



**ASHE**  
*Southern New Jersey*

# Winter 2017-2018 Newsletter

## UPCOMING EVENTS

Wednesday, January 31

### Social Event

Third State Brewing,  
352 High Street,  
Burlington, NJ 08016

Wednesday, February 7

### Delaware River Turnpike Bridge Emergency Repairs

Maggiano's Little Italy  
Cherryhill, NJ

Wednesday, March 7

### The Stony Brook Bridge

Hamilton Manor  
Princeton, NJ

## INSIDE THIS ISSUE

Meet the Board	2
Spotlight on Dewberry	4
Spotlight on McCormick Taylor	5
Spotlight on Arora & Associates PC	7
Spotlight on Michael Baker	9
SBE Networking Event and Annual Holiday Drive	10
ASHE SNJ Sponsors	11
Upcoming Events	12

### A Message from Lori Wade, ASHE SNJ President 2018

Happy New Year! It's hard to believe that we are almost through the first month of 2018. I hope everyone is having a great start to the year. First, I want to thank everyone who contributed to our Holiday drive in December by donating toys, clothing, gift cards, and money for the families of HomeFront New Jersey. I was honored to meet with one of the directors at their main office in Lawrenceville to deliver the donations, and they were very appreciative of the generosity of our organization. I was also able to see some of the amazing activities they have at the facility for the families to enjoy. It's just fantastic; I would love to continue working with them in the future. They are always looking for lightly used clothes, toys, and furniture all year round, so feel free to contact them if you start your spring cleaning early!

ASHE SNJ also sponsored the Future Cities of Philadelphia Competition on January 20th, where middle school students worked together to come up with innovative ideas to "build a city" to improve transportation and the environment in the future. Through our sponsorship, we were able to award a team of students for their outstanding project. This year, Mother Teresa Regional Catholic, under the direction of Sabrina Dwinnell, won our award. We look forward to having them join us at one of our upcoming meetings to present their project!

I am really looking forward to the programs our Section has in store this year! For those of you who made it out to Maggiano's for the Ethics Session in January, I hope you enjoyed the father-son duo, Steven and Justin Schorr, who presented an overview of forensic engineering with modern technology and ethical considerations. The case examples and autonomous vehicle discussion put a twist on how making ethical decisions applies to various aspects of engineering.

I hope to see many of you at the Social Event at Third State Brewing in Burlington, NJ, on January 31st. This is our first social event of the new year to benefit our scholarship fund. Our Section is the current leader of the ASHE organization in awarding scholarships. We awarded \$7,000 in 2017 and nearly \$185,000 to date. February 7th will be our next dinner meeting back at Maggiano's, and it will be a joint event with ASCE SJ. The topic is one most of us are very familiar with: Emergency Repairs of the Complete Fracture of the Delaware River Turnpike Bridge. We will be returning to the Hamilton Manor on March 7th for the NJDOT presentation of the Route 206 over Stony Brook project. Both the project and structure itself, being the oldest state-owned bridge in NJ still in operation, have a very interesting history. Keep checking our website for other exciting events and feel free to contact us if you have any ideas you'd like our section to consider for our programs.

Finally, I'd like to highlight that, since Rowan University became officially recognized as an ASHE student chapter at the end of October, they have been closely working with our section to attend meetings and events so they can grow their section and get us involved in their activities as well. They are also looking for speakers from both consultant and public sectors to share their work experiences with the students, so please contact Richard Grubb or John Eric Henson if you are interested in speaking at Rowan. Richard and John Eric have been instrumental in getting the student chapters integrated in ASHE. I am happy to announce that Mercer County is also very close to becoming chartered with their school and many of their students attended some of our fall events.

As always, if you are interested in becoming more involved in ASHE SNJ or have ideas to better our programs, please don't hesitate to speak with me or one of our board members at one of the next events!

