

2019 PENC Summer Conference Abstracts

Thursday, June 6

10:10-11:10am

Speaker: TBD

Title: TBD

11:20am-12:20pm

Speaker: Todd Rouse, PE, Cypress Creek Renewables, Sr. Director of Engineering

Title: Shining a Light on Solar Power

North Carolina ranks 2nd in installed solar, behind California, at 4,671 MW (2017) with an estimated additional 900 MW projected for 2018. This represents 5.44% of the State's Electricity from Solar, helping meet the NC Senate Bill 3 established Renewable Energy Portfolio Standard (REP) of 12.5% in 2020. This presentation will provide a general overview of how solar works, the US electric utility grid, solar power challenges, solar project sizes, project development and current utility scale solar technology.

Todd Rouse, PE is a registered professional electrical engineer in NC and SC. As Sr. Director of Engineering with Cypress Creek Renewables in Durham, NC, Todd leads the Substation, Protection, Controls and SCADA system functions for utility scale solar. Previously, he worked in engineering consulting with Booth & Associates in Raleigh, NC, and 29 years with Greenville Utilities Commission in Greenville, NC, as a Substation Engineer, COO and Analytics Officer. He holds an MBA from East Carolina University and a BSEE from North Carolina State University.

Keynote Address, 12:30-1:30 PM

Speaker: Louis L. Mitchell, NCDOT

2:00-3:00 PM Track 1

Speaker: Scarlett Kitts, PE, Schnable

Title: North Fork Dam Rehabilitation

2:00-3:00 PM Track 2

Speaker: Eban Z. Bean, PhD, PE, University of Florida, Assistant Professor

Title: Low-Cost Water Quality Monitoring Advancements

Water quality monitoring and sampling to identify non-point sources of pollution have conventionally been labor intensive and expensive tasks. Limited results from points in time and space are often extrapolated and used as the basis for significant infrastructure investments. Off-the-shelf, deployable water quality sondes with telemetry can provide real time, high frequency data but often at a steep cost and at one location. Recent advancements in microcontroller technology and DIY community have driven down costs and increased capabilities. We have leveraged these advancements to develop an open source, low-cost water quality monitoring platform known as GatorByte to make data more accessible to local governments and resource managers. The platform can be a stand alone station with real-time data transmission, or incorporate a GPS module into a form factor the size of a beverage container to function as a flow transported water quality buoy. This presentation will cover new opportunities that advancements like this can provide as well as others like satellite imagery and analysis.

Eban Bean, PhD, PE is an assistant professor and extension specialist at the University of Florida in the Agricultural and Biological Engineering where his work focuses on urban water resources engineering. His work has focused primarily on urban water resources issues,

including stormwater management, urban water quality, on-site wastewater treatment, and urban irrigation conservation. Previously (2012-16), he was an assistant professor at East Carolina University in the Department of Engineering where he led creation of the Environmental Engineering concentration. He received his BS and MS in Biological and Agricultural Engineering from North Carolina State University, and PhD in Agricultural and Biological Engineering from the University of Florida.

3:15-4:15 PM Track 1

Speaker: David J. Evans, NCBELS

Title: NCBELS Enforcement Update

The update from the North Carolina Board of Examiners for Engineers and Surveyors will focus on licensing and exam trends; enforcement; challenges of non-licensed practice, CPC compliance, recent Engineering Committee activities; and possible changes to G.S. 89C/Board Rules.

David joined the staff of the North Carolina Board of Examiners for Engineers and Surveyors in 1998. As the Board's Assistant Executive Director he supervises investigations of engineers, surveyors and corporations as well as non-licensed practice. David also oversees business licensure and compliance; continuing professional competency activities; license applications and renewals; and the Board's regular program of enforcement and education. David previously conducted criminal investigations in the U.S. Army as a Military Police Investigator. He is a past Chairman of the Committee on Law Enforcement for the National Council of Examiners for Engineering and Surveying (NCEES) and currently serves on the Law Enforcement Committee Advisory Group. David has a B.A. in History and Social Science from Eastern Connecticut State University.

3:15-4:15 PM Track 2

Speaker: Randall Etheridge, PE, Assistant Professor, ECU

Title: Water Resources Challenges of Today and the Future

Abstract: The current water resources challenges being faced along North Carolina's coast will only increase as sea levels rise and there are hurricanes such as Matthew and Florence. The potential effects include harming human health and loss of economic sustainability for people in the region. This presentation will provide an overview of the challenges using the following two case studies.

