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January 31, 2018

Department of Administration  
Purchasing Division  
2019 Washington Street, East  
Charleston, WV 25305

Subject:  
WV Department of Agriculture – Cedar Lakes Dam Restoration & Warehouse Slope  
Stabilization Project

To Whom It May Concern:

I am pleased to submit the enclosed package for the above referenced project.

TERRADON proposes the following qualifications to provide engineering consulting services for the above referenced. The included package details TERRADON's qualifications, expertise, management and staffing capabilities, prior experience related to the proposed project, and required documentation for consideration.

TERRADON Corporation is a full services engineering firm with locations in Poca, WV, Lewisburg, WV and Fayetteville, WV. TERRADON has an experienced team of professionals experienced in site design, civil engineering, and ancillary engineering and construction services to fully service this project.

TERRADON plans to lead this project under the management of Jason Asbury, ASLA, CESSWI, Geo-Environmental and Testing & Inspection Vice President and under the lead engineering services of John James, PE, Lead Geotechnical Engineer.

Upon your review of the enclosed, please do not hesitate to contact me at 304-755-8291 with any questions or concerns. I look forward to hearing from you soon.

Sincerely,

Ryan Wheeler  
Director of Business Development

02/01/18 11:01:26  
WV Purchasing Division





**SUBMITTED BY:**  
TERRADON Corporation  
P.O. Box  
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304-755-8291

**PERSON OF CONTACT:**  
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## STATEMENT OF QUALIFICATIONS

WV Department of Agriculture  
Cedar Lakes Dam Restoration &  
Warehouse Slope Stabilization Project

Department of Administration  
Purchasing Division  
2019 Washington Street East  
Charleston, WV 25305  
Attn: Guy Nisbet

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**FOUNDED:** 1989

**EMPLOYEES:** 65

**LOCATIONS:**

Poca, WV  
Lewisburg, WV  
Fayetteville, WV

**SERVICES:**

Geotechnical Engineering  
Environmental Engineering  
Transportation Engineering  
Structural Engineering  
Testing & Inspection  
Construction Monitoring &  
Administration  
Cultural Resources  
Archaeological  
Civil Engineering  
Land Planning & Design  
Survey & Mapping  
Water, Wastewater, & Storm Water

TERRADON Corporation offers a multi-faceted approach to design engineering and consulting services. For more than 25 years TERRADON staff has provided a wealth of engineering solutions blanketing West Virginia and surrounding states with successful projects. The company built its reputation on expert personnel and quality, time-sensitive service. Those same founding principles hold true today.

The firm has been recognized through numerous awards from professional organizations and agencies including the American Society of Civil Engineers, State Highway Departments, the Department of Environmental Protection and the American Institute of Architects.

TERRADON's diverse team of professionals work together on projects to offer a wide range of services in house to keep project centrally focused. By providing this range of services, TERRADON is able to work completely as a team to offer clients the most rewarding design.

TERRADON has experience working on projects funded by various agencies. Because of the variety of funding options for projects, TERRADON maintains in-house grant writing staff and support to help make funding client projects easier.

TERRADON maintains professionally registered engineers, landscape architects, and surveyors as well as a competitive team of highly certified inspectors and environmental specialists.

TERRADON's corporate culture promotes innovation and progressive thinking. Project leaders strive to sustain customers through a wide-range of engineering offerings. TERRADON employees understand the purpose behind their services and work to cultivate lasting relationships with clients through honest, hard work.



*TERRADON is the largest woman-owned engineering firm in West Virginia.*

*TERRADON is a certified Women's Business Enterprise as defined by the Women's Business Enterprise National Council and the National Women Business Owners Corporation.*





TERRADON offers some of the most experienced staff in the region for local geotechnical expertise. This team of experts brings a distinctive, specialized understanding of the difficult soil and groundwater conditions found in the Ohio Valley and Appalachian Regions of the United States.

The Geotechnical group has provided investigations associated with earthen dams, mining, waste disposal, new building construction, landslides analysis and remedial design, cell and high mast towers, landfill permitting and cap design, flexible/rigid pavement design, and environmental remediation.

### SERVICES INCLUDE

- Test Borings
- Test Pit Excavations
- Monitoring Well and Piezometer Installation
- Soil and Rock Logging, Sampling & Testing
- Landslide Analysis and Remedial Design
- Stability Analysis
- Retaining Structure Design
- Earthen Dams
- Foundation Design
- Municipal and Industrial Landfills
- Flexible and Rigid Pavement Design
- Complete Removal for Landslide Repair
- Removal, Stabilization & Replacement
- Buttreassing and Regrading
- Subsurface Drainage
- Structural Corrections
- Retaining Walls
- MSE Walls and Other Gravity Walls
- H-Piles and Lagging
- Anchors (Rock or Soil Nailing)

### GEOTECHNICAL DESIGNS

- Complete Removal for Landslide Repair
- Removal, Stabilization, Replacement
- Buttreassing and Regrading
- Subsurface Drainage
- Structural Corrections
- Retaining Walls
- MSE Walls and Other Gravity Walls
- H-Piles and Lagging
- Anchors (Rock or Soil Nailing)





TERRADON offers materials testing and construction monitoring services to document compliance with project design specifications and regulatory requirements. The firm provides construction monitoring for utility, highway, and commercial construction projects.

TERRADON also provides laboratory and field testing of construction materials. Engineers and technicians at TERRADON are West Virginia Department of Highways certified in Portland Cement Concrete, Hot-mixed Asphalt, Compaction and Aggregates.

### **MATERIALS TESTING & INSPECTION**

- Slump of Portland Cement Concrete (AASHTO-T119)
- Air Content of Freshly Mixed Concrete (AASHTO-T196 and T152)
- Unit Weight and Yield (AASHTO-T121)
- Making and Curing of Concrete Test Specimens (AASHTO-T23)
- Compressive Strength of Concrete Specimens (AASHTO-T22)
- Fine and Course Aggregate Gradations (AASHTO-T11 and T27)
- Specific Gravity of Aggregates (AASHTO-T84 and T85)
- Atterberg Limits (ASSHTO-T89 and T90)
- Moisture Content of Soil (ASTM-D2216)
- Nuclear Compaction Testing of Soil, Stone, and Hot Mixed Asphalt
- Preparation of Certification Forms and Construction Reports
- Welder Certification

### **CONSTRUCTION MONITORING**

- Document compliance with project design specifications
- Ensures compliance with regulatory requirements
- OSHA 10-Hour and 30-Hour Construction Safety & Health Certified

### **SPECIALTY TESTING & INSPECTION**

- Floor Flatness Testing
- Fireproofing
- Masonry Testing
- Structural Steel Inspection Certified
- Welding Inspection
- Dye Penetrant Testing
- Bolt Testing
- Project Safety Monitoring
- FAA Eastern Regional Laboratories



TERRADON has been a leader in West Virginia and the surrounding region for the land surveying industry since 1989. The team has developed an extensive resume of successful surveying and mapping projects performed for a diverse group of repeat private and public sector clients. TERRADON's experienced staff of licensed professional surveyors and mappers bring expertise and proficiency to every project task.

The company is committed to staying ahead of the industry's pace by investing in state-of-the-art equipment and technology. That commitment enables TERRADON to overcome unique and challenging project conditions or obstacles, and efficiently provide the most accurate and complete information available to clients.

TERRADON has a long history of providing design and construction survey services for numerous transportation projects. Efficient and accurate results are ensured by prioritizing the use of modern technology, including state of the art GPS and robotic total stations, with the latest design software.

TERRADON maintains full-time Professional Surveyors on staff. The firm services projects through the use of in-house field survey crews who are backed by corporate staff members, including an experienced team of CAD designers. TERRADON's transportation survey group is experienced in preparing highway right-of-way plans, including courthouse research and right of way questionnaires, and writing legal descriptions for right of way take parcels, temporary construction easements and permanent drainage easements.

TERRADON's Professional Surveyors are licensed in:

- West Virginia
- Pennsylvania
- Kentucky
- Tennessee

#### SERVICES INCLUDE

- Mapping
- Construction Layout
- ALTA survey
- Topographic Survey
- GPS Network Control Surveys
- Aerial & LiDAR Mapping



Constantly changing federal and state environmental requirements are difficult to track and can have a serious impact on businesses and other organizations. TERRADON offers a strong environmental services team to manage issues in a complex environment. Staff is well-versed on environmental permitting processes and regulations as well as site assessment and reporting.

TERRADON closely follows environmental activities on the local, state and federal levels. TERRADON has a thorough understanding of state and federal environmental permitting processes and regulations. This expertise applies to both the initial permit preparations, as well as subsequent negotiations affecting the permit. The firm's strength in addressing environmental issues is built on the diversity of its staff with credentials in chemistry, civil engineering, geotechnical engineering and geology.

