

Engineering ^{the} First Coast

Promoting Engineering to Future Generations



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Largest Robotics Tournament in Region's History

in Jacksonville on Feb. 23, 2019

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2019
Engineers Week
February 17 - 23

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Chairperson's Message

by Joe Champion, PE, ECS Florida, LLC



I first learned about Engineers Week (E-Week) as a student here in town at the University of North Florida. I was a recipient of one of the many scholarships provided by our industry. Fortunately for me the pickings were slim back in 2002 as I was one of less than 10 students in my class. I love to tell the story of how I graduated first in my class, and try and leave out the part that I technically graduated last since I was the only Civil Engineering student graduating at the time. The UNF engineering program has come a long way since then, in large part

due to the support it receives from the industry. That scholarship I received at the time meant quite a bit to me, not just the money I very much needed for books, but it was the first step in beginning to feel part of a large community that genuinely cares about our profession, our community, and the next generations.

This is my first year heavily involved in the E-Week committee, and I guess my need to be in charge made the Chairperson a natural fit. I've always been a fast riser, especially when there is no competition. Next year I am hoping there is more competition and plan to grow our E-Week committee to continue to focus on recognizing our profession, our local engineers and engineering companies, and the next generation of engineers.

I was recently in Tallahassee where I grew up and visited the place where I realized I would become an Engineer... The Florida A&M College of Architecture. My dad is an Engineer and I grew up being told by everyone that I too would one day become an Engineer because I was good at math. Because no one tells me what to do, I proudly enrolled in architecture school at FAMU. Well after nearly 3 years doing artsy stuff and arguing the stupidity of 'form over function', my professors told me I should really be an engineer when I grow up.

So what is an Engineer? I wanted to know what the world thinks an Engineer is, so I turned to the all-powerful Google. On the next page are the auto-populated searches when searching "Engineers are..." in 3 various search engines.

Chairperson's Message (Cont.)



<u>GOOGLE</u>	<u>BING</u>	<u>YAHOO</u>
Arrogant	Awesome	Developing new guns
Weird	Fungible	Designing a box-shaped aquarium
Underpaid	Dumb	Stupid
Boring	Lazy	Socially awkward meme
Lazy	Jerks	The best

My first impression, I'm changing my homepage search engine to Bing. Secondly, am I the only one who missed out on the gun design class? Looking further into 'searches' I plugged in "When I grow up, I want to be a..." in hopes that Engineer would make the list. The results were as expected with billionaire, rockstar, and cowboy baby topping the list, with top careers as a teacher, nurse, writer, police officer, doctor and surprisingly tax accountant. In the times we live in, I wasn't too surprised to see unicorn, tree, and potato also making the list on what the next generation wants to grow up to be. I have 3 kids and can confirm billionaire, unicorn, and potato are all true aspirations.

The real message I took away from this exercise is that we chose the engineering field because we love it. We don't seek fame or fortune, but seek challenges, problem solving, and ways to improve our community without the need for recognition. But this is our week, and we should all take a moment to recognize each other and our profession. So for those of you not destined to be Billionaire Potatoes, but rather Engineers, thank you for your service to our community.

My ego was slightly bruised by the Google Bing search, but I felt a lot better about how the world views engineers when searching "doctors are ..." and "lawyers are...", and "politicians are...". You will not be surprised on the world view of politicians these days. I finally searched how many engineers are in the USA. You're not just one in a million, you're an engineer so you're one in 1.61416 Million in the US.

Thanks to all of our great sponsors, the engineering organizations that have participated, the professors and students participating, and especially the small group of people who have volunteered their time to make E-Week happen. Let our week begin...

