake probability maps. The susceptibility of fine coal refuse material strength loss during the design earthquake was evaluated performing pore-pressure based method and one-dimensional dynamic response analysis by SHAKE2000 software.
- Coal Refuse Disposal Area (CRDA) No. 5, located in Greene County, PA. Performed finite element slope stability analysis, seepage analysis, and internal drain design for new tailing impoundment (dam). Involved in evaluations of a flexible membrane liner (FML or geomembrane) system beneath the proposed dams/embankments at proposed facilities (slurry impoundment and impounding embankment/dam). Conducted a parametric study of interface shear strengths and corresponding slope stability factors of safety for various cross sections through the CRDA No. 5 main embankment under different stages and conditions.
- Conducted a technical review of "Seismic Design: Stability and Deformation Analyses" of the U.S. Mine Safety and Health Administration, Engineering and Design Manual for design and construction of earth embankment dams and coal refuse impoundments.
- Participated in technical report preparation for a cutoff wall design evaluation of the Mosul Dam in Iraq, and proposed technical recommendations for seismic loading considerations to assess the potential for structural damage affecting the long-term hydraulic integrity of the cutoff wall.
- Completed a research study to investigate the roles of surface topography and subsurface conditions in seismic performance of natural slopes and earth structures by physical and numerical modeling methods. Performed physical model simulations of seismic performance of saturated cohesive slope models with a shaking table, and conducted numerical simulations of the dynamic response of cohesive embankments with finite difference software FLAC.
- Coal Refuse Facility Expansion Project, Justice, West Virginia. Developed field investigation and laboratory testing programs and evaluated PSCPT data from in-situ field testing, and laboratory testing data to estimate strength properties. Performed undrained strength analysis which is based on steady-state theory, staged upstream construction stability, and estimate an acceptable construction loading rate.



Jason R. Truckenbrod, PE
Senior Engineering Manager

Education

BS, Civil Engineering, University of Buffalo

Registrations

Professional Engineer (PE): PA, OH, WV,
VA, IN, MD

Skills

Structural Engineering Design and Analysis

Foundation Engineering Analysis and
Design

Certifications / Training

GAI Advanced Project Management
Training, 2011

ASFE Project Manager Training: 2004,
2005, 2006

PennDOT CMTW Construction
Management Training, February 2003

Industry Experience

GAI Consultants, Inc., 2010-Present

Civil & Environmental Consultants, Inc.,
2004-2010

M.A. Beech Corporation/Beech
Construction, 2002-2004

Eichleay Engineers, Inc., 1995-2002

Tredo Engineers, 1992-1995

Publications

"Winfall to Trowbridge Transmission Line
Foundation Design" ASCE-SEI Electric
Transmission and Substation Structures
Conference Proceedings, 2015

Professional Summary

Mr. Truckenbrod specializes in project management and design for industrial, commercial, and electric and gas utility projects. Mr. Truckenbrod manages multi-disciplined design-engineering projects and supervises a staff of structural engineers and drafting personnel. He is focused on client satisfaction, financial management and technically sound design. His experience includes the complete structural design of complex projects, from the selection of structural systems and definition of design criteria to the preparation of detailed calculations, specifications, and construction drawings. Additional experience includes structural assessments, forensic evaluations, building demolitions, bridge and highway projects, and construction administration. He has a working knowledge of the latest design manuals for steel, concrete, masonry, and timber, as well as the International Building Code.

Select Professional Experience

- Confidential Dam Spillway Condition Assessment, located in West Virginia (WV). Engineer responsible for the condition assessment of an existing concrete tower spillway at the existing impoundment within the power plant. The assessment included a camera survey for the 300-foot long spillway pipe as well as an under-water survey of the exterior of the spillway tower. The interior of the tower was inspected by lowering a camera down the inside of the tower. Prepared a condition assessment report which was submitted by the Owner to the WV Department of Environmental Protection.
- Cross-Creek Dam Sluice Gate Replacement, Washington County, Pennsylvania (PA). Engineer responsible for the design and specification for a new sluice gate to replace the existing gate. The project included removal of the existing sluice gate, inspection of the thimble and installation of the new gate. A new valve stem was also installed.
- Tamarack Lake Dam, Pennsylvania Department of Environmental Protection (PaDEP), Meadville, PA. Engineer responsible for the design of two new concrete spillway structures at the existing lake. The new spillways were designed to replace the existing deteriorated spillways and included two cast-in-place concrete spillway towers and steel framed pedestrian bridges, as well as pre-cast concrete spillway pipes.

- Deep Creek Dam Intake Structure Assessment, located in Maryland (MD). Project Manager and Engineer responsible for the structural assessment of the existing intake structure at the Deep Creek Dam. The results from the visual assessment were documented in an assessment report, which included photographs and a summary of the observed distress.
- Bradford Dam No. 2 Rehabilitation, Bradford Water Authority, Bradford, PA. Project Engineer responsible for the assessment and rehabilitation design of the structural components of the existing earthen dam. Items included in the structural rehabilitation included the reinforced concrete gatehouse, steel beam pedestrian bridge from the embankment to the gatehouse, and the concrete spillway. The spillway modifications included additional reinforced concrete retaining walls and 2,000 sf of new spillway slab to extend the existing spillway.
- Webster Lake Dam, Indiana Department of Natural Resources, Kokosciusko County, Indiana. Engineer responsible for the design of a new spillway to replace the existing primary spillway, and also for the rehabilitation of the secondary spillway at the outfall of Webster Lake. The primary spillway design included six sluice gates, which were mounted to a steel-framed pedestrian bridge, which spanned across the spillway. Rehabilitation included concrete spall repairs and replacement of the sluice gate at the secondary spillway.
- Outlet Riser Structure for Ash Filter Pond, Shelocta, PA. Engineering Manager responsible for the design of three new riser structures comprised of reinforced concrete walls, slabs, and shallow mat foundations. The outlet structures are tied into the HDPE pond liners and 18-inch diameter HDPE outlet pipes.
- Cresson Acid Mine Drainage Treatment Project, PaDEP, Bureau of Abandoned Mine Reclamation, Cambria County, PA. Senior Engineering Manager responsible for the design of the water containment structures, the plant Control Building, support framing for the pipes and open troughs that convey water and chemicals throughout the plant, support framing for the elevated access platform, and mat foundations for the pumps, pre-fabricated storage tanks and a silo.
- Riverwall Removal and Replacement Project, located in Springdale, PA. Project Manager and Engineer for the rehabilitation design of the existing riverwall that was damaged due to a water main break. The existing steel sheet pile riverwall was evaluated and found to be in need of replacement. The new riverwall design included a cantilevered steel sheet pile wall design in accordance with the U.S. Steel Company Sheet Pile Wall Design Guide. The design also included flowable concrete fill, concrete retaining walls and new structural steel to repair the damaged walkway which was attached to the riverwall.
- Gypsum Pond Sump Design Project, located in New Florence, PA. Project Engineer responsible for the design of a 25,000 square foot concrete sump for the collection and treatment of stormwater runoff. The design included the reinforced concrete slab and walls as well as rack anchors attached to the base slab designed to resist hydrostatic uplift forces from groundwater.
- Fish Hatchery Building Foundations, Castalia Trout Club, Castalia, Ohio (OH). Project Manager and Engineer responsible for the hydraulic design of a gravity fed fish hatchery, and the structural design of the hatchery building foundations. The fish hatchery is fed from a natural aquifer, known as a "Blue Hole" within the Castalia Trout Club property. The project scope included a site topographic survey, existing bridge condition assessment, preparation of hydraulic profile for the hatchery system, and structural design of the building foundations and concrete raceways for the hatchery building.
- Confidential Power Generating Station, located in Prince George's, MD. Project Manager and engineer responsible for the design for building foundations for new 3,000 sf, one-story, wastewater treatment building. Foundations consisted of drilled piers, grade-beams and a structural floor slab, which supported the building columns and process equipment. Project also included preparation of life-safety code analysis for permitting.
- Southside Slopes, Pittsburgh, PA. Project Manager responsible for the design of cantilevered grade beam on concrete drilled pier foundations for townhouses.