### SERVICES INCLUDE

- Environmental Site Assessments
  - Phase I ESA
  - Phase II ESA
- Hazardous Waste
- Process Water
- Wastewater
- Storm Water
- Groundwater
- Air Permitting
- Risk Management Plans
- Wetland Delineation
- Tier II Reporting
- Emergency Response Plans
- Environmental Audits
- Environmental Remediation
- NEPA Compliance
- Asbestos and Lead Inspection
- Underground Storage Tanks
- Impoundment Stabilization & Closure
- SPCC Planning
- BMP Planning

TERRADON's experienced environmental staff routinely performs Waters of the US determinations, wetland delineations, Nationwide Permits as well as Individual 404/401 Permits with the Army Corps of Engineers and West Virginia Department of Environmental Protection (WVDEP). TERRADON has performed hundreds of wetland delineations using the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region* (Corps, 2012).

TERRADON has performed floodplain modeling and elevation studies according to FEMA, state, and local floodplain coordinators. Our permitting team has performed numerous assessments and documentation according to FEMA standards for our clients.



TERRADON intends to follow the WV Department of Agriculture's Goals & Objectives to provide a detailed project approach and plan developed with the department upon award. TERRADON has reviewed the project areas and specifications to familiarize and develop a preliminary plan of investigative evaluation and analysis of the Cedar Lakes Dam and the Warehouse Slope Stabilization.

TERRADON will provide a turnkey project management team with the experience and expertise to complete the re-evaluation analysis of the Cedar Lakes Dam and the safety analysis and design of the Cedar Lakes Warehouse Slope Stabilization projects. Our proposed dam evaluation and slope rehabilitation design team, environmental permitting personnel, and the construction administration manager and construction inspection staff are qualified to provide exemplary service and communication throughout this project.

TERRADON will have an open line of communication with the WV Department of Agriculture, and all included parties throughout all aspects of this project. We propose conducting a project kick off meeting with the department's appropriate staff and our project management team to ensure that all parties have a clear understanding of the project goals and a clear path to accomplish those goals. Throughout the project, our team will be available to discuss the project with the department staff and we will have ongoing project summary reports and meetings to present our progress and discuss the design options. Each of the design options will be discussed and presented in a manner to fully describe the impact to the resources and the general public during construction activities.

Our project team will also apply for and obtain all required permitting from state and federal agencies. The permitting process can be lengthy and will directly impact the construction schedule. Therefore, communication between the agencies and internal Permitting staff and the design staff will be critical for composing a realistic construction schedule.

TERRADON proposes having senior construction inspectors on site during all phases of construction and conducting weekly meetings with construction supervisors and department managers. Our construction inspection team is well seasoned and has performed detailed site activities logs for documenting construction progress on a daily basis. These daily logs can be submitted electronically via email to the construction supervisors and the department on a weekly basis. This process accomplishes proper documentation of progress, accountability, and resolution of issues that arise on the construction site. It also ensures that all parties are continually informed of progress, issues, and resolution on a weekly basis.

TERRADON Corporation has more than 25 years experience services dam rehabilitation and slip repair design projects. This includes turn-key services utilizing all departments at TERRADON. TERRADON had qualified and certified personnel to prepare construction drawings and bidding documents for review, knowledgeable personnel to service right-of-way and right-of entry services, and certified personnel specializing in permitting applications and regulatory services. TERRADON's team is led by a Licensed Professional Geotechnical Engineer who has more than 50 years project experience in dam compliance, rehabilitation design, regulatory compliance planning following WV Dam Control and Safety Act & Dam Safety Rule. The TERRADON team has worked on various WVDEP Dam Rehabilitation and Compliance projects. The TERRADON team creates a timeline of project plans to ensure that each aspect of the project is evaluated for state compliance records.

TERRADON is prepared to develop comprehensive design and construction plans for both project A & B. TERRADON will work with the department to evaluate the two projects, develop a remedial process, and then work to create design plans that will fit within the departments time frame and budget. TERRADON's experience providing these services offers the department broad depth and full in-house services making both projects more time efficient with guaranteed quality delivery.

WV Department of Agriculture



**PROJECT PRINCIPAL,  
POINT OF CONTACT**

JASON ASBURY, ASLA, CESSWI

**LEAD PROJECT ENGINEER**

JOHN JAMES, PE

**GEOTECHNICAL ENGINEERING**

JOHN JAMES, PE  
CHRIS HANCOCK  
MARK CLUTTER

**ENVIRONMENTAL**

BILL HUNT, PG, LRS  
ANDREW ROBINSON, PG  
CLAYTON GUE

**SURVEY**

ROBERT THAW, PS  
DAVE BROWN, PS  
BRIAN BAKANAS, PS

**TESTING & INSPECTION**

MIKE WARD  
DAVE WALLACE  
CHRIS MORRIS

**CIVIL ENGINEERING**

JOE SAUNDERS, PE  
ROBERT SIMMONS, PE  
MIKE PYLES, PE  
WILL THORNTON, PE, PS  
JAMAL SHANAA, PE  
ADAM WOLFE



**MALLARD DAM  
GLADE SPRINGS, WV**

**Cost: Est.: \$150,000  
Contact: JW Hamm**

**Prime Firm: TERRADON  
Role: Engineer  
Location: Poca, WV**



Mallard Dam presents a difficult situation relative to the Dam Safety Rule (47CSR34) requirements. The hazard potential is represented solely by the heavily traveled roadway on the crest of the dam. The dam has overtopped at least twice previously and has a relatively large watershed which will result in future overtopping of the embankment due to inadequate spillway capacity combined with insufficient reservoir storm water storage. While the rule has provisions to determine hazard potential classifications in scenarios where houses and roadways exist downstream, it contains no specific guidance regarding hazards on the crests of dams. The lack of Rule guidance requires DEP to make design approval conditions and set precedent for this situation based upon its core dam safety mission – the protection of lives and property.

The hydraulic and hydrological studies and designs were performed using Soil Conservation Service (SCS) methods and computer program (SITES) to estimate potential runoffs and route resulting runoffs through the principal spillway pipes and dam overtopping. The dam was analyzed for a 100 year storm and the design storm (1/4PMP storm). It was found that the existing dam would overtop during a 100 year storm event by about 1 inch, thus the dam's principal spillway was upgraded. Additionally, the dam upgrade was designed to be overtopped by generally flattening the downstream slope to 5:1 (also providing an internal chimney drain) which also improves the stability of the dam. It was found that grassed permanent Erosion Control Matting (ECM) would provide the necessary shear resistance with a (considerable) Safety Factor of 2.

The proposed internal chimney drain resulted in an upgraded Static Safety Factor of 1.85 and Seismic Safety Factor of 1.3. The Sudden Drawdown condition is not applicable because there is no drain provided (grandfather provision). This is further justified due to the relatively shallow (<5 feet) depth of the pool.

**BECKLEY UPPER GLADE WATER  
SUPPLY DAM  
BECKLEY, WV**

**Cost: Est. \$15,206,000**  
**Owner: Beckley Water Company**  
**Contact: Matthew Stanley,**  
**304-255-5121**

**Prime Firm: TERRADON**  
**Role: Engineer**  
**Location: Poca, WV**



The general project included providing an additional 15 days of storage for drought conditions for Beckley Water Company. The selected water storage facilities included the Lower and Upper Glade Creek Dams. The study/design was complicated by the necessity to route design floods through the upstream Flattop Lake. The Lower Dam is a concrete Weir type dam, and the impoundment is dissected by WV Route 3. The upper dam is a 76 ft high Earth and Rock Fill dam built circa 1977. The study phase included evaluating the installation of automatic gates on the lower water supply dam which would be operated during "normal" flood events to prevent overtopping of WV Route 3 during flood events less than 100 years, yet provide storage during drought conditions, increasing the pool volume by dredging and excavating below the pool level, constructing another dam on water company property, and an innovative method of raising of the lake level in the upper impoundment. Cost analysis indicated that raising the lake level in the upper reservoir would be the least expensive.

The design for raising the upper lake normal pool level included evaluation of flood events including 100 year and Probably Maximum Precipitation floods and providing designs to safely handle each. This included modifications to the principal intake riser to raise the level while improving its hydraulic efficiency at a reasonable cost and raising the initial operating level of the emergency spillway. The modifications to the principal spillway riser included filling the existing intake weir openings, cutting the top off the riser to provide a new weir 2.5 times as long (ergo 2.5 times hydraulically more efficient at low heads), and constructing a new cover/trash rack. The emergency spillway operating frequency was maintained by designing a new higher concrete control weir to replace the existing; studies indicated this did not significantly affect the flow capacity at high flow rates. During the design, it was found that the Riser could be modified to gain essentially 27 complete days storage, pending weather, at about the same cost. Modifications resulted in 175 million gallons at the construction cost of \$206,000 or about \$0.0012/per gallons additional storage. Design included the addition of monitoring wells to monitor the phreatic surface within the dam.