Nearly 15% of the United States population and 30% of North Carolina residents rely on private wells for their drinking water. Portions of rural eastern North Carolina received over 20 inches of rainfall that resulted in catastrophic flooding during Hurricane Florence in 2018. The heavy rainfall and flooding inundated wells and mobilized contaminants from many sources including the waste storage lagoons required for the local animal production industry. In the middle of recovering from such a disaster, contamination of drinking water is a threat to human health that is often overlooked. The varying travel times of contaminants from the surface to aquifers used for drinking water make the potential risks long term. The extent and persistence of groundwater contamination due to extreme events, such as Hurricane Florence, is not known. To better characterize the risk to human health, our team is conducting multiple rounds of post-Florence drinking water well testing for six counties in the Cape Fear River basin. We are specifically targeting wells that were tested by the North Carolina State Laboratory of Public Health in the months prior to Hurricane Florence to provide a baseline before the storm. The collected samples are being tested for nitrate, total coliform, bacterial DNA, and other contaminants. Preliminary results on the groundwater contamination will be presented.

Hyde County, North Carolina is one of the top three counties in the United States for the projected percentage of population that will be displaced due to sea level rise (SLR). Three of the primary industries in the county are commercial fishing, agriculture, and waterfowl hunting/viewing. During

Hurricane Matthew in 2016 the county lost 90% of its cotton crop and over 60% of its soybean crop due to flooding. The centerpiece of the waterfowl hunting/viewing industry, Lake Mattamuskeet, no longer has submerged aquatic vegetation (SAV) as food for waterfowl. The disappearance of SAV can be linked to declines in water quality and increasing water levels. It is possible that the declines in water quality have been accelerated due to pumps added to the surrounding lands as a result of rising water levels. It is expected that these problems will only become worse as SLR increases. Our team has been a part of multiple projects to assist with the process of adapting to SLR in Hyde County. These include monitoring the water quality leaving a row crop farm and a waterfowl impoundment in addition to modeling the reduction in flow in local canals due to SLR. Results from these studies will be presented along with potential solutions that have been put forward by stakeholder driven watershed planning effort.

Randall Etheridge, PE is a registered professional engineer in North Carolina. Randall is currently an assistant professor in the Department of Engineering and the Center for Sustainable Energy and Environmental Engineering at East Carolina University (ECU). Prior to joining ECU, he served as an agricultural engineer with the Southwest Florida Water Management District. In addition to leading the environmental engineering concentration at ECU, his work focuses on helping communities in eastern North Carolina address water quantity and quality issues. He received his PhD and BS in Biological and Agricultural Engineering from North Carolina State University.

Friday, June 7

7:00-8:00 AM

Speaker: Laurie Onorio, PENC Lobbyist, Walk West

Title: Legislative Update

8:00-9:00 AM Track 1

Speaker: Russell Bendel, P.E., Senior Associate, Terracon Consultants, Inc.

Title: Lake Wackena Dam Emergency Spillway Modifications

Abstract: Hurricane Matthew caused the emergency spillway for the Lake Wackena Dam to activate in October 2016, and the outflow created damage to the left side of the outlet just beyond the end-wall of the concrete chute conveyance channel. Significant erosion occurred in the rock riprap outlet channel adjacent to the end of the concrete chute. In addition, the left corner of the concrete apron was undermined. A review of the as-constructed spillway drawings indicated the alignment of the box culverts was skewed toward the left wall of the conveyance chute. A photograph of the activated emergency spillway during Hurricane Matthew showed that cross-waves were present in the conveyance channel and that the hydraulic jump was located in the rock riprap channel beyond the end of concrete. Engineering estimates for extending the spillway to provide energy dissipation measures were \$850,000. As a result of a unique design approach, final construction costs to effectively and safely dissipate the energy were only \$350,000. Computational Fluid Dynamics (CFD) 3-D Computer Modeling provided by Utah State University was paramount in reducing the final costs and providing a predictable model for design. The creativity and experience of researchers at the Utah Water Research Laboratory led to the use of simple modifications to the existing spillway that had significant effects on the ability to dissipate energy. CFD modeling was used to modify the existing spillway configuration to enable all of the energy dissipation measures to be kept within the existing concrete channel at a cost that was significantly less than the original estimates. One month after completion of construction, the spillway modifications were tested as Hurricane Florence punished eastern North Carolina. The actual performance of the spillway performed as predicted by the CFD model, and the client was very pleased.

