

# S&ME

*Engineering leader is “Built for Versatility”*

By Greg Canivan, P.E., S&ME

**S**&ME has established itself as a national leader in engineering with a diverse range of services and expertise. For over 40 years, we have been helping our clients in the industrial, government, commercial, power, and transportation industries overcome complex compliance requirements and adverse land conditions using our proficiency in emerging trends and technologies, while maintaining our commitment to safety. Looking to the past as a foundation, S&ME set out to create a bold new vision for the future of the firm. Versatility stood out as a defining value, and it has become the cornerstone of our new brand and tagline, “Built for Versatility.”

## Who we are

S&ME is an employee-owned, ENR Top 100 engineering firm with international reach and expertise in geotechnical, civil, environmental, construction and planning services. S&ME was founded in 1973 as a geotechnical and materials testing firm with just one office in Raleigh, N.C. For the next 15 years, the

firm grew steadily and expanded geographically, adding environmental services to the mix by the mid-1980s. In 1987, the firm was acquired by Westinghouse, who sold it back to several S&ME staff in 1993. Since that time, S&ME has experienced sustainable-profitable growth. Our growth was enhanced by several key acquisitions over the past decade that prove to support our vision of transitioning S&ME from a traditional southeast geotechnical, construction materials testing and environmental firm to a national firm, providing a broad range of professional services. S&ME acquired QORE Property Sciences in 2010 and BBC&M in 2011, two firms that provided services similar to our own. In 2014, we departed from this strategy and acquired Littlejohn, a Nashville-based civil engineering firm known for its infrastructure planning, surveying and engineering services. With over 1,100 employees operating out of 36 U.S. offices, we use our abundant technical resources and experience to help our clients quickly identify the best solution and efficiently meet objectives.





### **S&ME and the driven pile industry**

S&ME has performed thousands of geotechnical explorations. Approximately half of our work consists of geotechnical, materials testing and construction engineering services. In addition to subsurface explorations, we routinely perform axial and lateral pile analyses, develop foundation testing programs, perform drivability analyses, monitor pile installation and perform pile testing, vibration monitoring and pre-construction surveys. Although subsurface conditions vary beneath the vast array of project sites we service, in general, we find that the geology is often well suited to driven piles. Therefore, driven piles are typically considered as a design option when controlling deformation under service, strength or when extreme loading is a concern.

S&ME has developed and implemented numerous comprehensive foundation testing programs and recognizes the benefits of design-phase load testing over traditional static load testing approaches. We install instrumentation within foundation elements prior to static load testing to provide load transfer and displacement measurements within the various bearing strata. We also frequently install instrumentation in the surrounding soil to measure displacements and pore pressure changes. Our engineers are well known at universities and at technical conferences for their presentations promoting the benefits of design-phase load test programs.

In addition to our expertise with static load tests, we are prominently involved with low-strain and high-strain dynamic testing. With the purchase of our first Pile Driving Analyzer® (PDA) in 1990, S&ME began offering in-house high-strain dynamic pile testing services. S&ME now maintains numerous PDAs, and regularly performs tests on timber, steel, fiber-reinforced and prestressed concrete piles. Recognizing the importance of training and continuing education in the complex field of foundation testing, our operators routinely receive training by experts in the field of deep foundation testing. An understanding of the fundamental aspects of the test method as well as the geotechnical principles of foundation design is a vital part of successful testing. For that

reason, we require that our operators be professionals (i.e., at least a BS in engineering and an EIT registration) who regularly participate in geotechnical and materials engineering projects in addition to their foundation testing duties. S&ME currently has 12 trained and experienced professionals who have passed the voluntary “Dynamic Measurement & Analysis Proficiency Test” available to perform dynamic pile testing.

### **Project spotlights**

#### **Portsmouth Bypass**

S&ME received a 2014 Christmas present of sorts when the Geotechnical Business Unit began the company’s first large-scale public-private-partnership project, which is located in Southern Ohio near the border with Kentucky. The Portsmouth Bypass (State Route 823) is a design-build-finance-operate-maintain design-build project requiring the developer, Portsmouth Gateway Group, maintain the project for 35 years after substantial completion. The four-year, approximately \$425-million design and construction project consists of 16 miles of four-lane highway, five interchanges and 22 bridges.