**BLUESTONE DAM PHASE IV  
DAM STABILITY  
HINTON, WV**

**Cost: Est.: \$94,788,808**  
**Owner: United States Army Corp of Eng.**  
**Contact: Aaron Reel, Project Manager,**  
**304-376-8140**

**Prime Firm: TERRADON**  
**Role: Engineer**  
**Location: Poca, WV**



TERRADON has performed the construction engineering and structural inspection during the Phase 4 Dam Safety project at the Bluestone Dam. The project is currently in its third year, and is expected to be completed in 2019. TERRADON performs routine inspections on all elements of the drilling platform. The steel decking is checked for deformation, section loss, confirmation that no gaps between adjacent panels exist, that all welds are performed, and that no panels are placed in such a manner that undue stresses will be introduced. We check the stringers for deformation, section loss, and that all bolts are properly installed. All connections at the dam face are checked for proper bearing onto the concrete, and the soundness of the concrete is confirmed. TERRADON worked closely with the contractor and various fabricators to develop and approve welding procedures in accordance with AWS D1.5 for these critical items. TERRADON was intimately involved in verifying the setting of welding equipment, the travel speed, welding materials, preheat application, interpass temperatures and proper position. TERRADON also reviewed all ultrasonic and radiographic testing performed during the development of the welding procedure and welder qualification.

TERRADON performed a detailed analysis of the existing stringer-on-pier system that was in place when the current contractor was awarded the project. The platform system originally consisted of nine (9) HP-14x89 stringers spaced at 3'-0-3/8". There have been a maximum of 107 pier systems installed at any given time, and the platform has been lowered 8'-0" in elevation twice, for a total of 16'-0".

The analysis of this platform included placing multiple pieces of equipment that included, but is not limited to a 150 ton crane, a 20 ton carrydeck, and a 22.5 ton drill rig at various locations on the platform in order to determine the governing load condition for the various structural steel elements. Because of the angle of the pier column, tension forces are induced into the pier cap. These forces are transferred to the dam by way of two (2) 2" diameter Williams Forms Spin Lock anchors. It was later required for the spans in key locations to be doubled to 15.2', while maintaining access for all equipment. In order to do this, deeper stringers (W24x84) were required. Because of this increased depth, as well as the fact that the HP14x89 stringers were still in use in adjacent locations, it was required that the new W24x84 stringers have the bottom flange and portions of the web coped at the ends. A new bottom flange, as well as bearing stiffeners was designed, and a complete fatigue analysis was performed to confirm that this was an acceptable design approach. Modifications to the column base plates were also required, adding an additional 2' to the overall length, and performing a full penetration groove weld on the 2-7/8" thick plate. Finally, a "fender" system was developed in order to protect portions of the column that have the potential to be submerged during high water events from woody debris collisions.

**LAKE CHAWEVA  
CROSS LANES, WV**

**Owner: Cross Lanes Land Owners  
Association.**

**Prime Firm: TERRADON  
Role: Engineer  
Location: Poca, WV**



TERRADON Corporation was retained for planning, design, construction (design-build) and Certificate of Compliance for an earthen and rock fill dam originally constructed in 1930 and taken out of service in 1998. Services included investigation and repair of several landslides caused by dewatering the lake when it was taken out of service. Extensive restoration analyses and studies were required to bring the impoundment structure up to current safety codes.

Hydraulic modeling, analyses and evaluations were performed to determine the correct spillway dimensions to allow for upgrade to the current standards for 100 year storm events. The dam break analysis evaluated the hazard classification of the dam and the potential flood wave downstream. The WINSTABL computer model was used to conduct a stability analysis of the up and downstream faces of the dam.

A limited subsurface investigation was valuable in defining the engineering characteristics at the abutments and within foundation soils. The borrow study reviewed the available earthen materials to rehabilitate the dam. While a sedimentation study and mitigation design was completed for the impoundment. The results and evaluations of the studies and modeling culminated in detailed rehabilitation designs of the embankments, the downstream face of the dam, and the principal and emergency spillways.

Construction plans and technical specifications were prepared by TERRADON in order to bid and construct the needed improvements. Construction inspection and ongoing engineering oversight was provided throughout the construction process on behalf of the client.

**PETTIGREW LAKE  
TORNADO, WV**

**Cost: Est.: \$100,000**

**Owner: Kanawha County  
Parks & Rec**

**Prime Firm: TERRADON**

**Role: Engineer**

**Location: Poca, WV**



Pettigrew Lake is located in the Meadowood Park in Tornado, WV. The recreational lake is approximately eight acres with an average depth of 10 feet. Over the course of several years, the dam had been significantly weakened by burrowing animals, which resulted in a near breach of the dam, plus the cmp outlet structure had mostly deteriorated. The dam had been damaged for approximately 10 years and the public facility was in disrepair. The Kanawha County Parks & Recreation Commission did not have adequate budget to make the repairs, as there were higher priorities for allocated funds.

Through the cooperative efforts of volunteers organized by the Coal River Group (a nonprofit community organization), the Kanawha County Parks and Recreation Commission and WVDEP granted permission to proceed with the project. TERRADON Corporation volunteered its engineering services to design plans for the repair of the dam structure. The design for the repair of the dam consisted of establishing an access road and compacted fill material to seal a 15 foot breach in the existing dam plus the installation of a new HDPE outlet structure. Massey Coal Services brought in a five man crew and bulldozers to carry out the construction of the design plans.



**DAWSON LAKE DAM  
GREENBRIER COUNTY, WV**

**Cost: Est.: \$350,000  
Owner: ARK Group, Dawson Lake, LLC**

**Prime Firm: TERRADON  
Role: Engineer  
Location: Poca, WV**



The developer desired a recreational lake as a design feature for an upscale residential development in Dawson, Greenbrier County, WV. The initial scope included a study of dam height/cost/lake area and included some non-engineering aspects such as aesthetic details as a residential feature, the developer was interested in the lake area as opposed to water volume. A challenging requirement imposed by the developer was that the difference in normal pool and 100 year pool be less than one foot. This requirement, combined with the WV dam safety requirements, necessitated a dam design configuration was actually less expensive than smaller dam designs that were studied. These smaller dams could not meet both project requirements, simultaneously.

Pertinent design analyses included hydrology/hydraulic analysis including flood routing for 100 year and PMP storms, and dam break analysis for both sunny day and overtopping events. The SITES computer model was used for flood routing and the NRCS's DAMBRK model for dam break analysis. Stability analysis was analyzed for the end of construction, sudden draw down, long term, and seismic conditions using the WINSTABL computer model. The dam design included a filter design using Part 628, National Engineering Handbook, Chapter 45.

TERRADON designed the dam to be as economical as possible, which included an innovative concept for making a portion of the emergency spillway a constructed wetland as part of necessary on site wetland mitigation required by the Army Corps of Engineers. TERRADON also provided quality control (QC) and construction certification for the Dawson Dam and has provided the WVDEP required dam safety inspections since the completion of construction. Services also included the development of an Emergency Action Plan and an Operation and Maintenance Plan for the Dawson Dam.



**CHATHAM LAKE DAM  
GLADE SPRINGS, WV**

**Cost: Est.: \$1,300,000  
Owner: Glade Springs**

**Prime Firm: TERRADON  
Role: Engineer  
Location: Poca, WV**



The general project included development of residential properties around an upscale golf resort in southern West Virginia. Initial involvement included planning, which evolved from three smaller dams and lakes to one large dam and lake. The chosen design resulted in a 70' high dam with one 70 acre lake. Studies included water balance studies including low flow augmentation requirements and golf course irrigation requirements. Of interest: it was found that low flow augmentation requirements, irrigation needs and peak summer evaporation rates were each about equal. After selecting appropriate lake and dam sizing, the dam was designed with safety and cost effectiveness paramount.

Several cost-saving innovations/items were incorporated into the design, including optimizing the use of available materials in a zoned earth and rock fill embankment, the use of a manhole riser as opposed to standard lake riser, (this was permitted as innovative/experimental by West Virginia Dam Safety), and the use of rigid/flexible principal spillway outlet pipe. (Designer John James partnered with WVDEP Dam Safety Engineer on a Paper presented at the ASDSO Southeast Regional Conference, Charleston, WV, May 4, 2010). This procedure provided for the use of high strength concrete pipe with limited flexibility joints to be installed in a flexible configuration within the dam as opposed to conventional concrete cradle on bedrock. This procedure included filling the dam to the half diameter elevation of the outlet pipe, cutting a "cradle" the size for the pipe for it to rest in. Dusting the cradle and top of pipe with dry bentonite (key for seepage control) and continue filling of the dam. While both these procedures were considered somewhat controversial by some peers, monitoring has indicated very successful performance to date. While such "new" or "experimental" practices may not be appropriate for USACE dam projects, it demonstrates TERRADON's willingness and ability to develop, consider and design cutting-edge and innovative solutions. It is estimated that these innovations saved up to 50% on the cost of the dam.