Russell Bender, PE is a Senior Associate for Terracon's Greensboro, NC office. Russ provides dam evaluation and design services, geotechnical services for data centers, and soil thermal resistivity expertise. His project experience includes serving as Senior Engineer for design and construction of the modifications to the emergency spillway for Lake Wackena Dam, an existing High hazard, 1400-foot long earthfill embankment that impounds a 172-acre lake. He also served as Senior Engineer for rehabilitation design and construction of the modifications to Ledbetter Lake Dam, an existing High hazard mill dam constructed in the 1880s. He received his Bachelor of Science in Civil Engineering from NC State University and is a licensed Professional Engineer in North Carolina, Virginia and South Carolina.

8:00-9:00 AM Track 2

Speaker: Gail Dempsey

Title:

9:10-10:10 AM Track 1

Speaker: Marc F. Plotkin, P.E., D.GE, ECS Southeast, LLP, Principal Engineer and Brian S. Wyatt, P.E., ECS Mid-Atlantic, LLC, Principal Engineer

Title: Tumbling Creek Road

Tumbling Creek Road provides access to portions of the Clinch Mountain Wildlife Management Area (WMA), managed by the Virginia Department of Game and Inland Fisheries (DGIF) for fishing, hunting, birding, as well as other recreational activities. The Clinch Mountain Wildlife WMA, a 25,477-acre mountain forest including Laurel Bed Lake, spans portions of Smyth, Washington, and Russell Counties. Elevations within the WMA range from 2,200 feet along Big Tumbling Creek to 4,700 feet on Beartop Mountain. Tumbling Creek Road was originally constructed as a rail bed accessing the mountainous area with approximate 1.3 horizontal to 1 vertical natural side slopes above and below. In February of 2018, a slope failure occurred within the road closing the road and a main access route to the WMA.

The project had several unique construction and design challenges. Due to limited access and the active slope failure, only limited subsurface information could be collected during the project design phase.

This resulted in many unknown issues that could have slowed construction and resulted in delays and costly change orders to the owner. In order to limit these construction related issues, a Shored Mechanically Stabilized Earth (SMSE) Wall was selected to reconstruct the failed roadway and stabilize the landslide. The shoring consisted of a permanent soil nail wall with shotcrete facing. Contingencies were included in the soil nail wall design to account for the variable rock depth while allowing the removal of fresh slide material. Since soil nail walls are top down construction, this single system would not allow for the required final road width. In order to widen the roadway, a wire basket faced Mechanically Stabilized Earth (MSE) Wall was constructed bearing on rock. The construction drawings allowed for multiple methods of attaching the MSE Wall reinforcing to either rock, soil nail wall or minimum embedment length in backfill. This facilitated the construction project with limited contractor down time as the rock surface was mapped and the soil nail wall was constructed.

The use of a SMSE Wall with combined soil nail wall and MSE Wall allowed the DGIF to procure the landslide repair in a Design-Bid-Build contracting approach. The implementation of various design contingencies resulted in a construction plan that allowed for the necessary construction variations required while working in mountainous terrain. The various design contingencies implemented early in the project allow an anticipated on-time construction completion and with the project under budget.

Marc F. Plotkin, P.E., D.GE.

Mr. Plotkin is a Principal Engineer with ECS Southeast, LLP. Mr. Plotkin is a licensed Professional Engineer in numerous states including North Carolina and Virginia, and has nearly twenty years of

experience in earth retention design, slope stability analysis and deep foundation design. Mr. Plotkin is the Engineer of Record for the Tumbling Creek Road Repair at the Clinch Mountain Wildlife Management Area.

Brian S. Wyatt, P.E.

Mr. Wyatt is a Principal Engineer with ECS Mid-Atlantic, LLC. He is a licensed Professional Engineer in Virginia, North Carolina, and West Virginia, with over 23 years of geotechnical engineering and construction testing and inspection experience. Mr. Wyatt has extensive experience with management of on-call contracts with state agencies, counties, and municipalities, including the Virginia Department of Transportation and Virginia Department of Game and Inland Fisheries.