Kerry L. Frech, MEng, PE
Civil Technical Leader

Education

MEng, Environmental Engineering, 1978,
Cornell University

BS, Civil Engineering, 1977,
Cornell University

Registrations

Professional Engineer (PE): PA - 1983,
██████████ WV ██████████

Skills

Hydrology and Hydraulics

Stormwater Management

Water Quality Analyses

Industry Experience

GAI Consultants, 1978-Present

Professional Summary

Mr. Frech specializes in applying hydrologic and hydraulic principles to the development of water and land related resources. He has prepared numerous state and federal permit applications for public and governmental entities and for private industry. His project experience ranges from planning and feasibility-level studies to design and the preparation of construction documents. His experience with hydrologic and hydraulic modeling includes HEC-RAS, HEC-HMS, HEC 1, HEC 2, DAMBRK, PSRM, SCS TR 20 and TR 55, RIVER2, WSPRO, and the Water Resources Council's Bulletin 17B.

Select Professional Experience

- Confidential Dam Analysis and Safety Evaluation, located in Monongalia County, West Virginia (WV). Dam analysis project to perform downstream routing procedures using HEC-1 and DAMBRK models. Project engineer responsible for hydrologic and hydraulic analyses and inundation studies performed as part of the Federal Energy Regulatory Commission (FERC) safety evaluations. Preparation of technical analyses and inundation mapping for the emergency action plan. Calibration of hydrologic and hydraulic analyses based on the November 1985 flood.
- Confidential Power Station Dam Assessment Project, located in Moundsville, WV. Assessment of the effects of future normal pool lowering of the river by more than three feet on existing water intake and discharge facilities. Project engineer responsible for preparing an Emergency Action Plan for the 55-foot high, 16.7 acre-foot dam.
- Petersburg Community on the South Branch of the Potomac River in Grant County, Petersburg, WV for the USACE, Baltimore District. Reconnaissance study project requiring engineering analysis for flood protection for local community that incurred \$18M in damages in a 400-year flood event.
- Tamarack Lake Dam A and Dam B in Crawford County, PA for the PA Department of General Services (PA Fish and Boat Commission). Principal Engineer for H&H analyses and design for replacement of Tamarack Lake Dams A and B. Responsibilities included dam safety storm classification, flood analyses, spillway re-designs, design of dam overtopping protection using articulated concrete block, and preparation of design drawings for both dams.

- Moorefield Community on the Potomac River in Moorefield, WV for the United States Army Corps of Engineers (USACE), Baltimore District. Reconnaissance studies at the confluence of the South Branch and the South Fork of the South Branch of the Potomac River for a community that incurred \$23M in damages in a 400-year flood. Project engineer responsible for reconnaissance and feasibility level flood protection studies including field reconnaissance, survey, two-river system HEC 2 modeling, interior drainage, cost estimates, and reports. Development of an economically feasible and implementable flood protection plan.
- Colver Dam in Cambria County, PA for Inter-Power/AhlCon Partners, LP and Cambria Township Water Authority. Hydrologic investigations to modify and design a 53-foot high embankment dam for a municipal water supply and cooling water for a cogeneration power plant. Technical and economic issues indicated replacement would be more effective than enlarging and rehabilitating the existing structure. Project engineer assisting with water yield analyses and H&H designs for proposed water supply reservoir to serve municipal and industrial water supplies for the Water Authority.
- Emergency Action Plans for Confidential Dam Projects, located in PA. Project engineer for preparation of the technical analyses and inundation mapping for the emergency action plan, under FERC criteria.
- Confidential Dam Emergency Action Plan, located in Armstrong County, PA. Project engineer assisting in the preparation of the Emergency Action Plan for the dam. Responsibilities included overview of field reconnaissance and technical analyses, including DAMBRK.
- Confidential Dam Safety Inspections and Analysis, located in Beaver County, PA. Principal Engineer responsible for performing the dam safety annual dam inspection and the technical analyses for the Emergency Action Plan for a 410-foot high coal combustion residual impoundment dam.
- Confidential Reservoir Emergency Action Plan, located in Homer City, PA. Project engineer responsible for preparing the Emergency Action Plan for this 90-foot high 16,200 acre-foot water supply reservoir.
- PA Game Commission. Project engineer for providing design analyses for rehabilitation of several Commission dams.
- Confidential Power Station Reservoir Management Plan Project, located in Pleasants County. Disposal site design for a 250-foot high sludge disposal impoundment (dam) at the power station, including an Emergency Action Plan. Project Engineer responsible for developing a reservoir management plan for the 300-acre residual waste impoundment. The plan included design of a siphon discharge system, and modifications to the principal spillway and to the operation of the emergency spillway. Responsible for emergency action plan technical analyses and inundation studies to satisfy state requirements for a solid waste (wet) disposal facility. Project engineer for landfill expansions, including extension of the reservoir spillway pipe and design of pump station for landfill discharges to the station's treatment plant.
- Pine Creek Flood Area in Etna Borough, Allegheny County, PA for the Allegheny County Department of Economic Development. Flood stage control project along Pine Creek requiring engineering, final design, and construction monitoring services. Included PA Department of Environmental Protection (PaDEP) study review, field reconnaissance, sediment sampling/analysis, environmental assessment, wetlands identification and delineation, endangered species survey, aquatic habitat assessment, survey and mapping, utility coordination with the Borough of Etna, bridge structural assessments, hydraulic analyses, plan formulation and assessment (dredging, levees, channel improvements, debris boom, interior drainage), environmental permitting, plans and specifications.
- Fishing Creek Restoration and Maude Mine Reclamation Project, for the South Fayette Conservation Group and PaDEP, Bureau of Abandoned Mine Reclamation. Project engineer for design and preparation of construction documents for the reclamation of a mining site. The site included several highwalls, a stream channel that discharged to an open mine portal, and abandoned coal processing structures. Restoration included diversion and restoration of stream channels, mine portal sealing, highwall elimination, and general site cleanup, drainage improvements, and restoration. The project was awarded the 2008 Appalachian Region AMR award.