Other design procedures included hydraulic design to provide a nearly constant lake level (the difference in lake level between normal pool and 100 year pool is only one foot, as requested by developer). The design also included dambreak modeling (using both the National Weather Service Dambreak and HEC-RAS programs) and development of downstream inundation maps and resultant emergency action plan. The cost of the dam project was about \$1.3 Million.

**THE SUMMIT BECHTEL FAMILY  
NATIONAL SCOUTING RESERVE  
GLEN JEAN, WV**

**Cost: Est.: \$350,000,000  
Owner: Trinity Works**

**Prime Firm: TERRADON  
Role: Engineer  
Location: Poca, WV**



TERRADON Corporation was heavily involved in the development of the Summit Bechtel National Scout Reserve as a consultant to Trinity Works. The Summit is a 10,600+ acre outdoor adventure center owned by the Boy Scouts of America and located near Mt. Hope, WV. From the initial site selection to surveying, planning, infrastructure design and inspection, TERRADON was a key player in creating one of the highest-profile design and construction endeavors in West Virginia. Working under tight specifications and time restrictions, TERRADON was responsible for agency coordination for all permitting activities for the project, acting as the primary contact with the WVDEP on behalf of all contractors and consultants working on the 10,600+-acre site. This coordination effort dealt with more than 50 permits for various developments within the project. TERRADON also spearheaded the delivery of quality results in:

- Initial Site Selection/Conceptual Designs
- Site Planning/Grading
- Erosion and Sediment Control
- Abandoned Mine Lands (AML) Mitigation
- Survey/Mapping
- All Environmental Permitting
- Geotechnical Engineering
- Utility Design
- Materials Testing and Construction Monitoring
- 60+ miles of underground utilities
- 550,000 tons of aggregate produced by on-site rock crushing
- 3 million cubic yards of excavation
- 600 acres of clearing, grubbing and rough grade operations
- 14 miles of new roads (grade and drain)
- 28 miles of drainage swales, including erosion and sediment control
- 600 acres of fine grading and re-vegetation
- Construction Inspection of 4 earthen dams
- 80,000 seat lawn amphitheater



**SLIP REPAIR  
LINCOLN COUNTY, WV**

TERRADON was contracted by Chesapeake Energy Corporation to administer the repair and remediation of a large slip for a natural gas well site in Lincoln County, WV.

After investigating the site and reviewing current conditions, TERRADON prepared plans for Erosion and Sediment Control, as well as Slip Remediation.

Using a combination of Erosion and Sediment Control measures, the plans detailed the stabilization utilizing control matting and earthwork, and provided protection of the slope to prevent any further erosion. TERRADON also identified specific plans for how to enter the stream to remove slip material.

The plans were coordinated with the West Virginia Department of Environmental Protection (WVDEP) for approval and completion.

**PROJECT  
TIMEFRAME**  
2015

**PROJECT COST**  
\$40,000





**FEMA SLIDE REPAIRS  
LINCOLN & WAYNE COUNTY, WV**

TERRADON completed engineering consulting services for the repair of thirteen (13) FEMA-Approved slides for the West Virginia Department of Transportation.

Projects involved the preparation of construction contract plans and related documents, surveying, geotechnical evaluations, utility coordination, and other related work as required for slide repairs. The projects were located on various roads throughout Wayne and Lincoln County, West Virginia.

TERRADON completed plans for embankment failures, damaged asphalt pavement, eroded shoulder stone, and silt filled ditches. The work on these projects included various sized piling walls with concrete lagging, maintenance of traffic, repair of asphalt and stone shoulder, cleaning of ditches, and guardrails.

**PROJECT  
TIMEFRAME**  
2016

**PROJECT COST**  
Various







**EMERGENCY FLOOD REPAIR BRIDGE DESIGN  
CLENDENIN, WV**

TERRADON Corporation was responsible for engineering design for nine emergency flood relief efforts by the WVDOT in the summer of 2016. The projects were completed in response to massive flooding near Clendenin, WV in June of 2016. TERRADON served as a subconsultant to the contractor performing emergency relief and tasks were completed in a design-build fashion in order to expedite the relief efforts.

*Bridge Design*

The projects included the design of two, adjacent box beam, one-lane bridges approximately 15' wide; East Porter Creek Bridge and West Porter Creek Bridge. TERRADON performed hydraulic analysis and designed both bridges to current WVDOT standards. The bridges were not in-kind replacements. West Porter Creek Bridge was nearly 39' long and East Porter Creek Bridge was 77' long.

*Piling Walls*

TERRADON designed five pile and lagging walls along Queen Road in order to correct landslides that occurred as part of the flood. The projects all utilized predrilled pile and lagging structures to correct the slips.

*Culvert Crossings*

TERRADON's engineers also designed two culvert crossings in the Clendenin area. Crossing one utilized a reinforced concrete box culvert approximately 40' long. Crossing two utilized an HDPE culvert and was also approximately 40' long. Each culvert crossing included hydraulic studies and engineering design that met current WVDOT standards.

The projects in whole began in early July of 2016 and were completed in January of 2017.

**SERVICES PROVIDED**

- Bridge Design
- Piling Wall Design
- Culvert Crossing Design
- Inspection



### **ROTARY PARK SLIDE HUNTINGTON, WV**

TERRADON Corporation was contracted by the Greater Huntington Parks and Recreation District to administer the repair to an access road slip at Rotary Park. A leaking storm drain system caused the slip, and Natural Resource Construction Services (Department of Agriculture) designed the original slip repair plans. However, TERRADON determined that those plans could be redesigned to reduce the cost and remain within the project budget. TERRADON's redesign also further reduced cost by utilizing materials from a nearby ball field to repair the slip, thus eliminating the need to move the existing materials offsite or to purchase new material for the slip repair.

### **SERVICES**

Site Evaluation  
Site Remediation  
Geotechnical Design



**VA MEDICAL CENTER  
HUNTINGTON, WV**

This Project involved the evaluation, exploration, and design remediation of a slip that has been observed at the Huntington VA Medical Center, Located at Spring Valley Drive, Huntington, WV.

TERRADON performed Geotechnical investigation for the 1300 cubic yards of soil that involved drilling seven borings to assess the subsurface and rock conditions, we also performed a Topographic survey to include the location of the geotechnical borings and generated a Topographic Map of the site area. Using this information, Terradon developed a design, which involved working drawings and specification, and construction bid Documents.

**SERVICES**

- Site Evaluation
- Site Remediation
- Geotechnical Design
- Topographic Survey



**CHESAPEAKE TRACE FORK SLIP REPAIR  
LINCOLN COUNTY, WV**

After investigating the site and reviewing current conditions, TERRADON prepared plans for Erosion and Sediment Control, as well as Slip Remediation for a well site in Lincoln County.

Using a combination of Erosion and Sediment Control measures, the plans detailed how to stabilize an erosion slip on the site, as well as how to protect the slope to prevent any further erosion in the future. In the stream permit, TERRADON also identified specific plans for how to enter the stream to remove slip material. The plans were then submitted to the West Virginia Department of Environmental Protection (WVDEP) for approval.

**SERVICES**

- Site Evaluation
- Site Remediation
- Geotechnical Design
- Erosion & Sediment Control



**AEP SLIDE REPAIR**

**LOGAN, WV**

TERRADON is currently providing geotechnical design services for Appalachian Electric Power (AEP) for a slide in Logan, WV. The area of the slide consists of 100' of riverbank and the adjacent areas, due to erosion from high water and river movement. Performed the geotechnical investigation study and slide repair recommendations. Currently installing slide repair and 200 ft. of riverbank rip rap.

**ORCHARD DRIVE SLIP REPAIR (FEMA-APPROVED SITE)**

**BARBOURSVILLE, WV**

TERRADON recently completed a study of alternatives and is currently working on the design of correction for a geotechnical slide on Orchard Drive in Barboursville, WV. This slide is approved for assistance from FEMA.

**CHESAPEAKE ENERGY—HAMLIN SLIDE**

**CHAPMANVILLE, WV**

TERRADON provided Geotechnical services to Chesapeake Energy - Hamlin on the slide project located at Chapmanville in Logan County, West Virginia. TERRADON provided a Nationwide (13) permit for stream bank stabilization through the Corps of Engineers. The project scope was designing the repair to the landslide that impacted, filled in 350 linear feet of stream, and filing the permit to restore the stream.