PROCLAMATION

- WHEREAS:** The National Society of Professional Engineers first recognized National Engineers Week (EWeek) in 1951. The February timeframe was selected to coincide with George Washington's birthday, in acknowledgment of our first president, the nation's first notable engineer and surveyor; and
- WHEREAS:** Today, EWeek is a formal coalition of more than 70 engineering, education and cultural societies, and more than 50 corporations and government agencies. The observance raises public awareness of engineers' positive contributions to communities' quality of life, while promoting the importance of a technical education and high levels of math, science, and technology literacy that motivate youth to pursue engineering careers; and
- WHEREAS:** The diverse engineering professions provide citizens with a number of necessities, including the design and construction of industrial facilities, delicate medical instruments, computer software, mechanical systems, water systems, and electrical transmission and distribution systems; and
- WHEREAS:** Engineers lead and address the technological challenges of our times by researching sustainable energy sources and studying new methods to improve safety and grow the nation's global communication abilities; and
- WHEREAS:** Jacksonville supports and relies on engineers to leverage their knowledge and skills to meet the demands of our future in Northeast Florida and throughout the world.


NOW, THEREFORE, I, LENNY CURRY, by virtue of the authority vested in me as mayor of Jacksonville, Florida, do hereby proclaim February 17-23, 2019 as

ENGINEERS WEEK

in Jacksonville and encourage all citizens to recognize the important and far-reaching contributions engineers make to our community and future.



IN WITNESS THEREOF, this 24th day of
January in the year Two Thousand and Nineteen


MAYOR

CITY OF JACKSONVILLE, FLORIDA

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American Society of Plumbing Engineers (ASPE)
American Water Works Association (AWWA)
Design Build Institute of America (DBIA)
Florida Association of County Engineers and
Road Superintendents (FACERS)
First Coast Manufacturers Association (FCMA)
Florida Engineering Society (FES)
Florida Structural Engineers Association (FSEA)
Florida Transportation Builders Association
(FTBA)

Florida Society of Surveyors and Mappers
(CROWN FSMS)
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(IEEE)
Institute of Transportation Engineers (ITE)
North East Florida Builders Association
(NEFBA)
National Utility Contractors Association
(NUCCA)
Society of Military Engineers (SAME)
Society of Marketing Professionals (SMPS)
UNF - The College of Computing, Engineering
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US Green Building Council, North Florida
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Supporting Societies (Cont.)



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Supporting Societies (Cont.)



Member Benefit



Networking

An extensive professional network is perhaps the most vital element to a successful career path. As an FES member you are part of a community of over 3,300 engineers in Florida. Your local chapter, committees, and the online LinkedIn group for FES members are all excellent ways you can get and stay connected.

Community Outreach

FES gives you a great opportunity to give back or to "pay it forward" through great programs like:

Help broaden young minds about the engineering profession through our **K-12** program and **MATHCOUNTS**

Volunteer through our many fundraisers at the chapter or state level to benefit **Scholarship** programs.

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Leadership Opportunities

Become a student in our world renowned **Florida Leadership Institute (FLI)** or becoming involved in a **FES Committee** or become a **Chapter Officer**. The opportunities to develop your leadership skills are endless.

Continuing Education

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Career Resources

FES offers everything you need to keep your career on track. From job listings, to opportunities to market yourself, FES provides you with the connections and resources you need to keep your career moving forward. FES Members can post their resumes at FEng.org free of charge.



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First Coast Florida Expressway

Offers Geotechnical Challenges and Opportunities

John O'Donnell, PE
Project Manager, Terracon

Terracon, in conjunction with Reynolds, Smith and Hills (RS&H), helped provide a more efficient path for residents and tourists in Clay County, Fla. by providing geotechnical design support for the First Coast Expressway (FCE) project, from just west of the Shands Bridge to SR 21 (Blanding Blvd.). This portion of the alignment is just a fraction of the overall project, which includes approximately 46 miles of new, multi-lane, limited access divided highway through generally heavily wooded areas and crosses numerous existing roadways, creeks and streams. The project also includes 41 bridge structures, 50 ponds and 44 MSE walls with numerous other miscellaneous structures, box culverts and toll gantries. Since 2007, Terracon (formerly Nodarse & Associates) has been the lead geotechnical consultant on the project. At times, Terracon has employed up to eleven drill rigs and crews simultaneously to meet the strict schedule of the project segments.