9:10-10:10 AM Track 2

Speaker: Ryan Moody, PE, Chief Technology Officer, Physcient Inc

Title: Differential Dissector Instrument

Physcient Inc. develops, produces and sells surgical instruments. The concept for the surgical instrument that we have been focused on for the past 4 years was developed by Physcient's founders in conjunction with surgeons. The instrument is called the Differential Dissector and is used to perform blunt dissection. It is a hand held powered device that allows surgeons to find and follow naturally occurring tissue planes thereby reducing the risk and reliance on sharp dissection. The Differential Dissector preserves dense connective tissue like organ capsules, blood vessels and nerve sheaths but disrupts loosely organized tissue thereby producing the differential dissection effect. The dissection effect is produced by a uniquely shaped tip that oscillates. The drive train that oscillates this tip shall be the subject of my presentation. In order to produce the desired dissection effect, the Differential Dissector tip must oscillate at a frequency and amplitude that are unheard of in most systems and given that it is a handheld surgical instrument, it must withstand nearly any force of application at the discretion of the surgeon. The engineering demands on this drivetrain are considerable and the design process required to arrive at this design makes for a good story with engaging graphics and some math and engineering analysis. As far as engineering challenges that lie ahead, it's not particularly related, but at the end of this presentation, I'd like to describe for a moment the engineering challenges that we and the next generation of engineers will encounter as we attempt to preserve structures and coastal communities as they are increasingly threatened and damaged by rising sea levels.

Ryan Moody is a licensed Professional Engineer in North Carolina and a native of Asheville, NC. He attended NCSU and earned a Bachelor of Science degree in Mechanical Engineering (1999) and a Masters Degree in Integrated Manufacturing Systems Engineering with a concentration in Mechatronics (2001). While attending NCSU, Ryan worked for the National Undersea Research Center, Meritor Heavy Vehicle Systems, Volvo Construction Equipment and became an accomplished welder. After Grad School, Ryan joined Nekton Research where he designed and built robotic equipment and became Principal Investigator on several large robotic technology development contracts for the US Army and US Navy. In 2008 Ryan joined iRobot, where he led multi-disciplinary engineering teams to develop maritime robotic equipment. Ryan received the iRobot Rock Award for excellence in leadership and technical development, and was nominated for the iRobot Chairman's Award. Ryan is an inveterate inventor, fabricator and machine designer with numerous patents and publications. In 2014, Ryan joined Physcient Inc. where he became Chief Technology Officer and currently leads new instrument development for the Physcient Differential Dissector technology.

10:20-11:20 AM Track 1

Speaker: Joseph E. Garceau, PE, CFM, Stantec

Title: Base Realignment and Closure Act of 2005

As a result of the Base Realignment and Closure Act of 2005 (BRAC05), the 7th Special Forces Group was targeted to relocate from Fort Bragg, NC to Eglin Air Force Base , FL. After completion of the original Master Plan in late 2006, design work began in early 2007, but was quickly stopped due to noise issues associated with a new jet fighter coming to an adjacent airstrip. A new site had to be identified and a new Master Plan developed. While the new site was being evaluated and master planned, the architectural design for multiple facilities on the new installation continued. The new Master Plan was completed in March 2008 allowing the site design to begin. However, due to the BRAC05 mandated completion date, the plans had to be completed to 100% Ready to Advertise by the end of June 2008. This meant the 350 acre cantonment area and all related items (water, sewer, storm drainage, roads, landscaping, etc., had to be complete within 3 months. The challenge was met and I will share how as part of the presentation and Q&A.

Joe Garceau is a licensed PE in North Carolina with more than 50 years of experience in civil and water resources engineering, primarily for public sector clients. He has been responsible for project management, budgetary control, and overall design quality of numerous civil and water resources projects. His total experience includes flood studies, engineering feasibility studies, life cycle cost analyses, preliminary and final design, permitting, technical specifications and bid documents, construction administration, and construction observation. Joe understands what is necessary to manage projects from the conceptual design phase through completion of construction and has been involved in numerous large and complex public and private projects including military installations, federal facilities, wireless telecommunications sites, airfields, office buildings, shopping centers, college campuses, industrial sites, residential developments, and water and wastewater treatment facilities. Joe is skilled in managing large contracts that involve numerous offices and disciplines across multiple geographic boundaries and time zones throughout the United States. His current responsibilities include financial management for multiple disaster projects under two contracts with FEMA. His disaster experience includes task orders for Substantial Damage Estimate inspections, Public Assistance, and Section 406 Mitigation support.