**GERATH LANDSLIDE**

**LEWIS COUNTY, WV**

The Gerath Landslide project is located adjacent to the Weston/Buckhannon exit off Interstate 79 near Weston, in Lewis County, West Virginia. The site is accessed by turning left (if coming from Charleston) from the exit ramp onto U.S. Route 33. The project area consisted of three landslides: one above the access road to RPM Salvage and two below. The two slides below the road were blocking the stream below and threatening the stability of the access road. The slide above the road was being addressed in this project. The remedial measures for this project included establishing positive drainage around the landslide, removal of the landslide material to a waste area, installing underdrains and riprap buttresses, revegetating all disturbed areas, and resurfacing the existing road in the project area after construction is completed.

Appendix A:  
Resumes

## **JASON ASBURY, ASLA, CESSWI**

### **VP GEO-ENVIRONMENTAL & FIELD SERVICES**

#### **EDUCATION**

B.S. Landscape  
Architecture  
West Virginia  
University

#### **WORK EXPERIENCE**

TERRADON  
Corporation  
2010-Present

Robert Gabriel &  
Associates  
2009-2010

R.G.S. Associates,  
Inc.  
2004-2009

#### **CERTIFICATIONS**

Certified Erosion  
Sediment Storm  
Water Inspector

38 Hour USACE  
Wetland Delineation  
Training

30 Hour OSHA  
Construction Safety  
& Health Certification

40 Hour OSHA  
HAZWOPER  
Certification

OSHA Confined  
Space Entry Trained

OPEC SafeLandUSA

Jason Asbury is the Vice President of Geotechnical, Environmental and Field Services at TERRADON. Additionally, Asbury is a Geo-Environmental Project Manager and serves as an Environmental Agency Coordinator. Acting as regulatory liaison/coordinator, Asbury provides critical project support for specialized permitting and erosion and sediment control planning, as well as conducting field work for wetland assessment/ delineation projects and Section 404/401 permitting. Asbury is also responsible for scheduling and coordinating field service teams for Construction QA/QC services. Asbury also provides site grading, landscape and utility plans, site detailing and erosion sediment control plans and permitting for energy, commercial, and educational projects.

#### **PROJECT EXPERIENCE**

##### **The Bechtel Summit National Scouting Reserve**

Served as Regulatory Coordinator for a 10,600+- acre recreational development in Fayette County, WV, acting as the primary contact with the WVDEP on behalf of all contractors and consultants, for more than 50 site permits. Task included NDPEs design and permitting, including erosion and sediment control, for multiple contractors/consultants with the WVDEP. Also coordinated monthly site inspections with representatives from the WVDEP and numerous on-site contractor representatives. The project included 550,000 tons of aggregate, 600 acres of grading activities, 28 miles of drainage swales, 14 miles of new road construction, 4 earthen dams, and more than 60 miles of new utility installation.

##### **Above Ground Storage Tank Inspections (WVSB 373 Compliance)**

Served as Regulatory Coordinator and Project Manager for Approximately 1,800 Above Ground Storage Tank Inspection across the State of West Virginia. Task included inspections of AST's, certification of tanks, submitting certifications to WVDEP for compliance. Inspections of the AST's included a visual inspection to determine if the tank was structurally sound and fit for service. Inspection and certification of secondary containment was also conducted to determine if proper spill prevention, control, and countermeasures were in place.

##### **Tanyard Station**

Served as Project Manager and Regulatory Coordinator for a 50 Acre mixed use commercial development located in Barboursville, WV acting as the primary contact with the WVDEP, US Army Corps of Engineers, US Fish and Wildlife, as well as the Village of Barboursville. The Tanyard Station project was a collaborative design effort between TERRADON and SITE Incorporated from Knoxville Tennessee. The site design included removing 956 linear feet of Tanyard Branch a Perennial Stream and re-routing the existing stream through a new 6'x8' concrete box culvert. Tasks included, conducting field assessments to determine quality of existing Tanyard Branch, preparation of sediment and erosion control plans and obtaining NPDES Permit Approval from West Virginia Department of Environmental Protection, coordination of habitat analysis study, coordination of FEMA Flood Study for Tanyard Branch, coordination of structural design of proposed box culvert, coordination of sanitary sewer and water design as well as health department permitting, coordination of all utility and access permits required from West Virginia Department of Highways.

**EDUCATION**

B.A. Civil  
Engineering  
West Virginia  
Institute of  
Technology

**WORK  
EXPERIENCE**

**TERRADON**  
Corporation  
2004-Present

James  
Engineering  
1983-2004

Triad Engineering  
1978-1983

James  
Engineering  
1973-1978

Ackenherl &  
Associates  
1968-1973

**REGISTRATION**

Professional  
Engineer: WV

John James is a Senior Geotechnical Engineer for various dam, landslide, foundation investigation/design, transportation, environmental, site selection, and mining projects. He has over 48 years of experience practicing engineering in WV and surrounding states. James specializes in innovative and cost-saving concepts for his projects. Coupled with his hands on common sense approach to projects, he works with many of the accepted geotechnical and other engineering software applications for latest technical solutions.

**PROJECT EXPERIENCE****Upper Glade Creek Water Supply Dam  
Beckley, WV**

Geotechnical Engineer. The \$205K project included providing an additional 15 days of storage for drought conditions for Beckley Water Company. The selected water storage facilities included the Lower and Upper Glade Creek Dams. The study/design was complicated by the necessity to route design floods through the upstream Flattop Lake. The Lower Dam is a concrete weir type dam, and the impoundment is bisected by WV Route 3. The upper dam is a 76 foot high earth and rock fill dam built circa 1977. The study phase included: 1) evaluating the installation of automatic gates on the lower water supply dam, which would be operated during "normal" flood events to prevent overtopping of WV Route 3 during flood events less than 100 years, 2) provide storage during drought conditions, 3) increasing the pool volume by dredging and excavating below the pool level, 4) constructing another dam on water company property, and 5) using an innovative method of raising of the lake level in the upper impoundment. Cost analysis indicated that raising the lake level in the upper reservoir would be the least expensive.

**Chatham Lake Dam****Glade Springs, WV**

The \$1.3 million dam project was complicated by the development of residential properties around an upscale golf resort in southern West Virginia. Initial involvement included planning, which evolved to combine three smaller dams and lakes to one large dam and lake. The chosen design resulted in a 70' high dam with one 70 acre lake. Studies included water balance studies including low flow augmentation requirements and golf course irrigation requirements. It was determined that low flow augmentation requirements, irrigation needs and peak summer evaporation rates were each about equal. After selecting appropriate lake and dam sizing, the dam was designed with safety and cost effectiveness paramount.

**Dawson Dam****Dawson, WV**

The developer desired a lake as a design feature for a residential development in Dawson, Greenbrier County, WV. The initial scope included a study of dam height/cost/lake area and included some non-engineering aspects as aesthetic details. As a residential feature, the developer was interested in the lake area as opposed to water volume. After the lake area was chosen, TERRADON designed the dam to be as economical as possible and included such innovative concepts as making a portion of the emergency spillway a wetland as part of necessary mitigation. TERRADON also provided QC and construction certification for the Dawson Dam and provided the required dam safety inspections since the completion of construction. Services included the development of an Emergency Action Plan and an Operation and Maintenance Plan for the Dawson Dam. Total construction costs totaled \$350K.



## RESUME CONT. | JOHN JAMES, PE

### **Water Supply Dams, Design & Upgrades West Virginia, Statewide**

Provided upgrade and design services for various water supply dams throughout West Virginia. Projects include: Upper & Lower Dog Run Dams, Salem, West Virginia; Key Dam, Bluefield, West Virginia; and Weston Water Supply Dam, Weston, West Virginia. Geotechnical analysis and studies included: seismic analysis and monitoring; seepage analysis and corrective design; and reconstruction and structural design components.

### **Bluestone Dam Structural Design & Inspection Hinton, WV**

Designs included structural cantilevered steel framing anchored to the sloped downstream face of the dam that supports drilling operations for anchor installation and a 150 ton crane. The cantilevered platform extends 32' from the face of the dam, with supports spaced up to as much as 15'. This spacing provides main support members to accommodate the full weight of the 150 ton crane and support vehicles, and requires a detailed examination of fatigue prone members for the design service life of the project. All members below high water level were designed to support full loadings and force effects from water and debris collisions.

**Rt. 35 Design Build, Putnam and Mason Counties, WV, 2015.** WVDOT. Geotechnical Engineer. Provided geotechnical design services that included fill slope stability analysis and cut slope and bench design for a 16-mile section of a four-lane highway on US Route 35 in Putnam and Mason Counties, WV.

**Corridor H Design Build, Randolph County, WV, 2015.** WVDOT.

Geotechnical Engineer. Provided geotechnical design services that included fill stability analysis and cut slope design for an eight-mile section of four-lane highway for Corridor H in Randolph County, WV.

**Corridor H, 2014.** J.F. Allen Company. Geotechnical Engineer. Provided geotechnical design services that included fill stability analysis and cut slope design for a six-mile section of Corridor H. **Thomas Bedford Pugh Bridge, WV, 2014.** Geotechnical Engineer. Provided L Pile analysis for the bridge.