Kevin M. Bortz, MS, PE
Assistant Engineering Manager

Education

MS, Civil Engineering, 1989,
University of Pittsburgh

BS, Civil Engineering, 1987,
University of Pittsburgh

Registrations

Professional Engineer (PE):
PA -1995 [REDACTED]

Skills

Hydrology and Hydraulics

Stream Restoration

E&S Control

Stormwater Management

Certifications / Training

Certified Open Water Scuba Diver, PADI

Countermeasure Design for Bridge Scour
and Stream Instability Training Course,
National Highway Institute

4-week training course on Natural Stream
Restoration, WV University / WV Dept. of
Transportation

HEC-RAS Continuing Education Training

PA Stormwater Best Management
Practices Manual, PADEP, 2006

PA's New Chapter 102 E&S Control
Regulations, PADEP, 2010

Industry Experience

GAI Consultants, Inc., 1989-Present

Professional Summary

Mr. Bortz specializes in hydrology and hydraulics, natural stream restoration, erosion and sedimentation (E&S) control, and stormwater management, as well as general civil engineering and surveying. He provides hydrologic and hydraulic (H&H) design and analysis for natural stream restorations, culverts, channels, ponds, dams, stream encroachments, and impoundments in Pennsylvania (PA), West Virginia (WV), Maryland (MD), Ohio (OH), Indiana (IN), and Virginia (VA). Mr. Bortz has extensive experience with hydrologic/hydraulic computer models including: HEC-RAS, HEC-HMS, Storm CAD, EPA SWMM, DAMBRK, PSRM, SCS TR-20, SCS TR-55, HEC-1, HEC-2, CYBERNET, and WSPRO.

Select Professional Experience

- Leetown Science Center Impoundment Conceptual Design, located in Jefferson County, WV for the United States Geological Survey (USGS). Project Engineer responsible for the conceptual design and cost estimate of a low-level impoundment to improve hydraulic conditions at a fishery research facility. The impoundment was to be used as a replacement for beaver impoundments that had improved ground water supplies at the facility.
- Confidential Dam Project, located in Wise County, VA. Project Engineer responsible for design and permit application process for two dams to be used at an energy facility. Project Engineer responsible for the preparation of an Operations Certificate Application and an Emergency Action Plan for the Stage 1 Leachate Pond and the Final Leachate Pond at the facility.
- Dam Permit Application for a Confidential CCB Landfill Site in Shinnston, WV. Project engineer responsible for complete H&H design, analysis, and report preparation as part of a successful dam permit application process for expansion of the site Sediment Pond.
- Confidential Power Station Reservoir in PA. Project Engineer for preparation of a Drought Management Plan for the Keystone Reservoir, including oversight of reservoir operations computer simulations and drought management plan modeling.
- Confidential Dam Project in Clarion County, PA. Dam-break analysis and inundation mapping using the National Weather Service's DAMBRK computer model for a hydroelectric project.

- Brookville Water Works Dam in Jefferson County, PA for the Brookville Municipal Authority. Dam rehabilitation project to repair damages incurred by flood-induced overtopping of the dam, including environmental permitting, breach analyses, flood wave propagation, inundation mapping, and an emergency action plan. Project engineer responsible for H&H analyses, preparing inundation mapping, and successful completion of a dam permit application.
- Confidential Dam Project located in Beaver County, PA. Dam project to modify the outlet works for a 420-foot high earth and rockfill embankment dam designed to impound CCR waste. Project engineer responsible for complete design and construction package preparation for secondary service spillway installation at the existing dam and modifications to the discharge lines and emergency spillway. Also responsible for inundation studies associated with failure of the Saddle Dam Embankment located along the perimeter of the dam's reservoir. Project engineer responsible for dam permit application to modify operating conditions at the dam for purposes of impoundment closure.
- Bradford Dams 2 and 3 Evaluation and Remediation Projects, located in Bradford, PA for the Bradford City Water Authority. Project engineer responsible for obtaining the necessary permits for maintenance dredging at Bradford Dam No. 3. Project engineer responsible for preparation of an H&H design package required for rehabilitation work for Bradford Dam No. 2.
- Colver Dam Expansion for the Colver Power Plant in Colver, PA for Inter-Power/AhiCon Partners, LP. Project engineer responsible for hydraulic layout and design of the reservoir intake tower and water distribution system, and hydraulic analysis and modeling of the reservoir for successful application for a water allocation permit. Flows simulation was accomplished using extensive historical records and reservoir operation modeling including inflows, conservation releases, consumptive uses, and losses such as seepage and evaporation. Allowable reservoir yield was also determined.
- Confidential Power Station, located in Chesterfield County, VA. Task manager and project engineer responsible for preparation of a construction package and permit package to close a coal combustion residuals (CCR) Impoundment (dam) under the requirements of the Environmental Protection Agency's CCR Rule.
- Confidential Power Station, located in Wayne County, IN. Task manager and project engineer responsible for development of conceptual closure plans for a CCR impoundment dam.
- Mine Water Use Study in the Susquehanna River Basin for the PA Department of Environmental Protection (PADEP) to study mine water use in the Susquehanna River Basin. Responsible for installing and monitoring a continuous flow metering system and determining base flow discharge from the mine, average discharge from the mine, and available water volume to use for supplemental flow. The final report was titled Susquehanna River Basin Low Flow Mine Storage and Treatment Project Evaluation.
- Saw Mill Run in Pittsburgh, PA for the City of Pittsburgh, Department of Planning. Flood mitigation project to review, analyze, assess and summarize hydrologic conditions and associated flooding along Saw Mill Run. Project engineer responsible for documenting previous flood studies, summarizing the state of the practice in flood mitigation and prevention, providing recommendations for the City of Pittsburgh, and producing a comprehensive study report.
- Flood Stage Reduction Project to alleviate flooding along Pine Creek for the Allegheny County Department of Economic Development, in the Borough of Etna. Project Engineer responsible for hydraulic modeling, assessment of inundated areas, flood damage estimates, cost estimates for construction of flood alleviation projects, and preparation of cost-benefit ratios.
- Confidential Stream Restoration Project, located in Potter County, PA. Project Engineer responsible for a Rosgen natural stream restoration design and construction package preparation for a stream restoration project. Total restoration length is 270 feet.
- Confidential Erosion and Sedimentation Control Project, located in Harrison County, WV. Project engineer responsible for preparing an E&S Control Plan for an engineered rock fill.



Richard M. Ruffolo, MS, PG

Assistant Geological Manager

Education

MS, Geology, 2005, Kent State University

BS, Environmental Geology, 2001,
University of Pittsburgh

Registrations

Professional Geologist (PG):

PA [REDACTED], KY [REDACTED], NC [REDACTED]

Skills

Subsurface Exploration and Investigations

Landslide Investigation and Remediation

Foundation and Slope Stability Analysis
and Design

Certifications / Training

Advanced Project Management Training,
GAI Consultants, Inc., 2009

ASFE Fundamentals of Professional
Practice, 2005

Industry Experience

GAI Consultants, Inc., 2002-Present

Pennsylvania Department of
Transportation, 2000-2001 (Summer
internship)

U.S. Marine Corps, 1993-1997, Sergeant,
Honorable Discharge

Professional Summary

Mr. Ruffolo specializes in site characterization, subsurface investigations for foundations, landslides, and mine subsidence; analysis of slope stability; foundation design; and geotechnical report writing.