10:20-10:50 AM Track 2

Speaker: Chuck Pippin, Anchor QEA, Senior Managing Geologist

Title: Non-Intrusive Survey Methods for Underground, Underwater, and Cliff Faces (30 min)

It can be challenging and costly to perform investigations and surveys underground, underwater, or high up on a cliff face. Traditionally these investigations have relied on relatively intrusive methods, such as installing a network of wells or performing an extensive bathymetry survey from a boat. But as technology has advanced, there are a growing number of cost-effective non-intrusive solutions that can provide extensive data sets to supplement a conceptual site model and provide a better tool for decision making. Anchor QEA uses many of these non-intrusive investigation and survey tools:

- Underground: Anchor QEA uses various tools including electrical resistivity imaging (ERI) and electromagnetic (EM) subsurface surveys to identify subsurface and groundwater features.
 - ERI surveys have been used to assess deep fractured bedrock in order to strategically place expensive groundwater monitoring or production wells in optimal locations and depth intervals, which improves the odds of meeting drilling goals over relying solely on an assessment of surface conditions.
 - EM induction and magnetic methods have been used to map underground utilities and construction debris, and to locate metal bodies to a maximum depth of 50 feet.
 - During well installation, the use of downhole geophysical logging using tools such as acoustic and optical viewers, calipers, and heatpulse flow meter, can be used to ensure that screen intervals are placed at the most ideal depths.

- Underwater: Performing bathymetry surveys of a water body is expensive and may provide limited data depending on the time investment. Various technologies can improve the quality and reduce the cost of bathymetry surveys, including sonar and ERI surveys. In addition to leading sonar and ERI surveys, Anchor QEA has been fortunate enough to use aerial LiDAR survey methods on Lake Adger in Polk County, by having the lake level drawn down to expose the investigation area floor.
 - Cliff face: Performing surveys of cliff faces is uncommonly challenging. Anchor QEA recently performed a rock-face assessment of Bridal Falls in Macon County for the US Forest Service. This work is often completed very high up, using either a lift or rope access. Instead, to minimize health and safety concerns and provide an exceptional data set, Anchor QEA employed a LiDAR survey of the cliff face. The data density of the LiDAR survey was more than sufficient to determine the orientations of rock discontinuities and allowed safe access to the entire cliff face. In the future, repeated use of this survey type will allow tracking of changes over time, as an additional identification of higher risk rock areas.
- This presentation will cover several topics relevant to a variety of investigation techniques that may be useful to improve the quality and reduce the cost of your investigations or developments.

10:50-11:20 AM Track 2

Speaker: Robert Cork, Anchor QEA, Managing Engineer

Title: Beneficial Use of Dredged Sediment to Create In-Lake Ecological Habitat (30 min)

Identifying a cost-efficient and suitable location to place sediment removed from Polk County's Lake Adger has proven difficult over the past years. In 2018, after Polk County and the North Carolina Wildlife Resources Commission had considered several options, Anchor QEA proposed an innovative beneficial use solution that would create an in-lake ecological habitat from sediment removed from the lake's navigation channel during maintenance dredging.

Anchor QEA completed pre-design investigations in 2018, and we are now moving into the design phase. At this time, it is anticipated that the 6,800 cubic yards of sediment will be used to enhance and create in-lake wetlands, and possibly islands or hammocks to provide greater capacity for sediment placement.

Key engineering design features of the project include:

- Selection of a dredging and dewatering methodology that allows the efficient transfer of dredged material from the lake navigation channel to the placement location, which has several feet of soft sediment and daily varying water levels.
- Engineering the design of the in-lake wetlands and hammocks to ensure that they remain stable during flood events, while establishing and maintaining suitable ecological habitat.
- Consideration of a construction option to modify braided channels as the Green River enters Lake Adger, to reduce future sedimentation of the navigation channel, and hence, to reduce future maintenance dredging needs.
- Development of a HEC-RAS 2D model to simulate velocities, shear stresses, and water surface elevations over a range of flow conditions to assess the stability of the proposed sediment placement design and possible Green River modifications.
- Working with the U.S. Army Corps of Engineers and North Carolina Department of Environmental Quality to identify efficient permitting processes, including consideration of Nationwide Permit or Individual Permit options.

Anchor QEA anticipates completing the design and permitting in 2019, followed by dredging and construction in 2020.