**Coalfields Expressway Design Build, Mingo County, WV, 2013-2014.** Kanawha Stone Company. Geotechnical Engineer. Provided geotechnical design including fill stability analysis for two critical 250' to 300' high sections of a five-mile, four-lane highway project in Wyoming County, WV.

**District 1 Office (Foundation Investigation), Kanawha County, WV, 2011.** WVDOT. Geotechnical Engineer. Provided geotechnical foundation recommendations for office building project in District 1, including seismic analysis.

**EDUCATION**

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

**WORK  
EXPERIENCE**

**TERRADON**  
Corporation  
2014-Present

Balance  
Consulting  
2009-2014

WV DOH  
2009-2014

Stantec  
2007-2009

DLZ  
2004-2007

EL Robinson  
1999-2004

**REGISTRATION**

Professional  
Engineer:  
WV, OH, VA

Professional  
Surveyor: WV

**CERTIFICATIONS**

WVDOH Portland  
Cement Concrete  
Technician  
WVDOT Asphalt  
Pavement  
Technician

Thornton is an experienced project manager and design engineer for civil engineering design projects. Thornton has more than 15 years of experience with consulting engineering in West Virginia, and three years with a construction firm performing major concrete paving projects in West Virginia, Pennsylvania and Ohio. Thornton also provided consultant review for the WVDOT, Division of Highways.

The major design projects with which he has been involved included roadway design, drainage design, site design, mine land reclamation, permitting, property surveys, airport design, Right-of-Way Services, maintenance of traffic and construction administration and oversight. He provides analysis and design on the construction and rehabilitation of a variety of infrastructure utilities (water, wastewater and storm water), including streets, drainage, sidewalks, buildings, and traffic and other safety improvements.

**PROJECT EXPERIENCE**

**Ravenswood Downtown Revitalization 2010, Ravenswood Development Authority, Ravenswood, WV.**

Management of the bidding, construction administration, inspection and material testing for the sidewalk rebuilding, lighting and ADA improvement project. Took over project after design was completed by another consultant. When the project bids came in over original estimate, we helped secure additional funding from WVDOH.

**WVDOH Master (On-Call) Engineering Services.**

Managed various highway, bridge, and related engineering services at locations throughout the state including: Lavalette to Huntington Road Widening, Spencer Center Turn Lane, Church Street in Ripley Center Turn Lane, WV 14, WV 15 Intersection Upgrade.

**I-79 Morgantown Interchange, 2013.**

Design study for a new Interchange on I-79 in Morgantown. This fast track project included the preparation of an Environmental Assessment as well as developing alignments for a new interchange on I-79.

**US 220 Passing Lane, 2012.**

Construction plans for the addition of a passing lane on US 220. Typical services included project scheduling and tracking, plan review for adherence to AASHTO and DOH standards and ensuring the project stays within scope.

**Bartley Branch Bridge, 2012.**

Construction plans for the extension of new roadway alignment to allow the removal of a structure.

**Hartland Bridge, 2012.**

Construction plans for the replacement of existing bridge over the Elk River and approach roadway.

**Fourth Street Bridge, 2013.**

Design Study and Construction plans to replace the existing Fourth Street bridge with a new structure and roadway at Third Street in Fairmont. This project included coordination with City of Fairmont officials as well as the local public.

**WVA Manufacturing Raw Material Retaining Wall**

Management during the design of a new retaining wall at the Raw Material Railroad loadout at the WVA Manufacturing Alloy, WV site. The proposed wall will be approximately 450 linear feet and range from 3 to 10 feet tall.

**EDUCATION**

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

**WORK  
EXPERIENCE**

TERRADON  
Corporation  
2012-Present

ms consultants  
2003-2012

Buchart Horn  
1998-2003

Laborers Union  
1990-1998

**REGISTRATION**

Professional  
Engineer:  
WV, OH, VA, NC,  
KY, NV

Joe Saunders is a Professional Engineer, licensed in West Virginia, Ohio, Virginia, North Carolina, Kentucky and Nevada. Saunders offers a wealth of experience through projects performed for the West Virginia Department of Transportation and Ohio Department of Transportation and the related to engineering design and plan development for structures and roadways.

As Lead Designer for Transportation at TERRADON Corporation, Saunders is responsible for the development of construction plans for transportation, including bridge replacements and rehabilitations, roadway and highway design, right-of-way plans, and ancillary design. Additional responsibilities include preliminary design and reports, construction plans and specifications, construction estimates, contracts and bidding review, and construction engineering. Saunders directs the highway design team at hydrology and hydraulic calculations. Saunders also works with the highway design team to schedule manpower and capacity for design projects and provides daily coordination of project tasks with clients/owners. With 18 years of experience as a designer and almost a decade of additional experience in highway and bridge construction, Saunders is experienced with all critical elements required of this contract.

**PROJECT EXPERIENCE****Bluestone Dam Structural Design & Inspection  
Hinton, WV**

Senior Design Engineer for the Bluestone Dam Phase IV Construction team. Designs included structural cantilevered steel framing anchored to the sloped downstream face of the dam that supports drilling operations for anchor installation and a 150 ton crane. The cantilevered platform extends 32' from the face of the dam, with supports spaced up to as much as 15'. This spacing provides main support members to accommodate the full weight of the 150 ton crane and support vehicles, and requires a detailed examination of fatigue prone members for the design service life of the project. All members below high water level were designed to support full loadings and force effects from water and debris collisions.

**US-35 Design****Mason County, WV**

Served as Principal Designer on the design of this 3.5 mile section of divided four lane highway on a new alignment with up to 4 million yards of excavation, several bridges and culverts, and a half mile of stream relocation. The design was completed on a fast track schedule within 6 months (instead of normal 18 month). Saunders coordinated this effort and provided quality control on this \$48M project by directing as many as 45 professionals at any time. The project won the engineering excellence award, the bids were under budget and was constructed with no change orders.

**Corridor H****Grant County, WV**

Served as Principal Designer on the design of this 2.5 mile section of divided four lane highway on a new alignment with several million yards of excavation, culverts, access roads and complete right of way plans. Saunders coordinated this effort by partnering with WVDOH and various environmental permitting agencies in the early stages of the design to meet the schedule. The project won the engineering excellence award, the bids were under budget and was constructed with no change orders.

## RESUME CONT. | JOE SAUNDERS, PE

### **Water Supply Dams, Design & Upgrades**

#### **West Virginia, Statewide**

Provided upgrade and design services for various water supply dams throughout West Virginia. Projects include: Upper & Lower Dog Run Dams, Salem, West Virginia; Key Dam, Bluefield, West Virginia; and Weston Water Supply Dam, Weston, West Virginia. Geotechnical analysis and studies included: seismic analysis and monitoring; seepage analysis and corrective design; and reconstruction and structural design components.

#### **I-81 Design/Build**

Saunders acted as lead designer on the design-build project known as the North Martinsburg to Marlowe Interchange in Berkeley County involved approximately 6 miles of interstate widening from 4 lanes to 6 lanes. The project included three twin bridge structures on the interstate, crossing County Route 11/7 (Bessemer Overhead Bridge), County Route 8 (Hainesville Overhead Bridge), and County Route 11/5.

#### **Corridor H, Tucker County, WV**

Saunders designed Value Engineering plans for this section of Corridor H in Tucker County, WV. Vertical alignment was modified to improve the earthwork balance, and cost savings of approximately \$700,000 were obtained by revising the alignments. Existing utility crossings and impacts had to be addressed in the re-design, and side road alignments were adjusted to match the revised vertical alignments. Changes to the profile resulted in revised drainage areas and culvert designs, further improving the cost of the alignment.

#### **Catfish Man of the Woods Bridge, Cabell County, WV.**

Saunders was the Project Manager for the design of the replacement of the Catfish-Man-of-the-Woods-Bridge. Tasks included assisting with the layout of the new bridge and roadway alignment, design of cantilever wing walls with up to 18 foot heights, drilled shaft foundations, semi-integral abutments, reinforced elastomeric bearings, spread pre-stressed box beams, and reinforced concrete deck. He also provided technical assistance to junior staff.

#### **Duhring Bridge Study, Design & Plan Preparation**

Saunders detailed the study of several alternates for a replacement bridge for a structure constructed in the 1930s. Considerations were economics, vertical alignment, horizontal alignment, site impact (the project is located in both an environmentally sensitive area and historically significant area). Completion of final detail bridge plans and all related documents with new structure at approximately the same location as the existing structure.