Select Professional Experience

- Tamarack Lake Dam A and Dam B in Crawford County, Pennsylvania (PA) for the PA Department of General Services (PADGS), Bureau of Engineering and Architecture. Assistant Geological Manager. GAI is working with the PADGS and PA Fish and Boat Commission to redesign two high-hazard dams associated with Tamarack Lake, a 1,000-acre flood control lake located near Meadville, PA. In 2014, GAI completed a significant geotechnical investigation that involved a drilling program, lab testing, ground penetrating radar, in-situ testing, stability analyses, and settlement calculations. A hydrologic and hydraulic study of the two dams utilizing HEC-RAS and HEC-HMS for a five-square-mile drainage area was also completed.
- Bradford Dam No. 2 in McKean County, PA for Bradford Water Authority. Assistant Geological Manager. The Bradford Water Authority requested that GAI evaluate the stability of the existing Dam No. 2 and design rehabilitation measures to upgrade the dam to currently accepted standards of the Commonwealth of PA. GAI conducted a subsurface investigation consisting of soil borings, piezometers installation, and Cone Penetrometer and Dilatometer Testing. Selected soil samples were submitted for laboratory analysis. Engineering analyses consisted of stability runs, seepage models, settlement analysis, and bearing capacity. A geotechnical report consisting of background, site descriptions, findings, and recommendations was prepared.
- Colver Dam and Reservoir Design and Inspection Project, located in Cambria County, PA for Cambria Township Water Authority. Assistant Geological Manager. Provided oversight of the design of the 53-foot high embankment dam and appurtenances, performing all geotechnical, structural, hydrologic, and hydraulic design; prepared associated permit application documents; prepared the Emergency Action Plan; provided Construction Management services; and monitored construction. The project was to provide a municipal water supply and cooling water for a cogeneration power plant.

- Indian Lake Dam in Somerset County, PA for Indian Lake Borough. Geological Specialist. GAI assessed the condition of Indian Lake Dam and to develop subsurface and soil testing investigations. The acquired information and technical data was used to rehabilitate and update the 45-year old facility. Maintenance work included a new Outlet Works pipe; a downstream embankment buttress to control seepage and improve stability; and an enlarged emergency spillway discharge capacity to comply with new regulatory standards.
- Bradford Dam No. 3 (Marilla Dam), located in McKean County, PA for the Bradford Water Authority. Assistant Geological Manager. On the basis of geotechnical, structural, hydrologic and hydraulic evaluations, GAI designed rehabilitation measures that satisfied dam safety standards of the Commonwealth of Pennsylvania. These included an earth buttress with chimney and blanket drains to satisfy embankment stability requirements, and a roller compacted concrete cap and downstream face to provide overtopping protection.
- H.B. Norton Dam, Ridgeway Water Treatment Plant in Elk County, PA for Hill Engineering, Inc. Geologist. GAI performed a geotechnical exploration for water treatment plant additions in 1987, and discovered unusual artesian waters below the plant and the toe of the adjacent H.B. Norton Dam. Our subsequent geotechnical exploration defined the artesian pressures, installed piezometers in the dam, and analyzed the effects of artesian water pressures on dam stability. GAI recommended and monitored installation of a deep well dewatering system to lower artesian pressures during construction of the treatment plant additions, and testing and installation of rock anchors to prevent flotation of empty tanks.
- Warren Ohi Dam, located in Clinton County, PA, for the City of Lockhaven. Senior Geologist for the development and engineering technical specifications and plans for the foundation grouting of the embankment and spillway areas.
- Romney Bridge (US 50) Replacement over the Potomac River in Hampshire County, WV for the West Virginia Department of Transportation, Division of Highways (WVDOH). Responsible for subsurface investigations and a geotechnical report for the replacement.
- Gateway Connector at East Marion County Park in Fairmont for the WVDOH. Impact assessment project to address impacts to the park resulting from construction of the 1-mile expressway from Interstate 79 to the City of Fairmont, completed in 2003. Assisted with subsurface investigation.
- Landslide stabilization project at a Confidential Power Plant located in WV. The 300'-wide and 500'-long landslide affected the power station's ash disposal area haul road. Monitored drilling and auger cast pile column installation.
- Dolph Refuse/Abandon Mine Fire, Lackawanna County, PA. Responsibilities included abandon mine fire characterization, developing a fire monitoring program, and to develop fire controlling recommendations for abandoned anthracite coal refuse/mine fire. Tasks included: site characterization, subsurface exploration, geologic mapping, aerial photograph interpretation, mine map research and interpretation, installation and data analysis of down hole temperature recorders, development of fire monitoring program and database, established limits of possible fire migration, report preparation.
- Ninevah Mine in Seward, PA, for the CTC Foundation in Washington, D.C. to evaluate the possibility of injecting alkaline coal ash into the 537-acre Valley No. 2 Mine to mitigate acid mine drainage polluting the Conemaugh River and Big Spring Run. Assisted with subsurface investigation and monitored drilling to identify abandoned deep coal mine conditions for acid mine pollution abatement project.
- Confidential Texas Wind Farms. Foundation investigations for 212'-tall towers supported on 14' diameter, 18'-deep concrete foundations experiencing excessive movement. Responsible for site characterization, subsurface boring and sampling, a rock strength study, drilling and micropile installation monitoring, and foundation construction monitoring.



Terry W. Queen
Lead Construction Technician

Education

Drafting and Design, 1992, West Virginia Institute of Technology

Math & Physical Education, 1986, West Virginia Northern Community College

Skills

Construction Monitoring

Civil Engineering

Subsurface Sampling and Testing

Certifications / Training

Troxler Nuclear Densometer Certified

ACI Certified

WVDOH Portland Cement Concrete Inspector

40-Hour HAZWOPER Health and Safety Training

10-Hour OSHA Construction Safety Trained

OSHA 30-Hour Hazard Recognition Training

Certified CQA Geosynthetic Materials and Compacted Clay Liner Inspector

Virginia Responsible Land Disturber Trained

WVDOH Compaction Inspector

Industry Experience

GAI Consultants, Inc., 1995-Present

Ultrasonic Specialists, Inc., 1994-1995

Dan Hill Construction Company, 1989-1992

D.E. Leonard & Associates, 1987-1988

WACO, 1986-1987

W&W Fabrication, 1984-1985

Professional Summary

Mr. Queen specializes in construction monitoring for impoundment, site closure, infrastructure, and municipal projects. He provides drafting for site planning, earthwork detailing, and pre-mining and pre-blast surveys. Mr. Queen develops preliminary and final designs for mine reclamation sites and mining permits, and site development, and prepares construction drawings for highway and bridge projects. He compiles engineering data from a variety of sources; processes data using well-defined methods and presents data in prescribed formats.

Select Professional Experience

Tomlinson Run State Park and Kanawha State Forest Projects for the West Virginia Department of Natural Resources (WVDNR). Performed construction monitoring for two lake dredging projects, located in West Virginia (WV). Activities included subsurface investigation, regulatory approvals, construction drawings, technical specifications, construction troubleshooting, cost estimating, daily reports, and client interaction.

- Confidential Dam Geotechnical Investigation and Foundation Exploration, located in Gauley Bridge, WV. Duties include monitoring of drilling activities, daily bore logs, concrete core and rock core sampling.
- Monitored construction of 600,000 cubic yard rock buttress for a failed coal slurry impoundment dam. Work included monitoring of activities, troubleshooting, preparing daily logs and construction administration coordination for the West Virginia Department of Environmental Protection (WVDEP).
- Geotechnical investigation for Freshwater Impoundment Dams in Columbiana and Carroll Counties, Ohio. Duties include monitoring of drilling activities and daily bore logs, soil sampling, and rock core sampling.
- Lead construction monitor inspector for a Confidential Client located in Marshall and Wetzel Counties, WV. Work included monitoring slope stabilization for failed well pads located in Marshall and Wetzel Counties, WV. Monitored erosion and sediment control best management practices associated with development of well pads. Monitored Blake Fork stream restoration.