S&ME’s original \$3.5-million contract for Portsmouth Bypass now approaches \$4.5 million from approved amendments and pending change orders. The alignment had been extensively (900 borings) explored previously, so the majority of those fees are for geotechnical engineering services rather than for subsurface exploration and laboratory testing. Streamlining the additional exploration during the design phase brought value to the developer, and helped meet the aggressive design schedule. Geotechnical submissions were required at the 60 percent, 100 percent and RFC milestones. Between January 2015 and June 2016, 119 geotechnical deliverables were submitted. Sixty-three of the submissions were due within the first six months alone. It is estimated that another 50 to 70 submissions have been prepared addressing additional services such as instrumentation reviews, addendums, soil/rock waste mound analyses, etc. Approximately 35 geotechnical engineers



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from across the S&ME dedicated their time and talents to meet the aggressive deliverables schedule, and leaned on the remaining geotechnical professionals to staff other projects and assure that they were completed in a timely manner. Between January 2015 and 2017, S&ME had dedicated over 31,000 man-hours to the Portsmouth Bypass project.

The bypass alignment is above the river floodplain, necessitating approximately 20 million CY of earthwork, including fills of up to 150 feet and cuts up to 200 feet as elevations ranged from approximately 500 to 1,100 feet. This massive earthwork quantity necessitated significant slope stability and settlement analyses so that embankments could be designed and constructed in accordance with project performance requirements. The bridges are founded on various deep and shallow foundation systems, and in the end it is anticipated that approximately 60,000 linear feet of steel piling will be driven to bedrock for bridge support.

### Emergency bridge replacements

Between October 1 and 5, 2015, a combination of a stationary low-pressure system off the coast, a slow moving upper low to the west and a persistent plume of tropical moisture associated with Hurricane Joaquin funneled a record rainfall over portions of South Carolina. Some areas experienced more than 20 inches of rainfall, with many locations recording rainfall rates of two inches per hour. This caused major flooding that resulted in 19 fatalities, and damage losses estimated at \$1.5 billion. During the rain event, approximately 410 roads and bridges, including 75 miles of I-95 between I-26 and I-20, were closed due to high water, flood inundation or safety.

After assessment of hundreds of bridges throughout the state of South Carolina, SCDOT issued “emergency” requests for design-build proposals as a mechanism to efficiently design, construct and ultimately re-open roadway segments closed by the flooding. S&ME was a part of successful teams who won Packages 2, 5 and 6. The RFP for Package 2 was issued in late October 2015, and by the end of 2015 S&ME had completed the geotechnical design of both bridges included in the package. Based on collaboration with the contractor, driven piles were the preferred option at the end (HP14x89) and interior (24-in. square, pre-stressed concrete with HP extensions) bents for various reasons, including cost, schedule and the ability to self-perform installation. S&ME also provided dynamic testing services for the bridges, which had an aggressive substantial completion date of April 15, 2016.

The RFP for Package 5, which included the replacement of four bridges, and Package 6, which included the replacement of

three bridges, were issued on February 1, 2016 and May 23, 2016, respectively. The bridges were to be substantially completed by November 15 and December 31, 2016; therefore, design and ultimately construction of seven bridges was occurring simultaneously. As with Package 2, driven piles were the preferred option for full support of six of the seven bridges included in Packages 5 and 6. The seventh bridge employed driven piles at the end bents only. With designs complete by the summer of 2016, S&ME engineers traversed South Carolina performing many dynamic tests during installation and restrike of the HP and PSC piles at the seven bridge locations.