This presentation will cover several topics relevant to a variety of engineering projects, such as modelling of currents and sediment deposition, dredging and dewatering techniques, innovative engineering design to create ecological habitat, and options for navigating the permitting process

11:30-12:30 Track 1**Speaker: Ben Beagle, Tideland EMC****Title: OBX Blackout**

Mr. Ben Beagle with Tideland EMC will discuss the behind the scenes issues that they faced that fateful day of July 27, 2017 when they learned that the power to Hatteras and Ocracoke had been knocked out. The issues involving the race to splice the existing cable versus installing an overhead line, how the peaking plant generator on Ocracoke failed after operating for approximately 10 minutes, the troubles faced getting temporary generators to the island, getting them up and running and getting the power demand down low enough that the generators could keep up. All the while hearing about how this was ruining the tourist season.

Ben Beagle serves as the Manager of Engineering and Operations for Tideland Electric Membership Corporation headquartered in Pantego, NC. A 39 year veteran of the industry, Ben began his career with American Electric Power in Bluefield, West Virginia supervising construction projects for AEP's transmission network. His utility experience includes numerous varied job assignments in transmission, distribution, and substation with investor owned utilities as well as electric cooperatives. A native of Roanoke, Virginia, Ben currently resides in Belhaven, NC with his wife Gloria and two Boxer dogs.

11:30-12:30 Track 2**Mick Ribault****President, Dragonfly Pond Works****Stormwater Control Measures**

The numbers of Stormwater Control Measures (SCMs) are increasing every year. The North Carolina has a wide variety of County and Municipal Stormwater programs in place to keep these systems functioning properly and compliant. As a private SCM management company, we have encountered stormwater programs that work well in achieving compliance, while other programs that fail to achieve compliance and good system function. Many programs add unnecessary time and money to the process. We will give an overview of the different regulations in places such as Raleigh, Morrisville, Durham, Charlotte, and Concord. We will discuss ways to improve the compliance process for all stakeholders: SCM Owners, Private Sector Inspectors and Municipalities.

Mick is the founder and President of Dragonfly Pond Works. His lifelong love of nature and the environment led him to earn a degree in Fisheries and Wildlife Science from North Carolina State University. During the years leading up to his founding of Dragonfly, Mick worked in a variety of environmental positions—from an early, ground-floor position as an aquatic applicator to later gaining his certification as a BMP Inspector of stormwater retention facilities, and eventually becoming a General Contractor, specializing in grading and excavating.

Throughout his 19 years working in the field of lake and pond management, Mick has been a steadfast believer in lifelong learning and continual professional growth. Today, he expresses that belief as the overseer of Dragonfly University, the company's internal professional development program. He refers to himself as the "cultural gatekeeper" at Dragonfly. As President of Dragonfly his goal is to build a company that solves client problems and executes its responsibilities with professionalism, passion and a desire to pursue continuous improvement.

Keynote Address, 12:30-2:00 PM**Speaker: Jesse Jacobson, BLE Corporation****Title: Harrah's Expansion Project****2:00-3:00 PM - Optional Tour of Harrah's Expansion****Advance registration required.**

2:00-3:00pm Track 1**Speaker: Iona L. Thomas, AICP, McAdams****Title: The Last Only Woman in the Room**

Our current model for women in the workplace often reflects those who succeed against a gauntlet of challenges. We hold up these women as models of success without examining the message that sends to our industry – that struggling against bias and discrimination is a necessary part of a professional woman's journey. Implicit or unconscious bias has a demonstrably negative impact on team performance, problem solving and innovation.

Iona will explore current research on how lack of diversity impacts the bottom line, what workplace bias looks like and how each of us can contribute to creating equitable team environments. Ultimately, Iona proposes a new model for women in the transportation fields that cultivates talent, leadership and innovation and moves beyond the limiting stereotype of a determined fighter.

Iona L. Thomas, AICP leads Public Sector pursuits and project deliver for McAdams a multidisciplinary engineering and design firm with offices in North Carolina and Texas. She began her career in the defense industry and has steadily navigated towards work creating strong, resilient communities. Iona currently serves on the Boards of the American Council of Engineering Companies North Carolina, East Coast Greenway Alliance and Downtown Durham Inc. She is a passionate advocate for authentic diversity in the workplace.

2:00-3:00 PM Track 2**Speaker: Dan Brubaker, PE, CFM, NCDPS****Title: Substantial Damage Estimates Following Flooding Events**

The Substantial Damage requirement is designed to reduce the risk to older, non-compliant structures. Hurricane Florence was the second 0.2% storm across eastern North Carolina in two years, following Hurricane Matthew in 2016. This presentation will explore the unexpected challenges with performing substantial damage assessments in areas where assessments were performed two years previously, and how the substantial damage requirement and process may be improved in order to better achieve its goal.