## MARK CLUTTER

GEOTECHNICAL ENGINEER

### EDUCATION

B.S. Engineering  
Technology,  
Fairmont State  
College

A.A.S Civil  
Engineering  
Technology,  
Fairmont State  
College

### WORK EXPERIENCE

TERRADON  
Corporation  
2010-Present

Triad Engineering,  
Inc.  
2000-2010

WV Army National  
Guard  
1990-2003

Mark Clutter is experienced in preparing construction documents and associated permitting for numerous projects throughout Kentucky, Ohio, and West Virginia to include: creating erosion and sediment control plans, storm water management, design of impoundment closures, slope stability analysis, field surveying, drawings and specification preparation, design, design drafting, construction inspection, quality control testing, shop drawing review, project management, contract administration, permitting and report preparation. Clutter's landfill experience adheres to the WVDEP's Landfill Closure Assistance Program (LCAP) for landfill designs and construction, including all closure-related activities such as: leachate management control, sediment and erosion, natural gas management, groundwater monitoring, and a final cover on non-composite lined landfills.

### RELEVANT PROJECT EXPERIENCE

#### **WVDOT Mill Creek Bridge, WV**

**US 35—Slope Stability Design of Waste Pit Areas** - Clutter served as Staff Engineer for US 35—Slope Stability Design of Waste Pit Areas.

**WVDOT City Beer Bridge, Wood County, WV** - TERRADON conducted a field exploration for the proposed overpass replacement on I-77 located in Wood County, West Virginia. A total of thirteen (13) structure borings at the proposed bridge and one pavement boring were required by the WVDOT, and TERRADON performed drilling for the fourteen borings, delivered samples to MCS&T and provided GINT logs.

**WVDOT Charleston Interstate Roadway Lighting Renovation project in Charleston, West Virginia** - The purpose of this investigation was to provide foundation recommendations for the design and construction of self-supporting light towers ranging in height from 60 to 150-feet. This investigation included a geotechnical drilling program, laboratory testing, and engineering evaluation. This subsurface exploration consisted of a total of forty four (44) structure borings drilled at the approximate locations of the proposed Light Tower Locations as indicated on the WVDOH Plans for Construction prepared by another consultant.

**Coonskin Park Bridge** - The project included geotechnical design for a bridge in Charleston, WV.

**Mullens Portals & Drainage- 2009, Mullens, Wyoming County, WV**  
Served as Project Manager for AML Project No. DEP14430. Responsibilities included: project management, design, drawings and specification preparation, contract administration, water sampling, permitting, and report preparation. The project consisted of extensive mine workings requiring: construction access, treatment of numerous open and collapsed portals, and treating/conveying storm/mine drainage, in and around the city of Mullens. A majority of the mine drainage flowed through the city storm sewer system and under County Route 54, requiring close coordination with city, state, and federal agencies.

**Bellington Portals & Drainage— 2009, Bellington, Barbour County, WV**  
Served as Project Manager- responsibilities included: project management, design, drawings and specification preparation, contract administration, water sampling, permitting, and report preparation. The project consisted of extensive mine workings requiring: construction access, treatment of numerous open and collapsed portals, and treating/conveying storm/mine drainage, in and around the city of Bellington.

**TERRADON**

**EDUCATION**

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

**WORK  
EXPERIENCE**

TERRADON  
Corporation  
2011-Present

Chapman  
Technical Group  
2009-2011

HC Nutting  
2007-2009

**REGISTRATION**

Professional  
Engineer: WV

Robert Simmons serves as a Project Engineer at TERRADON Corporation. He offers a background in structural, highway, geotechnical, and hydraulic design, as well as material testing and inspection. He has provided services on a number of projects throughout West Virginia, Virginia, Kentucky, and Ohio.

**PROJECT EXPERIENCE****Bluestone Dam Phase IV, Summers County, WV.**

Simmons was a Senior Design Engineer for the Bluestone Dam Phase IV Construction team. Designs have included structural cantilevered steel framing anchored to the sloped downstream face of the dam that is able to support not only the drilling operations for anchor installation, but also a 150 ton crane. The cantilevered platform extends 32' from the face of the dam, with support spacing in excess of 15'. The design required not only that each main support member was able to accommodate the full weight of the 150 ton crane and supply vehicles, but also required a detailed examination of fatigue prone members for the design service life of the project. An additional design concern was that all members below high water level had to be designed to support full loadings, along with force effects from water and debris collisions.

**Catfish Man of the Woods Bridge, Cabell County, WV.**

Simmons was a Senior Design Engineer for the design of the replacement of the Catfish-Man-of-the-Woods-Bridge. Tasks included assisting with the layout of the new bridge and roadway alignment, design of cantilever wing walls with up to 18 foot heights; drilled shaft foundations, semi-integral abutments, reinforced elastomeric bearings, spread pre-stressed box beams, and reinforced concrete deck. He also provided technical assistance to junior staff.

**Portsmouth Bypass Design/Build, Scioto County, OH.**

Simmons was a Senior Design Engineer for the design of two bridge for the proposed Portsmouth Bypass Design Build project. Tasks included assisting with the layout of new bridges, driven pile foundations, integral abutments, reinforced and un-reinforced elastomeric bearings, pre-stressed bulb "T" beams, and a 35' tall cap and column pier. He also provided technical assistance to junior staff.

**Noise Wall Design, Montgomery County, OH.**

Simmons was a Design Engineer assisting in the design of the drilled shaft foundations, FAA aeronautical clearance requirements, and plan review of the free standing noise wall located adjacent to I-75 near Dayton, OH.

**Value Engineering for Sections 3 and 5 of Corridor "H", Tucker County, WV.**

Simmons aided in the design of roadway drainage, super elevations, and vertical geometry. He also provided assistance with plan and cross section review and quantities.

**EDUCATION**

A.S. Mining  
Engineering  
Technology  
West Virginia  
Institute of  
Technology

B.S. Civil  
Engineering  
West Virginia  
Institute of  
Technology

M.S. Engineering,  
Marshall University

**WORK  
EXPERIENCE**

TERRADON  
Corporation  
2009-Present

HTNB Consulting  
Engineers  
1997-2009

Kelley Gidley, Blair  
& Wolfe  
Consulting  
Engineers  
1986-1997

WV DNR  
1978-1986

WV DOH  
1973-1978

**REGISTRATION**

Professional  
Engineer: WV

Mike Pyles is a Senior Project Engineer for various civil and environmental engineering projects with emphasis on transportation, water, and sewer projects. Pyles is responsible for engineering studies, design, contract documents, engineering analysis, computer modeling, regulatory compliance, and permitting with emphasis on public water and sewer systems.

**PROJECT EXPERIENCE**

**Fairmont Gateway Connector, Fairmont, WV**— Design Engineer for the storm water system on a WVDOH project for the relocation and upgrade of WV 273 to a four-lane divided highway and a new interchange with I-79.

**Corridor H – Davis to Bismarck Section 3, Tucker County, WV** – Design Engineer for the revised storm water ditch design on a WVDOH project for Corridor H – Davis to Bismarck Section 3.

**Corridor H—Davis to Bismarck Section 5, Tucker County, WV**—Design Engineer for the revised storm water ditch design on a WVDOH project for Corridor H – Davis to Bismarck Section 5.

**Huntington Mall Road, Cabell County, WV** – Design Engineer for the storm water system and culverts on a WVDOH project for the upgrade of US Rt. 60, Mall Road, and Ring Road, and the new road crossing over I-64 from US Rt. 60 to Ring Road to better accommodate Mall traffic.

**Culloden I/C, Cabell & Putnam Counties, WV** – Design Engineer of the storm water system on a WVDOH project for the I-64 interchange and modifications of Route 60/21.

**North Mineral Wells Relocated WV 14, Mineral Wells, WV**— Design Engineer for the storm water system and culverts on a WVDOH four lane divided highway project for the relocation and upgrade of approximately 1.5 miles of WV 14.

**Pleasant Valley I/C to WV Route 310 I/C, Marion County, Fairmont, WV** – Design Engineer for the storm water system on a WVDOH project for the widening of approximately 1.5 miles of I-79 from a 4-lane road to an 8-lane road.

**Harsh Sugar Camp Bridge, WV**— Design Engineer for a scour analysis of the piers and abutments on a replacement bridge for a WVDOH project.

**Fort Seybert Bridge, WV** – Design Engineer for a scour analysis of the piers and abutments on a replacement bridge for a WVDOH project.

**US Route 35 Relocation, near Buffalo, WV** – Design Engineer for a scour analysis of the piers and abutments on three new bridges for a WVDOH project. Design Engineer for the storm water system and culverts on a WVDOH four lane divided highway project for the relocation and upgrade of

approximately 3 miles of US 35 to a four-lane divided highway.

**New River Bridge, Hinton, WV** – Design Engineer for a scour analysis of the piers and abutments on an existing bridge for a WVDOH project.