# MEET THE BOARD

**President**  
Lori Wade, PE



lwade@mbakerintl.com

**Vice President**  
Matt Bencoter, PE



mbencoter  
@hardesty-hanover.com

**Treasurer**  
Joseph Macios, PE, PTOE,  
CME



joemacios@hotmail.com

**Secretary**  
Heather Jones, PE



heatherbjones1@gmail.com

## Executive Board

## Board of Directors

**Past President**  
Carrie Strehle



cstrehle@promatechinc.com

**PDH Coordinator**  
Amy Sokalski, PE, PTOE, PTP



asokalski@mccormicktaylor.com

**Website Coordinator**  
Rémy Donahey



remy.donahey@gmail.com

**Public Relations Chair**  
Chris Donahey, PE



cdonahey@gpinet.com

**Membership Chair**  
Richard Grubb



rgrubb@rgaincorporated.com

**Regional Director**  
Joseph Danyo, PE



jdanyo@mbakerintl.com

**Sponsorship/Meetings**  
Mike Frabizzio, PE



mfrabizzio@aidpe.com

## Up a Stream Without a Paddle: Drone Boat Technology

Contributed by Keith Ludwig

Hydrographic surveying technology has advanced significantly in recent years. Today, with the use of drone technology in particular, surveys of drainage basins, streams, rivers, and reservoirs can be completed much more quickly, cost-effectively, and safely.

### Efficient Technology

Dewberry is now frequently using drone boat technology, which obtains water depth either by using GPS or by linking to a robotic total station. Our portable, remote-controlled HyDrone-RCVs are a significant change from the more difficult and time-consuming process of finding access to a stream or waterway, then taking out a john boat to obtain elevations. First, the technology eliminates the need to get boat access to the water—a process that often complicates traditional hydrographic surveys. In some cases, access may not be available near the survey site, and may require permission from other landowners. Second, instead of a three-person team, with one person on land and two in the boat, use of the drone requires only one surveyor. That person can stay on land, which reduces risk. In shallow water, the drone approach eliminates the need for a surveyor to enter the water, wrapped in a life preserver and surveyors' rope, to obtain the elevations while a second surveyor keeps a watchful eye from land. Drone technology also reduces the need for boat licenses and extensive water safety training.

### Multiple Applications

We have completed several projects using the HyDrone-RCV for hydraulic analysis. Under contract with Mercer County, New Jersey, we recently performed field survey work for a bridge replacement project using the HyDrone-RCV to determine the streambed and structure outline for the hydraulic analysis model. We set up a robotic total station outside of the roadway and under the bridge, then launched the drone boat with a 360-

degree prism that the remote total station could use to take measurements. Using the prism helps when there is extensive tree cover. This approach produced a good cross-section of the stream, and we were able to create a detailed 3-D map for the engineers.

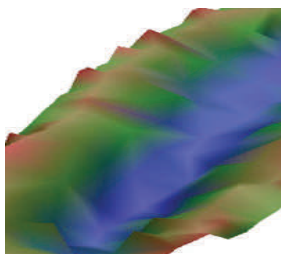


Contributed by Keith Ludwig

For another project, we were surveying a deep drainage basin on a mixed-use site. The basin was enclosed by a six-foot fence and the only access was through a four-foot-wide gate, so a john boat would not fit. This was the perfect application for a drone boat. We affixed a GPS receiver to the top of the drone and navigated it through the basin, collecting elevations every ten feet. This gave us a detailed look at the bottom of the basin.

There are limitations, as the drones cannot be used in water less than two feet deep, and they don't perform well in water with heavy currents. Generally, though, this high-powered, efficient tool, which sits atop catamaran pontoon hulls, is stable and reliable. The technology is another way we can better serve clients by providing hydrographic survey results safely, accurately, and more cost-effectively.

For additional information on drone boat technology, contact Keith Ludwig (kludwig@dewberry.com) or Lisa Peterson (lpeterson@dewberry.com) at Dewberry Engineers Inc.



Contributed by Keith Ludwig

# Spotlight on McCormick Taylor

## NJDOT Earns Praise for Dam Rehabilitations

By Eric Ditchey, PE

Dams protect our communities and provide benefits such as drinking water, flood control, and recreation. But, of the 90,580 dams in the country, the average age is 56 years. In the American Society of Civil Engineer's (ASCE) 2017 Report Card for America's Infrastructure, dams received a grade of D, with the number of high-hazard potential dams nearing 15,500 in 2016. It's estimated that it will require an investment of nearly \$45 billion to repair aging, high-hazard potential dams.

Many dams have inadequate spillway capacity and structurally deficient bridges. Given the significant potential for damages and loss of life that can result from a dam failure, it is important that safety inspections be performed on a regular basis and that updated Emergency Action Plans are prepared and available.