Soft soils at the end bent locations for the Black Creek bridge crossing were encountered during Terracon's Standard Penetration Testing (SPT) of the end bent borings. This presented one of the more difficult challenges on this portion of the project because it affected both the settlement of the approach embankments and constructability of the MSE walls located at the bridge abutment. Terracon was able to mobilize a rig equipped with a flat plate dilatometer to better define the modulus values of the soils in question. Upon determining that the soils were not suitable for the bridge abutment, Terracon consulted with RS&H, where it was determined the best course of



[Expanded view of Terracon drill rigs drilling on barges for the Shands Bridge Replacement job in St John's County, Fla.](#)

action was extending the bridge beyond the limits of the poor soils. With the additional testing from Terracon and quick turnaround from RS&H, the team was able to save both time and money for the Florida Department of Transportation (FDOT).

Terracon also encountered deep pockets of soft clays in several areas of the alignment where fill heights exceeded 30 feet. This presented a challenge to the design team because the layer in question was too deep to excavate and would have caused more than a tolerable amount of consolidation settlement because of the embankment heights. Due to the quick thinking of the Terracon field staff, Shelby Tube samples were obtained from the soft clay layer and sent immediately to the Terracon laboratory for consolidation testing. From this information, Terracon was able to recommend surcharge and settlement monitoring programs for the construction of the embankment.

Other areas of the project that presented major challenges for the design team were due to the project location itself. The majority of the new Right of Way was not previously owned by FDOT, which led to the field teams needing to clear properties to access the soil boring locations. This proved especially difficult after Hurricane Irma tore through the state and uprooted trees in the project area. In some areas of the project, where Right of Way was difficult to acquire, Terracon coordinated directly with property representatives before gaining access to the sites. This was necessary

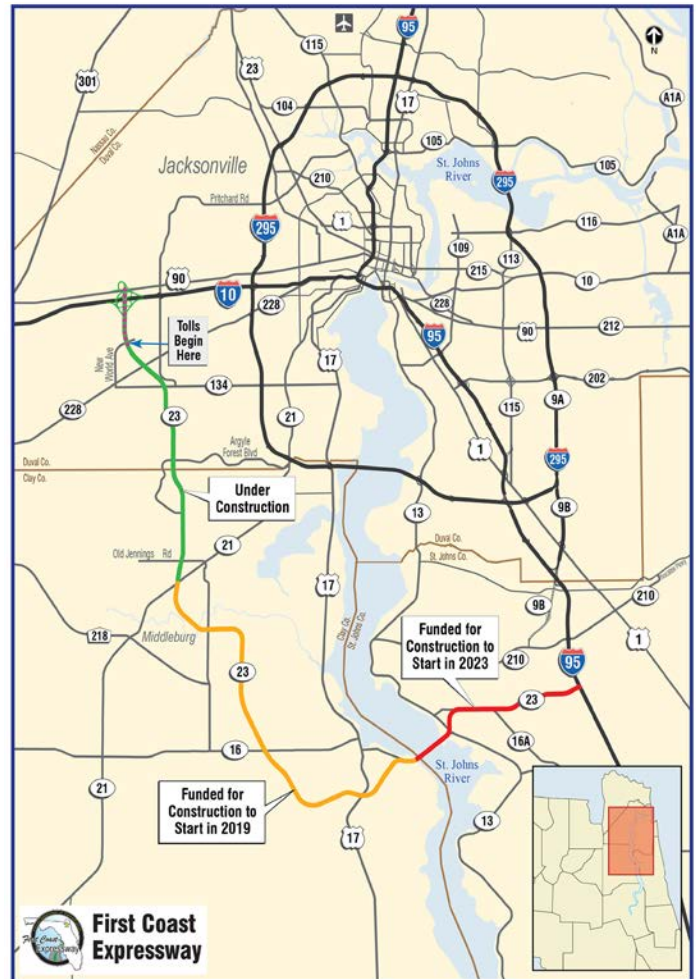


[Terracon Drill Rigs Drilling on Barges for the Shands Bridge over St. John's River](#)



to keep up relations between the property owners and the design team, as well as keep Terracon's field crews safe. When working on a project of this magnitude, the safety of everyone involved is paramount in delivering the project on-time. Having to work around hunting season, wildlife (including venomous snakes) and various site conditions were other issues that factored into keeping the field teams safe.