**EDUCATION**

B.A. Accounting,  
Marshall University

Engineering &  
Construction  
Management,  
West Virginia State  
University

**WORK  
EXPERIENCE**

2009 - Present  
TERRADON  
Corporation

Thrasher  
Engineering

Day & Zimmerman

Ghosh Engineering

**CERTIFICATIONS**  
WVDOH Aggregate

WVDOH  
Compaction

WVDOH Portland  
Cement Inspector

WVDOH Portland  
Cement Technician

OSHA 10-Hour  
Construction Safety  
and Health

WVDOH  
Bridgemont TRET  
Certification—Level  
III

OPEC  
SafeLandUSA

Michael Ward serves as a Senior Field Technician for TERRADON Corporation. He has provided construction management, construction observation, testing, and inspection services in the engineering industry for 30 years. Ward serves as a third-party independent inspector, or the owner's representative for municipal, commercial and industrial projects. He has extensive experience in heavy highway construction, underground utilities, soils, asphalt, concrete, grout, auger cast piles, and anchor testing.

**PROJECT EXPERIENCE****The Summit Bechtel Family National Scouting Reserve  
Glen Jean, WV**

As the Senior Inspector, provided QA/QC inspection services during the construction of four (4) earthen dams. Inspection consisted of the observation of fill placement, soil compaction testing of fill, observation of concrete placement for spillways and strength testing of concrete. In addition, Mr. Ward performed evaluations of soil borrow areas used as fill material for the construction of these four (4) dams. Daily and weekly inspection logs were completed and turned into the client for documentation of construction activities and progress. In addition, the Senior Inspector led the construction inspection team which oversaw QA/QC on 14 miles of new road construction built to WVDOH specifications; installation of 64 miles of underground utilities, including 21 miles of waterline, 24 miles of sewer line, 17 miles of electric conduit, and 2 miles of gas lines; installation of the largest grey/ Blackwater sewage system east of the Mississippi. The camp also had 600 acres cleared, grubbed and graded with 28 miles of drainage swales, including erosion and sediment control best management practices. The work also included the testing of over 7,000 CY of structural concrete and over 5 Million CY of mass excavation and compaction. In addition 4 earthen dams were built with over 800,000 CY of embankment.

**Above Ground Storage Tank Inspections  
West Virginia, Statewide**

Senior Inspector for approximately 1,800 Aboveground Storage Tank (AST) inspections. Task included navigation to and conducting field inspections of AST's according to the specifications of WVDEP. Tanks were certified as Fit for Service, Fit for Service but Repairs Required, or Not Fit for Service. The field inspections also included marking each AST with the company emergency contact number, WVDEP's emergency spill number, and the WVDEP tank identification number.

**City of Dunbar Wastewater Treatment Plant  
Dunbar, WV**

Construction Manager and Field Inspector 10M Wastewater treatment plant and storm and sanitary line upgrades for the City of Dunbar, WV and the West Virginia Department of Environmental Protection. Contracts 2&3 installation of storm conduit and wastewater piping Inspection of 50,000 ft. of waste water and sanitary piping. 48" to 6". Excavation depths 6' to 28' monitoring excavation, backfill and compaction procedures and road repairs to ensure compliance with approved plans and specifications, inspection for alignment, grade and leakage. Extensive documentation and resolve of any complaints concerning construction activities.



## ROBERT THAW, PS

LEAD SURVEYOR

### EDUCATION

A.S. Survey  
Technology, West  
Virginia Institute of  
Technology

B.S. Surveying,  
West Virginia  
Institute of  
Technology

### WORK EXPERIENCE

TERRADON  
Corporation  
1994-Present

Bowman Land  
Surveying  
1992-1994

Dunn Engineers  
1990-1992

Kelley Gidley Blair  
& Wolfe  
1988-1990

Pierson &  
Whitman  
Architects and  
Engineers  
1984-1986

### REGISTRATIONS

Professional  
Surveyor: WV

With more than 30 years of experience in a wide range of surveying projects, Robert Thaw serves as head of TERRADON's Survey and Mapping department. He organizes and supervises survey crews, reviews project plans, and creates base mapping for various projects including noise barriers, interchanges, connectors, bypasses, sidewalks, bike paths, and bridges. Thaw oversees all TERRADON survey activities, including: preparation of Right-Of-Way plans; the development of GPS static networks for aerial mapping in the design of roadways; identification of existing utilities and property lines; base image development and control placement for construction projects; and drafting of legal descriptions for ROW parcels.

### PROJECT EXPERIENCE

#### Laurel Fork Campground Bridge

TERRADON provided surveying and design engineering on a USDA Forest Service project in Randolph County, West Virginia. Surveyors led by Thaw provided Right-Of-Way services, including courthouse research, construction easements, and location of alignments. Additionally, provided topographic mapping, project control for construction, hydraulic cross sections, and stream profiles.

#### Sedalia Arch Bridge

Thaw oversaw survey services for the replacement of an existing concrete arch bridge with a 72' single span bridge. The bridge consisted of adjacent concrete pre-stressed box beams with a cast-in-place concrete deck. Survey services consisted of a topographic survey, ROW plans, construction control, and legal description creation. Roadway design consisted of new bridge approaches and a designed detour. Drainage, maintenance of traffic, and right-of-way plans were included in the scope of work.

#### Sleeth's Run Bridge

Thaw provided Right-Of-Way services during the design for the replacement of an existing truss bridge in Lewis County, WV. The project included the design of a new 200' structure and approaches. Survey services consisted of a topographic survey, ROW plans, construction control, and legal description creation.

#### Grade Road

Thaw oversaw Right-Of-Way services for the new construction of two lanes adjacent to an existing two-lane roadway. Right-Of-Way services included Right-Of-Way Plans, legal descriptions, and questionnaires for take parcels.

#### St. Mary's Bypass

Working for the WVDOT, Thaw led transportation survey services for the relocation of WV 16 in Pleasants County, from Pleasants County Route 18 to WV 2 in Saint Mary's, West Virginia for approximately two miles of highway. The project included topographic mapping, survey control mapping, right-of-way and utility cost estimates, and inventories.

**TERRADON**

**EDUCATION**

B.S. Engineering  
Technology/  
Surveying, West  
Virginia Institute of  
Technology

**WORK****EXPERIENCE**

1999-Present  
TERRADON  
Corporation

1997-1999  
Trans Ash

1997  
Summit Engineering

1996-1997  
USGS

**PROFESSIONAL  
QUALIFICATIONS**

Registered  
Professional  
Surveyor: WV, TN

Since joining TERRADON in 1999, Dave Brown has been involved in highway design/right of way projects and many surveying projects in West Virginia and surrounding states. Brown's responsibilities include survey project management, GPS networks, control surveys, subdivision design, development of highway Right-of-Way Plans, boundary solutions, reports, courthouse research, drafting, construction staking, survey data reduction, and preparation of surveying cost estimates and proposals.

**RELEVANT PROJECT EXPERIENCE****The Summit Bechtel Family National Scouting Reserve (SBR)  
Glen Jean, WV**

Assisted in incorporating design drawings from multiple sources and as-built features into an overall GIS for the project. This work consisted of organizing drawings in different phases (preliminary, final, as-built) from the various engineering and architectural firms working on the project to keep a current plan of the site at all times during construction. Provided construction staking, volume calculations for various aspects of the project. Collected as-built information, including x,y,z, locations of all underground utilities installed on the Summit Bechtel Reserve, which was incorporated into GIS. This information was collected by conventional survey method and by real-time GPS, utilizing the WVDOT VRS network. This information is invaluable for future development and conflict avoidance during construction. Additionally, supervised a 14.5-mile boundary survey of a portion of the SBR property boundary line.

**WVDOT Corridor L Right of Way Project  
Summersville, WV**

Performed a GPS static network and placed aerial mapping target control for aerial mapping for the project in Nicholas County, WV. Performed boundary ties, hydraulic cross sections, mapped existing underground and above ground utilities, and established reference points for the project.

**Harris Riverfront Park  
Huntington, WV**

Prepared a detailed topographic and existing utility survey of the 50 + acre site, including a 25 acre hydrographic survey of the Ohio River —utilizing GPS and sonar equipment to map the river bottom for design of a new marina. Existing underground utilities were located and surveyed to avoid conflict during construction and aid in design.

**Yeager Airport  
Charleston, WV**

Conducted an ALTA/NSPS survey for the 19 acre General Aviation portion of Yeager Airport, which involved creation of a new surveyed boundary line for the leasehold area. The title commitment involved over 130 Schedule B2 items, which were examined and reconciled as to their affect on the subject property.

**WV Turnpike Bridges**

Prepared detailed surveys of two bridges on I-77 Turnpike, which including x,y,z locations of existing bridge girders, pier caps, abutments, bridge decks and topographic survey of the area surrounding the bridge, along with underground utility location. Surfaces were delivered for the bottoms of the girders, tops of pier caps and abutments and decks to allow for design of the bridge deck replacements.