The future for dam safety may be brighter since the passing of the Water Resources Development Act of 2016, which included a new dam rehabilitation program that will help communities mitigate the risk of high hazard aging dams across the country.

The New Jersey Department of Transportation (NJDOT) has been ahead of the curve in addressing dam safety, having completed rehabilitation projects on 10 dams throughout southern New Jersey in recent years.

“NJDOT has made tremendous progress in addressing dam safety concerns and improving the overall compliance of their dams.”

John Moyle, PE

Director, NJDEP Division of Dam Safety & Flood Control

McCormick Taylor has been working with NJDOT to bring 29 of the Department's dams into compliance with the NJDEP Dam Safety Regulations, including inspections, concept development studies, EAP updates, rehabilitation designs, permitting, construction phase services, and emergency response services over the last 15 years.



Malaga Lake Dam – 2004 Distinguished Award for Engineering Excellence, ACEC/NJ

# Spotlight on McCormick Taylor

Projects completed or underway for NJDOT in southern New Jersey:

**Atsion Lake Dam, Blue Anchor Dam, Crystal Lake Dam, Cumberland Pond Dam,  
Layton Lake Dam, Newton Lake Dam, Pohatcong Lake Dam**



**Rainbow Lake Dam** – Project of the Year Award, ASCE, NJ Section; Project of the Year Under \$5M Construction Cost, ASHE, North Central NJ and Southern NJ Sections



**Mullica Hill Pond Dam** – 2015 Distinguished Engineering Award, NJ Alliance for Action; Outstanding Project Honorable Mention, ASCE New Jersey Section, South Jersey Branch; 2015 Regional Winner, America's Transportation Awards Competition

# Spotlight on Arora & Associates PC

## Route US 206 Bridges over Stony Brook

Built in 1792, the Stone Arch Bridge over Stony Brook in Princeton is the oldest state-owned bridge in New Jersey still in use. The triple-arch stone bridge was built by local masons using stone from nearby quarries and currently carries Route 206 vehicular traffic in Mercer County.

The project was triggered by a partial collapse of the parapet and spandrel wall above the north arch on the upstream side of the structure, forcing this section of Route 206 to be closed on February 22, 2016. The failed area was stabilized, and an in-depth inspection of the bridge was performed, which revealed additional areas that needed to be addressed prior to reopening the road to traffic. The roadway was re-opened to traffic on March 7th, 2016; however, the failed area and extensive leaning and bulging of the spandrel walls and parapets remained and required more thorough rehabilitation, thus prohibiting heavy truck traffic across the bridge during this period. For the emergency repair, temporary concrete barriers were installed to protect the collapsed area and other nonstable parapet areas. The partial collapse was a sign that the bridge needed attention to address the underlying reasons for the failure and to retrofit the structure for strength, safety, and durability. The emergency repair allowed for the continued use of the bridge while advancing needed coordination to identify the most feasible methods to repair the structure and preserve the historic features of the bridge and the Historic District. The crossing where the Stone Arch Bridge stands represents a link in the early transportation history of New Jersey as part of the early eighteenth century King's

Highway and as an important crossing during the Battle of Princeton. The original bridge was damaged for strategic reasons in the battle. The replaced bridge which stands today was built a decade after the end of the Revolutionary War and had a cartway width of 18 feet. The bridge was later widened to 32 feet wide around 1916.

The Route 206 Bridge over the Stony Brook Flood Channel (Flood Channel Bridge) lies adjacent to the Stone Arch Bridge on the southern approach. The bridge was in poor condition and in need of replacement. Since the two structures are adjacent to each other, it was determined that the rehabilitation and replacement of these two structures be advanced at the same time to accelerate the project and limit the time needed for the required detour of this section of Route 206. Built in 1892, the Flood Channel Bridge was an existing three-span bridge which was later widened along with the Stone Arch Bridge. The Flood Channel Bridge was determined to be a contributing factor to the Kings Highway Historic District.

Another historical and important aspect of the project was the treatment of Worth's Mill Ruin Wall which stands adjacent to both the Stone Arch and Flood Channel Bridges. This wall, which predates the Stone Arch Bridge, was determined to be in poor condition and in need of repair and stabilization. To ensure the stability of the wall during construction, electronic monitoring of the structure was conducted.