Currently, Terracon is involved in the design-build preparation package to support the next section of the Expressway in St. John's County. This section is approximately 12 miles of new roadway, includes the replacement of the Shands Bridge and connects the current sections of FCE to I-95 in St. Johns County. This segment of the project includes approximately 60 barge-based SPT borings within the St. Johns River, as well as numerous borings for other bridges, embankments, walls, and stormwater treatment areas.



Overview

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Solar Installations Impact Distribution

by Matt Lundeen, Systems Analysis Manager, JEA and
Trishia Swayne, Director of System Planning and Protection, Leidos
(Reprinted with permission from: T&D World)

JEA evaluates policies, procedures and programs that will promote solar to be sustainable for the utility, its customers and the environment.

Maintaining the power quality and reliability of the grid becomes more challenging as customers and utilities add solar generation sources. Conducting comprehensive impact studies and implementing various screening methods are two approaches JEA uses to provide reliable electric service while continuing to explore more opportunities to increase its solar portfolio.

Like many utilities, JEA recognizes the need to address technical issues, such as voltage rise, voltage flicker and the risk of islanding, and to adopt sustainable policies and procedures surrounding distributed energy resources (DERs). By observing and learning from the pioneering work of other utilities with large amounts of solar, such as those in California, Hawaii, Arizona and the Northeastern region of the U.S., JEA continues to evaluate policies, procedures and customer programs that will promote solar in sustainable ways for the utility, its customers and the environment.

Solar Penetration

With a service territory of approximately 900 sq miles (2330 sq km) in northern Florida and a base of about 460,000 electric retail customers, JEA is the eighth largest community-owned municipal utility in the U.S. By 2014, the utility had become home to the 12-MW Jacksonville solar project, multiple individual photovoltaic (PV) installations on municipal facilities, such as schools, city buildings and the Jacksonville Zoo, and approximately 1000 residential net-metering customers.

Through a board-approved solar policy in late 2014, JEA planned a fourfold increase in its solar portfolio from 12 MW to 50 MW. After installation of the planned solar PV projects to meet the 50-MW target, solar PV will account for approximately 1% of JEA's total energy.

JEA faces several challenges due to the increasing penetration of solar generation. In addition to the potential impacts to the distribution system – such as thermal overload, protection and coordination, stability and overvoltages – the intermittent nature of

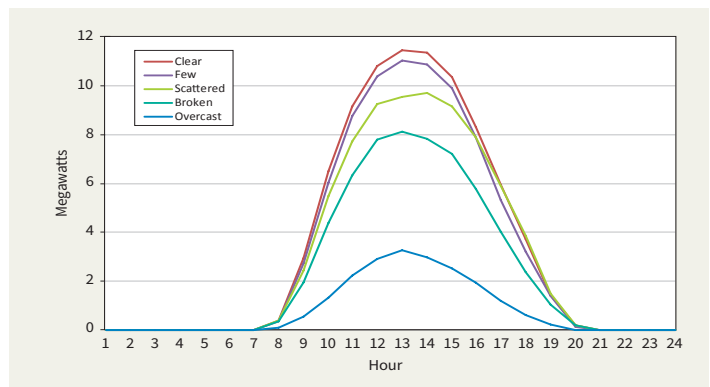


[The Montgomery Solar Project is the Newest Solar Photovoltaic Project to come on-line in JEA's Service Territory](#)

solar generation also can present operational challenges. In Jacksonville, there is approximately a 40% loss in energy output due to cloud coverage in the region over a 12-month period.

For the solar projects in which JEA entered into power purchase agreements, a primary goal was to scatter the solar facilities in locations across the service territory to minimize the weather impacts from those facilities. Another goal was to limit the size of solar PV systems based on minimum daytime load of the interconnecting circuit and the adjacent circuit to restrict reverse power flow through the substation transformers.