- Construction Monitoring for Shotcrete Soil/Rock Nail South Wall and North Wall Complex at a Confidential Power Plant Flue-Gas Desulfurization (FGD) Landfill. The construction monitoring of the North Pond Complex. Project included two soil nail shotcrete wall up to 70 feet in height, sedimentation pond, leachate holding basin, leachate and electrical pipeline and conduit to connect to the South Pond Complex, and installation of a 72-inch diameter clean water diversion culvert.
- Monitored construction of municipal storm sewer project. Work included monitoring activities, troubleshooting, preparing daily logs and construction administration coordination for the Town of Gauley Bridge, WV.
- Monitored construction of approximately 30 miles of waterline. Work included monitoring installation activities, troubleshooting, preparing daily logs and approving pay item quantities for West Virginia-American Water Company.
- Construction monitoring for closure of municipal solid waste landfills. Work included monitoring construction activities, preparing daily reports and trouble shooting in Fayette, Kanawha, Mingo, and Braxton Counties, WV for the WVDEP, Office of Waste Management. Closure activities included waste regrading, leachate collection and soil caps.
- Construction monitoring for closure of the municipal solid waste Berkeley County Landfill in Berkeley County, WV. Closure activities included regrading waste, intermediate cover, gas management, leachate collection and 125,000 square yards of HDPE geomembrane. Construction was completed over a two-year construction period.
- Construction monitoring for closure of the municipal solid waste Mingo County Landfill in Mingo County, WV. Closure activities included re-grading waste, intermediate cover, gas management, leachate collection, and 41,500 square yards of HDPE geomembrane.
- Construction monitoring for cell expansion of a municipal solid waste and C&D landfill at S&S Landfill in Harrison County, WV. Construction included earthwork, leachate detection and collection, clay liner, and geomembrane liners.
- Construction oversight for a landslide reclamation project of a valley fill in Fayette County, WV. Construction included collecting drainage in rock drains, rock buttress, earthwork, and drainage channels.
- Monitored construction of approximately 13 miles of waterline. Work included monitoring installation activities, troubleshooting, preparing daily logs and approval of pay item quantities for the Shortline Public Service District.
- Construction monitoring for closure of municipal solid waste landfill, located in Kanawha County, WV. Closure consisted of West Virginia Subtitle "D" Closure Cap with leachate collection system. Monitoring included construction activities, preparation of daily reports, troubleshooting, approval of pay item quantities, and construction administration coordination for the WVDEP, Office of Waste Management.
- Fayette County Landfill. Construction monitoring for closure of municipal solid waste landfill. Closure consisted of West Virginia Subtitle "D" Closure Cap with leachate collection system. Monitoring included construction activities, preparation of daily activity logs, troubleshooting, approval of pay item quantities, and construction administration coordination for the WVDEP, Office of Waste Management.
- Lead construction monitor inspector for Chesapeake Energy. Work included monitoring slope stabilization for failed well pads located in Marshall and Wetzel counties, WV. Monitored erosion and sediment control best management practices associated with development of well pads. Monitored Blake Fork stream restoration.
- Mill Creek Regional Water Supply Extension Project, Logan County, WV. Prepared construction documents for the project. Project included design of water treatment plant, two water tanks, three booster stations, two master meter assemblies, and approximately 34 miles of waterline; and preparation of drawings. Drawings included 51 plan drawings using aerial photography as base mapping.

APPENDIX B WVDA Signed Forms





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

State of West Virginia
 Centralized Expression of Interest
 02 - Architect/Engr

Proc Folder: 405455

Doc Description: Addendum 01, WV Department of Agriculture

Proc Type: Central Contract - Fixed Amt

Date Issued	Solicitation Closes	Solicitation No	Version
2018-01-22	2018-02-01 13:30:00	CEOI 1400 AGR1800000001	2

BID CLERK

DEPARTMENT OF ADMINISTRATION

PURCHASING DIVISION

2019 WASHINGTON ST E

CHARLESTON

WV 25305

US

Vendor Name, Address and Telephone Number:

GAI Consultants, Inc.
 300 Summers Street, Suite 1100
 Charleston, West Virginia 25301
 T. 304.926.8100

FOR INFORMATION CONTACT THE BUYER

Guy Nisbet
 (304) 558-2596
 guy.l.nisbet@wv.gov

Signature X

FEIN # 25-1260999

DATE January 30, 2018

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

Addendum

Addendum No.01 issued to publish and distribute the attached information to the vendor community.

Expression of Interest
(Cedar Lakes Dam Restoration/Food Warehouse Slope Stabilization Project)

The West Virginia Purchasing Division is soliciting Expression(s) of Interest for the Agency, West Virginia Department of Agriculture from qualified firms to provide architectural/engineering services for the "Cedar Lakes Dam Restoration and Food Warehouse Slope Stabilization Project" per the Expression of Interest, and the Terms and Conditions as attached hereto.

SHIP TO	
PROCUREMENT OFFICER 304-558-2221 AGRICULTURE DEPARTMENT OF ADMINISTRATIVE SERVICES 1900 KANAWHA BLVD E CHARLESTON WV25305-0173 US	AUTHORIZED RECEIVER 304-558-3200 AGRICULTURE DEPARTMENT OF EXECUTIVE DIVISION 217 GUS R DOUGLAS LN, BLDG 1 RM 100 CHARLESTON WV 25312 US

Line	Comm Ln Desc	Qty	Unit Issue
1	Engineering Services	0.00000	

Comm Code	Manufacturer	Specification	Model #
81000000			

Extended Description :
Engineering Services

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.

Charles Straley Senior Engineering Manager
 (Name, Title)
 Charles F. Straley, PE, PLS, Senior Engineering Manager
 (Printed Name and Title)
 300 Summers Street, Ste. 1100, Charleston, WV 25301
 (Address)
 T. 681.245.8866 / F. 304.926.8180
 (Phone Number) / (Fax Number)
 C.Straley@gaiconsultants.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.

GAI Consultants, Inc.
(Company)

Bruce L. Roth Engineering Director
(Authorized Signature) (Representative Name, Title)

Bruce L. Roth, PE, Engineering Director
(Printed Name and Title of Authorized Representative)

January 30, 2018
(Date)

T. 412.399.5022 / F. 412.476.2020
(Phone Number) (Fax Number)

ADDENDUM ACKNOWLEDGEMENT FORM
SOLICITATION NO.:

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

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

Addendum Numbers Received:

(Check the box next to each addendum received)

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

I understand that failure to confirm the receipt of addenda may 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.

GAI Consultants, Inc.

Company



Authorized Signature

January 30, 2018

Date

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

Revised 6/8/2012

SOLICITATION NUMBER: CEOI 1400 AGR1800000001

Addendum Number: No.01

The purpose of this addendum is to modify the solicitation identified as ("Solicitation") to reflect the change(s) identified and described below.

Applicable Addendum Category:

- Modify bid opening date and time
- Modify specifications of product or service being sought
- Attachment of vendor questions and responses
- Attachment of pre-bid sign-in sheet
- Correction of error
- Other

Description of Modification to Solicitation:

Addendum issued to publish and distribute the attached documentation to the vendor community.

1. Vendor submitted question and Agency response.

No other Changes.

Additional Documentation: Documentation related to this Addendum (if any) has been included herewith as Attachment A and is specifically incorporated herein by reference.