The rehabilitation of the Stone Arch Bridge consisted of removing the fill above the arches, rebuilding out-of-plumb walls with the same

# Route US 206 Bridges over Stony Brook



Partial collapse of the stone parapet and spandrel wall of the Stone Arch Bridge. Worth's Mill Ruin Wall is on the right.



Construction of concrete saddles to strengthen the arches of the Stone Arch Bridge.



Completed Stone Arch Bridge

stone using a lime-based historically appropriate mortar, and constructing concrete saddles and walls within the roadway fill to strengthen the arch. The fill of the roadway above the arches was constructed with lightweight concrete to eliminate water infiltration. A reinforced concrete core was used for the parapets for crashworthiness and was faced with existing stone. The parapet maintains the existing draping pattern across the bridge. The replacement of the Flood Channel Bridge consisted of a single-span, prestressed-concrete box-beam bridge. The north abutment was moved to the south to avoid demolition and excavation near the Worth Mill wall. The abutments were faced with a similar ashlar stone to blend in with the environment and provide a connection to the history of the two bridges and the Worth Mill Ruin Wall.

An accelerated construction schedule of 120 days was set to complete the bridges and approach work during which archaeological monitoring was conducted and documented. The collaboration between all stakeholders during design and construction was the key to the success of the project. Coordination with local and agency stakeholders included the New Jersey Historic Preservation Office and the Princeton Historic Preservation Committee both of which contributed to specific design elements.

The Route 206 bridges over Stony Brook will be featured at the March 2018 ASHE SNJ dinner.