To identify and understand the key concerns related to the addition of a utility-scale solar PV facility to the JEA electric system, the utility reached out for consulting support in performing an interconnection study.



[Generation Output of 12-MW Jacksonville Solar Project Under Different Weather Conditions](#)



A Case Study

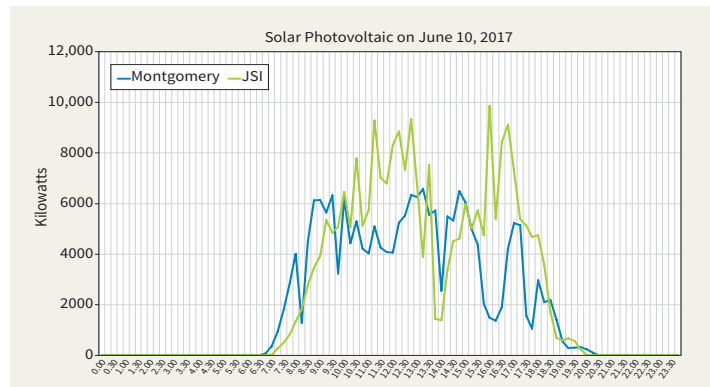
JEA collaborated with Leidos to conduct a case study based on a 7-MW solar project interconnecting to a 26.4-kV distribution circuit. The study focused on whether the project would create power quality and reliability issues on the distribution circuit for JEA and its customers. The study results would enable the utility to determine whether any system upgrades would be required for the interconnection of the solar project. The study results also were useful in revising JEA's standard study practices for DERs as well as revising its interconnection requirements.

The study incorporated industry standards such as IEEE 1547, the standard for interconnecting distributed resources with electric power systems; existing JEA standards for interconnections and distributed generation; and industry best practices for study methods and various technical assumptions. The study included a thorough set of analyses to determine potential issues and technical interconnection requirement violations. At daytime peak and light load scenarios, the analyses included steady-state analysis, voltage flicker analysis, short-circuit and protection analysis, risk of islanding analysis and transient analysis.

The circuit in the study had a small 168-kW amount of residential net-metering customers on-line, which were considered for the analyses as existing and on-line. Prior to performing the analyses, data and engineering model validation was conducted to ensure the accuracy of various models for valid study results. Time was spent confirming the status of JEA's existing DNV GL Synergi distribution model and a newly built transient analysis model in PSCAD.

Along with study model validation, careful attention was given to testing the inverter manufacturer's model provided for transient analysis. Documentation from the inverter manufacturer was provided to illustrate inverter response to system disturbances, including ride-through and inverter protection details.

Simulations were performed to confirm the inverter manufacturer's results matched the results with the inverter model added to the JEA distribution model. The study results indicated the IEEE 1547 settings for

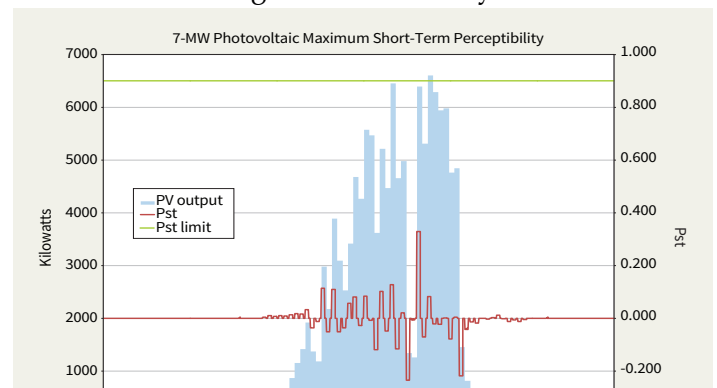


On a cloudy day, 15-minute-interval data is recorded from two solar PV systems about 21 miles apart. (The JSI array is a 12.6-MW fixed array system, and the Montgomery array is a 7-MW tracking system.) The intermittent nature of these large PV sources is one of the concerns investigated in detailed impact studies.

the inverter generated an overvoltage response outside the standard curve of the Computer and Business Equipment Manufacturers Association (CBEMA) and Information Technology Industry Council (ITIC).