Dan Brubaker, P.E., CFM has served as the National Flood Insurance Program Engineer for the State of North Carolina since June 2011, and as the NFIP Coordinator since January 2017. He assists North Carolina municipalities with technical questions and reviews of engineering reports, reviews engineering information associated with North Carolina map maintenance, provides training and community assistance visits.

3:15-4:15 PM**Women's Wine and Chat**

All are welcome. Join us for an informal discussion on topics like work-life balance, gender equality and more.

3:15-4:15 PM Track 1**Speaker: David P. Martini, PE, F.NSPE, NSPE President Elect****Title: NSPE Update**

Hear an update from NSPE President Elect on Threats to Licensure across the United States, a look at NSPE's Strategic Plan and other NSPE activities.

David Martini is the President Elect of NSPE. He is a 1994 graduate of North Dakota State University with a BS in Civil Engineering. In 2002, he also received a MS in Infrastructure Systems Engineering from the University of Minnesota. Mr. Martini is a Principal Engineer with the firm Bolton & Menk, Inc. in Chaska, MN. He is a Licensed Professional Engineer with job responsibilities that include the management of a variety of municipal engineering projects including water supply, wastewater, drainage, and streets. Mr. Martini has been a member of NSPE since 1994. Over the years he has been very active in promoting and protecting the value of Professional Engineering Licensure by advocating that certain positions and responsibilities require a Licensed Professional Engineer to ensure that the health, safety, and welfare of the public is protected.

3:15-4:15 PM Track 2

Speaker: Dr. David Young, PE , Professor of Civil and Environmental Engineering at UNC Charlotte

Title: Challenges Facing Engineering Education in North Carolina

Over the past few years, academic programs throughout the U.S have been altered or established in response to published needs for changes in engineering education. The pressing needs are for increasing the number of students enrolling in engineering programs and for better preparing graduates for evolving job expectations. North Carolina's participation in these changes is reflected in various reports that count up to 63 "engineering" programs in the state. These programs include intro to -engineering curricula at college-preparatory high schools located on community college and university campuses. They expand into pre-engineering, technology, and associate engineering programs at community colleges and then to BS, MS, PhD programs at universities. At all locations, innovations in scheduling, curricula, teaching and learning methods, and easier flow between programs will attract more students. Expanded real-world applications in coursework, more engagement with industry inside and outside the classroom, less cumbersome access to MS degrees, and earlier career guidance will make students better prepared as graduates.

The predictions made above are ideal, but in reality they are challenged by several competing factors. Many "digital world" students today are accustomed to rapid satisfaction of their goals and turn away from engineering because they perceive it to be slow and plodding in delivering results. Industry desires graduates who can understand the basics of math and science, work in teams and communicate, and apply their knowledge in the lab, office, and field. Most professors still view a university education as broadly preparing students as citizens of the world, and they resist any transition from education to training. Accreditors and administrators apply pressure to all in attempts to maintain quality, improve graduation rates, and keep costs down. This presentation will describe in detail the changes mentioned above and what is happening in North Carolina. Attention will be given to how new and revised programs are fitting together to meet challenges and move toward a holistic solution for more and better-prepared engineers. At the same time impacts of changes on students, academia, industry, and the profession will be described and predictions offered.

Dr. David T. Young, PE is a professor in the UNC Charlotte Department of Civil and Environmental Engineering, which he chaired for 18 years. For two years he served as the director of the IDEAS (sustainability) Center, and for nine years the director of the campus-wide INES PhD Program. Until recently he served as the associate director of the Energy Production and Infrastructure Center (EPIC). During his 32 years as UNC Charlotte, he has conducted research in the area of structures and materials, with much of his work funded by industry, publishing 100+ articles and reports on his work and presenting his work at conferences around the world. Currently, he teaches courses in structural analysis and design, forensic engineering, and power plant design.

6:30pm - Awards Dinner Keynote

Speaker:

Title:

Saturday, June 8

7:00-8:00 AM

PENC Membership Meeting

8:00-10:00 AM

Leadership Institute Presentations

10:15-11:15 AM Track 1

Speaker: Christopher K Horne, PE, eMuWave, PLLC

Title: Engineering the Wireless Building - Techniques and Tradeoffs

Building construction projects often overlook the need for WiFi and Cellular infrastructure during the bid and design phase. Then, typically, after the building construction is completed the owner/tenants request a distributed low-voltage wireless system would add value to the owner-client relationship by offering ubiquitous wireless coverage. The challenge is the installation costs increase significantly when the add-on wireless systems are employed in the post-construction phase. Additionally, the owner determines a public safety (police/fire) radio system may also be needed to meet fire safety regulations inside the building. The author designs and manages turn-key wireless infrastructure in small and large buildings and will share case studies in several venues for application and manager planning. The case studies will show the cost benefit of engaging the client and wireless service providers in the early stage of a project to determine technical requirements.