Terms and Conditions:

1. All provisions of the Solicitation and other addenda not modified herein shall remain in full force and effect.
2. Vendor should acknowledge receipt of all addenda issued for this Solicitation by completing an Addendum Acknowledgment, a copy of which is included herewith. Failure to acknowledge addenda may result in bid disqualification. The addendum acknowledgement should be submitted with the bid to expedite document processing.

ATTACHMENT A

Addendum # 1 for AGR18*1 CEOI

Question 1 : Are the inspection reports available for Dams No. 1 and No. 2?

Answer: Past copies of inspection and previous engineering assessments will be provided to successful vendor. However, successful vendor will be required to complete immediate initial assessment to determine current state and shortcomings of dam structure.

STATE OF WEST VIRGINIA
Purchasing Division

PURCHASING AFFIDAVIT

CONSTRUCTION CONTRACTS: Under W. Va. Code § 5-22-1(i), the contracting public entity shall not award a construction contract to any bidder that is known to be in default on any monetary obligation owed to the state or a political subdivision of the state, including, but not limited to, obligations related to payroll taxes, property taxes, sales and use taxes, fire service fees, or other fines or fees.

ALL OTHER CONTRACTS: Under W. Va. Code §5A-3-10a, no contract or renewal of any contract may be awarded by the state or any of its political subdivisions to any vendor or prospective vendor when the vendor or prospective vendor or a related party to the vendor or prospective vendor is a debtor and: (1) the debt owed is an amount greater than one thousand dollars in the aggregate; or (2) the debtor is in employer default.

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

DEFINITIONS:

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

"Employer default" means having an outstanding balance or liability to the old fund or to the uninsured employers' fund or being in policy default, as defined in W. Va. Code § 23-2c-2, failure to maintain mandatory workers' compensation coverage, or failure to fully meet its obligations as a workers' compensation self-insured employer. An employer is not in employer default if it has entered into a repayment agreement with the Insurance Commissioner and remains in compliance with the obligations under the repayment agreement.

"Related party" means a party, whether an individual, corporation, partnership, association, limited liability company or any other form or business association or other entity whatsoever, related to any vendor by blood, marriage, ownership or contract through which the party has a relationship of ownership or other interest with the vendor so that the party will actually or by effect receive or control a portion of the benefit, profit or other consideration from performance of a vendor contract with the party receiving an amount that meets or exceeds five percent of the total contract amount.

AFFIRMATION: By signing this form, the vendor's authorized signer affirms and acknowledges under penalty of law for false swearing (W. Va. Code §61-5-3) that: (1) for construction contracts, the vendor is not in default on any monetary obligation owed to the state or a political subdivision of the state, and (2) for all other contracts, that neither vendor nor any related party owe a debt as defined above and that neither vendor nor any related party are in employer default as defined above, unless the debt or employer default is permitted under the exception above.

WITNESS THE FOLLOWING SIGNATURE:

Vendor's Name: GAT Consultants, Inc
Authorized Signature: Charly Shaly Date: Jan. 30, 2018
State of West Virginia
County of KANAWHA, to-wit:

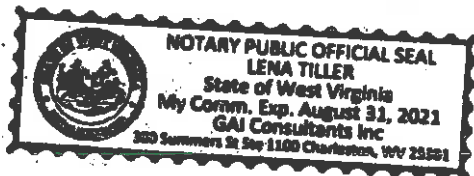
Taken, subscribed, and sworn to before me this 30th day of January, 2018.
My Commission expires August 31, 2021.

AFFIX SEAL HERE

NOTARY PUBLIC

Lena Tiller

Purchasing Affidavit (Revised 07/07/2017)



APPENDIX C

Certificate of Authorization



CERTIFICATE OF

Authorization

STATE BOARD OF REGISTRATION FOR PROFESSIONAL ENGINEERS

*The West Virginia State Board of Registration for Professional Engineers
having verified the person in responsible charge is registered in
West Virginia as a professional engineer for the noted firm, hereby certifies*

GAI CONSULTANTS, INC.



Engineer in Responsible Charge: ANTHONY F MORROCCO - WV PE 012843

*has complied with section §30-13-17 of the West Virginia Code governing
the issuance of a Certificate of Authorization. The Board hereby notifies you of its
certification with issuance of this Certification of Authorization for the period of:*

January 1, 2018 - December 31, 2019

providing for the practice of engineering services in the State of West Virginia.

IF YOU ARE REQUIRED TO REGISTER WITH THE SECRETARY OF STATE'S OFFICE,
PLEASE SUBMIT THIS CERTIFICATE WITH YOUR APPLICATION.



IN TESTIMONY WHEREOF, THE WEST VIRGINIA STATE BOARD OF
REGISTRATION FOR PROFESSIONAL ENGINEERS HAS ISSUED THIS COA
UNDER ITS SEAL, AND SIGNED BY THE PRESIDENT OF SAID BOARD.

BOARD PRESIDENT

APPENDIX D GAI Service Briefs



Dam Engineering Services

Since 1958, GAI has designed, restored, and inspected hundreds of dams, levees, and residual waste impoundment dikes for private and government owners – many regulated by the Federal Energy Regulatory Commission, West Virginia Department of Environmental Protection (WVDEP), and other government agencies. **We have a good working relationship with the WVDEP's Dam Safety Section, and have had success dealing with applicable local, state, and federal permitting agencies.**



GAI's services for soil, rock, mine tailings, concrete dam structures, and dam conversions include instrumentation and installation design, and monitoring for pore water pressures and slope movement. Skilled geotechnical engineers conduct mandated inspections and structural integrity evaluations, and certify that existing structures meet the regulations of the governing agency.

GAI evaluates dam and reservoir sites by studying hydrologic balance and geotechnical conditions in the area. We assess economic and environmental impacts from facility construction and operation, and use advanced computer programs to analyze water quantity and quality, evaluate historical rainfall and streamflow, and determine probable maximum precipitation and runoff. Our subsurface investigations reveal foundation soil and rock characteristics, underlying leakage and aquifer recharge potential, faults, and borrow material.

GAI's dam professionals are a library of knowledge on earth embankment dams, concrete structures, seepage concerns, spillways, Emergency Action Plans (EAPs), inundation studies, and dam foundations in simple, flat-lying strata; complex, fractured and folded strata; and metamorphic rock in cavernous limestone, sandstone, claystone, shale, schist, phyllite, and granite bedrock. Understanding that some sites in karst areas or overlying mines require special treatment, we analyze site-specific seismic risk when designing dams and appurtenances.

The success of a dam project rests on the type of comprehensive quality control testing that GAI provides during construction projects. Using sophisticated testing methods, we evaluate soil, rock, and concrete construction materials on-site while monitoring construction; and design and monitor installation of sophisticated instrumentation systems to evaluate post-construction performance. Our piezometer installations reach depths over 400 feet, establish survey control, and record movement.

GAI's dam structure stability analyses evaluate the behavior of earth, rockfill, and coal waste embankment slopes under varying conditions. Our inspections cover hydrologic, hydraulic, and stability assessments, structural evaluations, geologic reviews, and operation and maintenance program evaluation. GAI is diligent in providing inspection, design, and training services that promote safe operation of the dams, levees, and residual waste impoundments vital to our nation's economy.