# Spotlight on Michael Baker

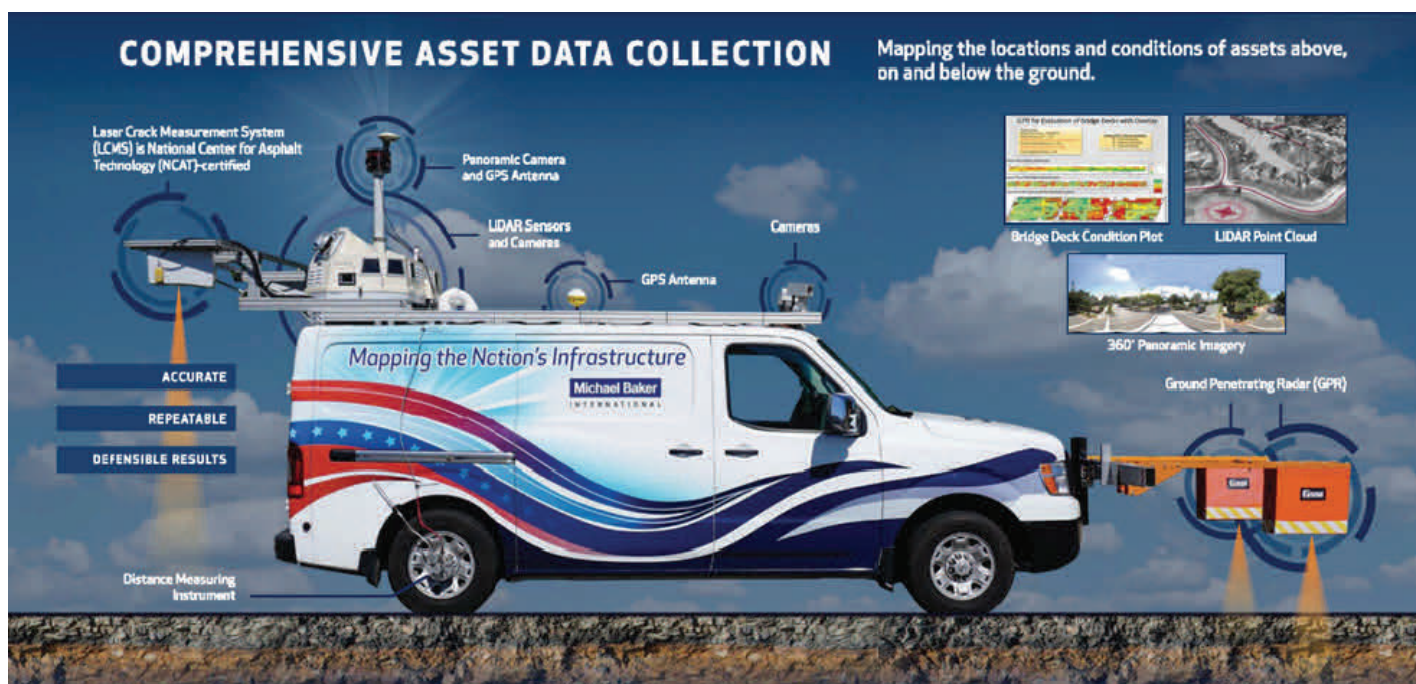
## Automated Pavement Data Collection

Michael Baker International, Inc. (Michael Baker) owns and operates a Pavemetrics™ Laser Crack Measurement System (LCMS). The technology solution can automatically detect certain pavement distresses such as cracks, rutting, and potholes as well as other roadway characteristics by capturing 2D and 3D images of a highway with high-speed cameras, custom optics, and laser line projectors. Michael Baker's LCMS unit is currently used in various states throughout the country. The unit is integrated with a Lynx mobile LiDAR system and a GSSI SIR-30 Ground Penetrating Radar (GPR) which allows for the capture of asset locations and conditions above, on, and below the pavement surface in one pass.

26.4' x 13', an XML containing granulated distress information, and pavement images that include configurable distress overlays.

### The Dallas Fort Worth Project

In 2016, the Dallas Fort Worth International Airport (DFW) contracted with Michael Baker to perform pavement analysis on several runways and taxiways across the airport. Using the vehicle mounted LCMS and LiDAR systems, Michael Baker inventoried over 56 million square feet of pavement areas at normal vehicle speeds and collected detailed crack information and other pavement distress data for the entire area. To minimize disruption to airport operations, data



The LCMS is bundled with pattern recognition software (LCMS Analyzer) that can detect surface-level pavement features in an automated fashion, including cracks, potholes, and certain aspects of pavement geometry, including slope and cross slope.

The LCMS Analyzer software produces two types of outputs for each collected 'survey', which consists of an area of pavement approximately

collection was performed during off-peak nighttime hours.

While the integrity of the raw data collected during inventory is vital to project, it provides little value in its raw format. As such, Michael Baker developed a post-processing workflow to classify, quantify, and align detailed pavement distress information with the airport's logical pavement management sections. Custom software tools and database scripts were built and



# Spotlight on Michael Baker

combined with manual processing tasks performed by highly skilled and trained GIS specialists to process the data into useful information products.

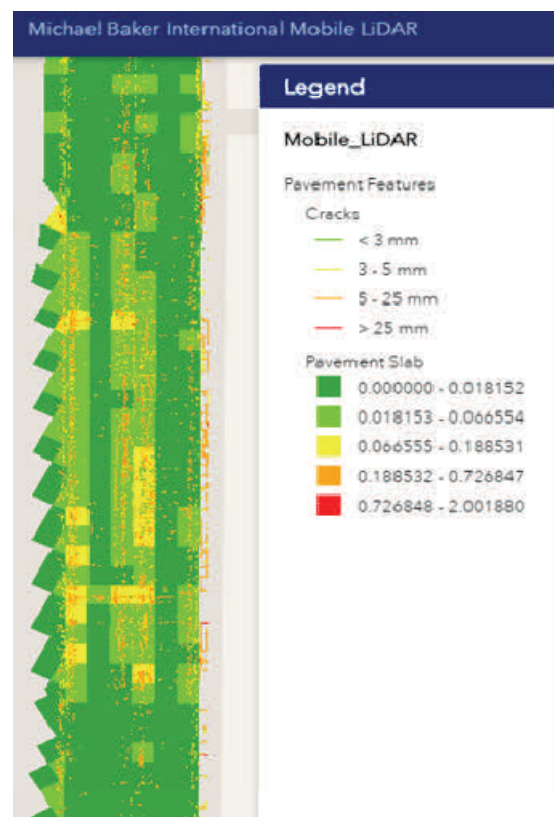
A critical step in the process was aggregating and loading detailed distress information (formatted as XML files) into a single unified database. Michael Baker developed a robust pavement database model specifically for the processing and analysis of pavement data collected by the LCMS solution. Distress and pavement information from each XML file was extracted and loaded into a MS SQL database using a custom-built data loader application (XML Data Loader). Since areas of pavement patching cannot currently be derived from the LCMS Analyzer software, a custom application was developed (Distress Selector) which allows trained users to identify patching areas and tag an associated severity level for each within a pavement image. The Distress Selector application can be configured to capture any feature or distress viewable within pavement imagery.