### Support for PDCA and the deep foundation industry

S&ME has been a strong supporter of PDCA. Of particular note, more than 60 S&ME engineers attended the 2010 Design and Installation of Cost-Efficient Piles (DICEP) Seminar, which was held in Charleston, S.C. Greg Canivan, P.E., a technical principal with over 20 years’ experience with S&ME, has served on the board of the PDCA of South Carolina Chapter since 2006, and currently serves as chapter’s president. As chapter president, Canivan currently sits on the national PDCA Board, and is active on the Chapters and Communications Committees. Canivan and Billy Camp, P.E, D.GE, also a technical principal with S&ME, have helped organize seven highly successful biennial Driven Pile Technical Seminars on behalf of the PDCA of South Carolina Chapter. Camp is an active member of the PDCA Technical Committee, is the past president of the American Society of Civil Engineers (ASCE) Geotechnical Institute, and he has helped organize two joint PDCA/DFI Driven Pile Seminars (Baltimore and Chicago).

The geotechnical engineering community benefits greatly from engineers that share their experiences in the technical literature. S&ME’s engineers recognize the importance of technical publications and have published numerous papers related to driven piles. S&ME engineers frequently make deep foundation presentations at universities and engineering conferences, and also provide support for driven pile related research performed by various universities and PDCA.

Along with other PDCA of South Carolina members, S&ME stepped up to provide in-kind materials testing and high-strain dynamic testing services to assist Auburn University alumnus Neill Belk and his advisor professor Brian Anderson, Ph.D. with research into using lightweight aggregate (LWA) concrete piles. A summary of this research is presented in *PileDriver* magazine (Q1 2013, pages 101-104), and Belk’s dissertation is available at

## MEMBER PROFILE – ENGINEERING AFFILIATE

Piledrivers.org. Piles were cast and driven by local Charleston PDCA members at the Citadel’s Outdoor Soils Lab.

In-kind services were also provided by S&ME and other PDCA of South Carolina chapter members in support of Oregon State University alumnus Tygh Gianella and his advisor, professor Armin Stuedlein, Ph.D. with research into the use of driven timber piles as a method of ground improvement. Full-scale, controlled blasting field tests on driven displacement pile-improved ground were conducted to study the response of densified and reinforced ground to blast-induced excess pore pressures. S&ME performed cone penetration tests (CPT) with seismic measurements before and after pile installation, and monitored pile installation with a PDA and performed subsequent CAPWAP to refine the collected data.

Papers on the research have been written by Stuedlein, Gianella and Canivan and presented in several peer-reviewed conference proceedings and the *Journal of Geotechnical and Geoenvironmental Engineering* (JGEE).

A synopsis of the timber pile research is summarized in the 2017 JGEE abstract:

“In order to make appropriate comparisons to the baseline response of the native, unimproved ground,

explosive charges sufficient to induce liquefaction were detonated in a control zone and the resulting post liquefaction settlements were measured. Excess pore pressures generated in the improved ground were observed to be significantly smaller than that in the unimproved ground, and resulted in settlements that were generally one-sixth to one-third of that measured in the unimproved ground. Piles tipped into a dense bearing layer settled significantly less than the surrounding soil and piles that were floated above the bearing layer.”

### Built for versatility

S&ME has become a trusted engineering and design firm for resources, knowledge and fresh perspectives on old problems. For those who don’t know us, we invite you to meet the revitalized S&ME. We also thank our existing clients for their continued trust and for their invaluable participation in our rebranding process. Versatility will not only star in our external brand, it will continue to guide and inspire. S&ME’s vision for the future also includes a continued commitment to safety, sustainability and quality, and to its employee-owned legacy. ▼

Photos courtesy of S&ME, Inc.

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### EFFICIENT SOLUTIONS FOR YOUR PROJECT



**MKT V2Esc / V5Esc  
Side Clamp Vibro**

Driving Force	25–53 tons
Weight	5,500–10,000 lbs
Excavator Size	45,000–95,000 lbs



**CZM EK 125HH  
Hydraulic Impact Hammer Rig**

Ram Weight	4 tons
Rated Energy	2,700–32,000 ft-lbs
CAT 320 Tier IV	83,000 lbs single transport



**CZM EK125  
Drilled Shaft Rig**

Max Depth / Diameter	120 ft / 5 ft
Max Torque	90,000 ft-lbs
CAT 320 Tier IV	78,000 lbs single transport



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