Dam Engineering Services

- ▣ Structural and hydraulic analysis and design
- ▣ Geotechnical and foundation investigations
- ▣ Site, economic, and hydraulic feasibility studies
- ▣ Hydraulic and embankment analysis and design
- ▣ Spillway hydraulic design and remediation
- ▣ Seismic analysis, stability, and seepage analysis
- ▣ Spillway and outlet works design
- ▣ Instrumentation design, installation, and monitoring
- ▣ Maintenance and operation plans
- ▣ Failure/flood inundation analysis and mapping
- ▣ Emergency warning/action plans
- ▣ Inspection and safety training
- ▣ Construction monitoring
- ▣ Inspection and materials testing



Geotechnical Engineering Services

GAI's achievements in helping manage the materials and geologic processes that affect their facilities, properties, and project sites, has been exceptional. Since 1958, our geotechnical engineers and geologists are highly experienced in the basic principles of engineering geology, soil and rock mechanics, foundation engineering, subsidence, and mine studies.

GAI has amassed formidable experience in full-scale load testing of foundations, calibrating analytical models, and developing computer programs for designing foundations. Our engineers analyze earth slope stability and retaining wall systems and design solutions for buildings, highways, and deep excavation projects. The uneven rise of expanding subgrades can damage structures built where this danger was not anticipated. GAI investigates these types of movements, determines their causes, and designs repairs that stabilize the structure or eliminates the problem.

Thorough site explorations detect geologic and environmental hazards that can disrupt site or project development. Our geotechnical expertise in site design includes addressing areas subject to expansive materials, sinkholes, and subsidence such as those underlain by karst and underground coal and limestone mines. GAI also has extensive site design experience in areas of potential seismic activity and those with liquefaction potential.

GAI has certified geotechnical, geological, soil science, geoarchaeology, geomorphology, and pedology professionals with years of academic training, research, and field experience. GAI's depth of experience and knowledge in geotechnical engineering, geology, and soil and rock mechanics, represents a viable and valuable solution for unforeseen foundation issues.



Geotechnical Engineering Services

- ▣ Subsurface studies and investigations
- ▣ Subsidence studies and remediation
- ▣ In-Situ testing
- ▣ Slope stability analysis and slope design
- ▣ Soil and rock anchor design and testing
- ▣ Seepage analysis and filter design
- ▣ Pile static and dynamic load testing
- ▣ Earth and rock retaining system design
- ▣ Foundation recommendations, design, research
- ▣ Site characterization, soil sampling, and testing

Foundation Studies

In 1958, GAI established itself as a premier engineering and consulting firm specializing in foundation and soil mechanics engineering. Over the following years, GAI has amassed formidable experience in full-scale load testing of foundations, calibrating analytical models, and developing computer programs for designing foundations. We continue to provide specialized services in foundation engineering for clients in energy, industry, transportation, government, and land development.

GAI's engineers and geologists are highly experienced in the basic principles of engineering geology, soil and rock mechanics, foundation engineering, subsidence, and mine studies. These professionals analyze earth slope stability and retaining wall systems, and design solutions for buildings, highways, and deep excavation projects.

When structures are built in areas where the uneven rise of expanding subgrades can occur, structural damage that was not anticipated can be a major concern. GAI investigates subgrade movements, determines their causes, and designs repairs that stabilize structures or eliminates the problem.

GAI's foundation services for electric transmission structures are based on our 60 years of geotechnical engineering experience. Geotechnical engineers and geologists conduct subsurface investigations, geologic assessments, subsidence evaluations and remediation, and detailed foundation testing, analysis, and design for energy clients' facilities.

With proven foundation analysis and design capabilities, GAI also focusses on construction – using detailed quality control procedures to monitor the construction of all types of structures and foundations. As a matter of routine, we perform pile, pier, or plate load-testing, and vibration monitoring. We also conduct pre-blast or pre-driving surveys of facilities near a construction or demolition project to determine the presence of pre-construction damage.

Utilizing skills in applied foundation research and analytical model calibrations, GAI's foundation services are supported by the work of proven professionals who understand the fundamentals of foundation analysis and design, and are dedicated to assisting clients in achieving their project goals.



Foundation Studies Services

- Structure capacity investigations
- Stress analyses for new loading conditions
- Catastrophic damage inspections and analyses
- Shop drawing review
- Subsurface investigations and stabilization
- Geologic, subsidence, and landslide assessments
- Foundation testing, analysis, and detailed design
- Applied foundation research and analytical modeling
- Drilled shaft and grillage design
- Pipe pile foundation and foundation retrofit design
- Construction monitoring



Surveying

The survey teams at GAI are a dedicated and experienced group of skilled professionals that provide services ranging from boundary and topographic surveys to specialized surveys for archaeology projects. Our surveys cover any discipline in any market including transportation, development, energy, and industry.

GAI field survey crews, working closely with in-house mapping specialists, have access to an extensive library of computerized mapping software including Terramodel, Arc-Info, GRASS, Microstation and AutoCAD.

Design Surveys—Design surveys are the foundation upon which designs are based. GAI records boundary line locations, topography, physical features, onsite buildings and utilities, encroachments, and easements. Quality foundation design plans are produced from these details.

Topographic Surveys—GAI uses the latest technology in field equipment, recorders, and computer mapping for accurate topographic surveys that incorporate ground run, aerial, tree, utility location, wetland, floodplain and hydrographic surveying and mapping for CADD.

Construction Surveys—Conducted onsite during the initial preparation stage of construction, these surveys provide information critical to establishing location and elevation. GAI saves clients and contractors thousands of dollars in potentially damaging lost time and litigation liability by providing this key information accurately and early.

Boundary Surveys—GAI's boundary surveys identify land titles and ownership, and document real estate financing, appraisals and sales, insurance, as-built delineations, encroachment delineation, boundary line disputes, subdivisions, rezoning and variances.

Control Surveys—GAI's control surveys establish a series of grid lines and points that pinpoint physical features. The data is used to establish horizontal and vertical control points and independent triangulation measurements to develop reliable control grids.

Hydrographic Surveys—Supporting stormwater management and wetland mitigation, these surveys require trained staff, special equipment, and extensive experience. GAI conducts hydrographic surveys for bridges and on wetlands, lakes, rivers, and shorelines.

GAI uses global positioning systems (GPS) for horizontal and vertical control surveys. With GPS technology our surveyors can reference global datum, re-create control points. We conduct utility location surveys, document archaeological/historical data, and support eminent domain work. Combining GPS technology with conventional survey saves time and money. Organized for quick response, GAI's comprehensive surveying services cost effectively meet the needs of public and private landowners, developers, and government agencies.

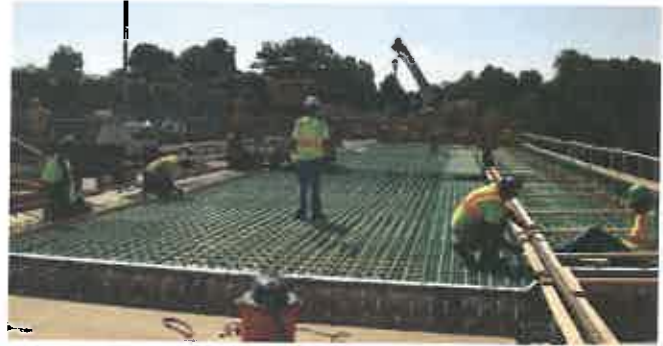


Surveying Services

- ▣ Floodway and dam surveys
- ▣ FEMA flood elevation certificates
- ▣ Embankment failure surveys
- ▣ Structural monitoring surveys
- ▣ Construction layout
- ▣ Erosion and Sedimentation Control Drawings
- ▣ Borings and piling layout
- ▣ Topographic surveys
- ▣ Property surveys
- ▣ Hydrographic/Bathymetric surveys
- ▣ Wetland boundary delineating surveys
- ▣ Existing conditions surveys (as-built)
- ▣ Post-Construction Stormwater Management Plans
- ▣ Forensic surveys

Construction Engineering and Inspection Services

GAI monitors the daily activities and building materials that are critical to Construction Engineering and Inspection projects with the following in mind—client service, construction integrity, and a successfully completed project. Whether GAI provides transportation construction monitoring, construction engineering and inspection for development, or construction management services for massive facility projects, our pool of resident engineers and construction specialists skillfully addresses the distinct construction challenges of clients in all industries.