Christopher K Horne, PE is the principal engineer with eMuWave, PLLC, a multi-disciplinary engineering consulting firm offering expertise in electrical and mechanical systems as well as communications infrastructure. eMuWave stands for 'e'- electrical, 'M'-mechanical and 'Wave'-electromagnetic waves. Engineering services include design of plumbing, lighting, power and HVAC for commercial buildings. eMuWave also provides design and evaluation of cellular, WiFi, Fire and Police public safety radio systems as well as AM, FM and TV broadcast systems for regulatory compliance and network interoperability. Mr. Horne is a licensed Professional Engineer in North and South Carolina, Florida and several other states and a member of ASHRAE and IEEE and Vice President of the Association of Federal Communication Consulting Engineers. He has served as an expert witness to attorneys in legal cases including radio frequency (RF) interference issues and related FCC matters. He has also designed, constructed or supervised over three dozen construction projects that included wireless systems. Mr. Horne worked in outside plant construction at AT&T from 1996 to 2010 and LBA Group from 2010 to 2015 before launching eMuWave Engineering in 2016. Mr. Horne holds a Masters in Electrical Engineering from NC State University and an MBA from East Carolina University. While not engaging in engineering projects, Mr. Horne teaches an engineering problem solving course to freshman at NC A&T State University in Greensboro. His personal interests include long-distance running, family, working on antique cars and amateur radio.

10:15-11:15 AM Track 2

Speaker: Sam Stryker

Title: Electric Grid Reliability

NEED ABSTRACT

Sam Stryker is a retired Senior Executive Engineer Consultant with Utility Systems Efficiencies, Inc. (USE), and was most recently engaged in efforts to assist clients throughout the US in the development and refinement of activities related to compliance with North American Electric Reliability Council (NERC) reliability Standards. Previously, he was a Senior Compliance Auditor in SERC Reliability Corporation, a nonprofit corporation responsible for promoting and improving the reliability, adequacy, and critical infrastructure protection of the bulk power system in all or portions of 16 southeastern and central states.

Mr. Stryker served as the Manager of Engineering at the Fayetteville, NC Public Works Commission for over 16 years. In that position, Sam was responsible for the activities related to compliance with NERC Standards and SERC Supplements. Mr. Stryker has a B.E.E. degree from the Georgia Institute of Technology. He is a Life Member of the IEEE Power Engineering Society and NSPE/PENC. He is a currently registered Professional Engineer in the Commonwealth of Virginia and the State of North Carolina.

11:30-3:30 PM Track 1**Substantial Damage Training*****Pre-Registration Required*****11:30-12:30 Track 2****Speaker: Dr. Lenoard W. White, PE, RCDD, NSF FREEDM Systems Center, NCSU****Title: Microgrids**

Microgrids come in all sizes and ratings. We'll take a look at the definition of microgrids, the individual components, how they work and potential difficulties. The NFPA-99 Electrical Committee has established a sub-committee assigned to looking at microgrids. We'll discuss how microgrids may be used as generating resources in a hospitals essential electrical system.

Leonard W. White was born in Henderson, NC, USA in 1945. He received a BS from NC State University in 1969, in Engineering Operations, a MS in Electrical and Computer Engineering from NC State University in 1986, and a PhD in Electrical Engineering at NC State University in 2012. His area of specialization is power quality with emphasis on mitigation of flicker phenomena and harmonics as caused by Electric Arc Furnaces (EAFs) and similar utilization equipment.

Dr. White is one of the founding partners and former Senior Principal of Stanford White, Inc., a mid-sized engineering firm specializing in engineering services for the construction industry, with an emphasis on mission critical and health care facilities; he is presently a Professor of the Practice at NC State University in Raleigh, NC. Dr. White is a Senior Member of the Institute of Electrical and Electronic Engineers (IEEE), a registered Professional Engineer (PE) in eight states, a Registered Communications Distribution Designer (RCDD), a member of the NC Board of Examiners of Electrical Contractors, and serves on the NFPA-99 hospital electrical systems committee.