Using GIS tools, Michael Baker aligned surface distress data derived from the LCMS to pavement slabs. This provided detailed cracking information on a per-feature basis for each of the 130,000 individual concrete slabs across the airport. The images below show an example of the cracks displayed on pavement slabs. As an added value, Michael Baker combined airfield pavement imagery into a GIS tiled mosaic dataset. This information is now available to airport engineers and planners to review and utilize as needed in standard GIS software (such as ArcMap).

While the LCMS system can produce highly detailed pavement cracking, it uses a proprietary metric-based coordinate system based on a distance measuring instrument (DMI). In a unique approach, Michael Baker leveraged the highly accurate positional information captured through the LiDAR system and integrated Inertial Measurement Unit (IMU) to geo-reference and locate LCMS data during the data collection process. Skilled GIS technicians geo-referenced the first pavement survey of each inventory pass, and used an automated process

to position the remaining LCMS images in each pass based on linked LiDAR trajectory information. With pavement distresses referenced to real-world location, GIS scripts were developed that produced geo-spatial layers of cracks, patches, and other distress.

The primary challenge in this project was developing new methods to quickly process and accurately display the massive dataset in a spatial format. An ArcGIS Online portal was created for the project which aligned project data collected with the LCMS and LiDAR systems. In the example to the right, cracks and associated severities are displayed, but the portal is also capable of displaying different pavement features and over 40 additional assets which were collected across the airport and extracted from the LiDAR system. The use of the mobile LiDAR\LCMS system allowed DFW to incorporate a safer assessment process and create an inventory of existing pavement conditions and the airport's ancillary assets that can now be integrated into the airport's existing GIS framework.



# SBE Networking Event and Annual Holiday Drive

This year our holiday drive benefited **HomeFront NJ**.

HomeFront's mission is to end homelessness in Central New Jersey by harnessing the caring, resources, and expertise of the community. They lessen the immediate pain of homelessness and help families become self-sufficient. They work to give their clients the skills and opportunities to ensure adequate incomes, and they work to increase the availability of adequate, affordable housing. They help homeless families advocate for themselves individually and collectively.

Find out more on their website! <https://www.homefrontnj.org/>

Representatives from NJDOT and NJTA discussed the contracting process and opportunities available through the Disadvantaged and Small Business Programs.

## *Exhibitors:*

Imperial  
Urbantech

RGA

Stokes

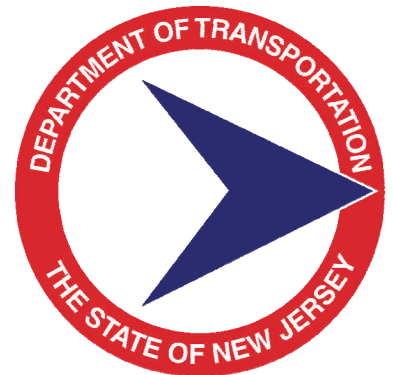
Amy Greene

AID

STOP

KMA

Promatech, Inc.



# THANK YOU TO OUR SPONSORS

## PLATINUM LEVEL



## GOLD LEVEL



## SILVER LEVEL

JMI

REMINGTON AND  
VERNICK

URBAN ENGINEERS

PROMATECH

HARDESTY &  
HANOVER

NJ ASPHALT  
PAVEMENT  
ASSOCIATION

STANTEC

PENNONI

# UPCOMING EVENTS

January 31, 2018

5:30 PM

Social Event

Third State Brewing  
352 High Street, Burlington, NJ

FEBRUARY 7, 2018

5:00 PM

Delaware River Turnpike Bridge  
Emergency Repairs

Maggiano's Little Italy  
2000 Route 38, Cherry Hill, NJ

MARCH 7, 2018

5:00 PM

The Stony Brook Bridge

Hamilton Manor  
30 Rt 156, Hamilton Township, NJ