GAI's engineering and inspection services cover all elements of the building process. We start by evaluating each construction project before it begins, tailoring staff and resources to fit the need, and setting a tone of cooperation and close communication. GAI uses pre-construction meetings with client, owner, contractors, and subcontractors to outline communication methods, detail change order and pay request processes, and emphasize milestone completion dates. We believe successful pre-construction conferences are the basis for superior project performance.

GAI's construction professionals test construction material quality, inspect workmanship, and monitor onsite construction safety. Our services often include progress and materials reporting, shop drawing review, plan interpretation, pay request administration, claims and disputes resolution, and more. We follow each stage of construction to verify the work is executed in accordance with the contract documents, and administer concrete, bituminous material, steel, and soil sample testing.

GAI understands the importance of implementing public information processes that keep all project stakeholders well informed. We work with each client to prepare public outreach programs as needed, and when construction is complete, we submit a detailed report to the client. Our final reporting summarizes overall performance and includes a full evaluation of the established goals and objectives. GAI's project portfolio includes construction services for major highways and bridges, large-scale site developments, wastewater treatment plants, industrial facilities, and power plants. We specialize in complex, multi-phase construction projects for state agencies, municipalities, institutions, private developers, and power providers. Our repeat success is based on building trusted relationships with clients and contractors, and helping them meet their project goals.

As a client's eyes and ears, GAI provides quality control and cost protection throughout the building process so the work meets or exceeds quality standards. Clients' projects are professionally delivered with minimal or no construction delays, cost overruns, or safety violations.

Construction Engineering and Inspection Services

- ▣ Pre-construction project evaluation and conference
- ▣ Post-construction inspection and evaluation
- ▣ Value engineering
- ▣ Biddability and constructability reviews
- ▣ Cost estimating
- ▣ Scheduling
- ▣ Permit approval
- ▣ Construction inspection and monitoring
- ▣ Project management
- ▣ Contract administration
- ▣ Progress reporting
- ▣ Change order review and processing
- ▣ Supplier/construction deliveries
- ▣ Shop drawing review and plan interpretation
- ▣ Contractor quality control program monitoring
- ▣ Project closeout
- ▣ Public outreach

Mechanical Engineering Services

Industrial facilities and power plants benefit from seasoned mechanical engineers who are skilled in a broad range of disciplines. The design services and operations and maintenance support that GAI has for building, in-plant, and power generation challenges keeps boiler systems, gas compressors, and entire manufacturing facilities and power plants operating efficiently. GAI's solutions improve efficiencies and reduce costs with a focus on preventative maintenance and safety.

Professionals that have career-long familiarity with industrial processes are the earmark of GAI's ability to provide mechanical engineering solutions that are both cost-effective and innovative. The applications we address for industrial processes include pump, motor, mechanical seal, air compressor, rotary lube blower, gearbox, instrumentation, and steam turbine design.

GAI designs practical piping solutions for compressed air and steam lines, industrial processes, manufacturing and food processing plants, power generation facilities, and water and wastewater treatment systems. Our design packages include specifications for instrument and control equipment, pumps, vessels, tanks, process equipment, and conveyor systems. We design vessels in accordance with ASME International codes and standards and tanks in accordance with American Petroleum Institute standards.

Engineers specializing in boiler systems test boiler efficiency, troubleshoot poor performance, make recommendations for operational efficiency, and conduct combustion safety reviews. GAI educates clients' employees on the systems we develop and provides training for maintenance and safety. GAI designs waste-to-energy facilities that reduce carbon footprint and landfill overflow. We specialize in air pollution control and keep facilities, including bag houses, spray absorbers, fume incinerators, and flare stacks, compliant with federal and state regulations.



Mechanical Engineering Services

- Finite element analyses
- 3D machine design and modeling
- Facility piping and valve mapping
- Energy conservation studies and planning
- Combustion system design and safety review
- Steam and air load analysis and system sizing
- Equipment and facility layout

Electrical Engineering Services

Industry relies on electric power and control systems to operate and monitor processes that function within defined environmental and economic considerations. The electrical engineers at GAI help clients meet this critical need with safe and reliable electric power and control systems. Our innovative solutions for electrical systems and components benefit energy and industrial facilities—from food processing and manufacturing to power generation plants.

Developing control systems starts with system mapping and a detailed summary of operations. Turnkey power systems require precise substation sizing, detailed designs, and specialized equipment and structural components. GAI's services include equipment testing and validation, system testing and start-up, contractor selection, and O&M training for employees. Our job is not complete until start-up is successful and controls are fine tuned.

GAI's substation and power plant services cover 5kV-138kV primary and 120V-15kV secondary voltage, and facility sizes ranging from 500kVA-50MVA. Our skilled electrical engineers address harmonic and power quality problems and conduct studies to evaluate equipment ratings, protective device coordination, system loading, and arc flash incident energy and flash protection boundaries.

GAI uses sophisticated software to conduct arc flash hazard studies. We quantify arc flash hazard information for plant workers to use when evaluating how to approach work tasks involving energized electrical equipment. These arc flash studies often reveal preventive maintenance or equipment upgrades needed to help avoid catastrophic damage to electrical equipment caused by arcing between energized conductors. GAI also provides safety training and helps clients determine the level of Personal Protection Equipment required for their maintenance staff. We address National Fire Protection Association 70E and Occupational Safety and Health Administration (OSHA) compliance and allowable approach distances for non-qualified personnel.

GAI's lighting system designs cover interior building systems, entire facilities, and highways. We follow standard illumination guidelines and use innovative concepts based on legacy/cutting edge technology. GAI also specializes in audio and visual system design, and provides design and analysis for security systems.



Electrical Engineering Services

- ▣ AC/DC substation design, layout, specifications
- ▣ AC/DC power distribution system (PDS) design
- ▣ Motor control system design and specifications
- ▣ Traction power substation (TPSS) design
- ▣ AC/DC substation, PDS, and TPSS construction
- ▣ Lightning system and surge protection design
- ▣ Emergency backup power and protection systems
- ▣ Building and facilities security and access systems
- ▣ Program and construction management
- ▣ Control system design and construction
- ▣ Energy storage systems engineering and design
- ▣ Electrical testing/preventative maintenance
- ▣ System integration and procurement services
- ▣ Ground grid design/smart and micro-grid solutions
- ▣ Building information system coordination
- ▣ Copper, fiber, wireless voice data and networking
- ▣ Short circuit analysis/equipment rating evaluation
- ▣ Arc flash hazard analysis, labeling, training
- ▣ Electric load flow analysis/motor starting studies
- ▣ Power factor analysis/corrective mitigation design
- ▣ Switching transient analysis