JEA and Leidos collaborated with the inverter manufacturer on a solution to clear the overvoltage response on the distribution system during distribution disturbances, such as load rejection and ground fault scenarios, faster than the IEEE 1547 response for the 7-MW solar project. Multiple simulations were performed to deduce a target clearing time to mitigate the transient overvoltage.

Another interesting result that may not be obvious



Short-term Perceptibility (Pst) of Voltage Flicker Estimated at PV Point of Interconnection

Solar Installations Impact Distribution (Cont.)

by Matt Lundeen, Systems Analysis Manager, JEA and
Trishia Swayne, Director of System Planning and Protection, Leidos
(Reprinted with permission from: T&D World)

when thinking about DER-to-load penetration issues is, while the risk of islanding might be negligible based on various screening methods in the industry, higher levels of solar PV penetration can lead to unacceptable and damaging overvoltages, even in a transient time domain. This situation can occur with a circuit breaker response or even a midstream protective device response, with heavy penetration of DER downstream.

Study Results

Results indicate a large utility-scale project as far as 6.5 miles (10.5 km) away from the substation can interconnect without causing major system upgrades. However, from the study, the utility identified some seemingly minor requirements that could lead to larger system issues if ignored. They primarily have to do with protection and inverter response. From the analyses, the utility learned the following:

- The steady-state analysis identified the voltage and capacity of the distribution circuit would not be impacted adversely from the addition of the 7-MW solar project, apart from a planned capacity upgrade on the circuit tap interconnecting the project. Based on a year of substation transformer data and estimations of the project output over the same time period, reverse power flow is not expected through the substation transformer, even considering potential N-1 scenarios that could reduce the bus load. Excessive tap movement at the substation transformer load-tap changer (LTC) is not expected with the new solar PV source on the circuit, and the power factor requirements at the substation level can still be maintained.
- The voltage flicker analysis identified a single timestamp voltage flicker of 3.81% is not expected to occur frequently but is potentially high enough to be noticeable even as a rare occurrence. However, the conductor upgrade project for the circuit alleviated this concern.
- The short-circuit and protection analysis identified the JEA distribution circuit remains effectively grounded with the project on-line. Two protective devices upstream of the project are between the project point of interconnection and the distribution

circuit breaker. The protection analysis concluded a fuse should be relocated because of capacity concerns. In addition, concerns for miscoordination on the upstream recloser with the utility-owned PV site recloser led to a recommendation to replace the midstream recloser with an electronic device for more options with curve speeds and response times.

Protective device reclosing on the circuit protective devices should be set to not reclose for at least 2 seconds, leaving time for the PV to be fully off-line, as documented in IEEE 1547. This setting is becoming an industry approach to protection-related issues with DER on distribution circuits.

- The risk of islanding screening identified the DER-to-light load percentage could reach 294% at the circuit breaker and 740% at the midstream recloser. However, other concerns that generally trigger islanding, such as other types of generation on the circuit and reactive power matching, were not concerns on this circuit.
- The transient analysis was performed in PSCAD and included load rejection, ground fault and in-rush simulations. Results from the study identified there could be overvoltage violations outside the CBEMA/ITIC standard curve during load rejection events, where the circuit breaker or midstream recloser opens while the PV site is on-line.

The event results in voltage over 1.2 per unit for 0.0297 seconds, which is a violation of the CBEMA/ITIC standard. Similar findings occurred during the midstream recloser event. The inverter manufacturer conducted inverter model updates to include the real-world protection mechanisms in addition to the existing modeled IEEE 1547 trip settings. The self-protection overvoltage (SPOV) relay within the inverter actually is set to trip at 1.2 per unit voltage in 3.33 msec and 1.25 per unit voltage in 1.83 msec. In conducting updated simulations for load rejection, there were still violations outside the CBEMA/ITIC standard.

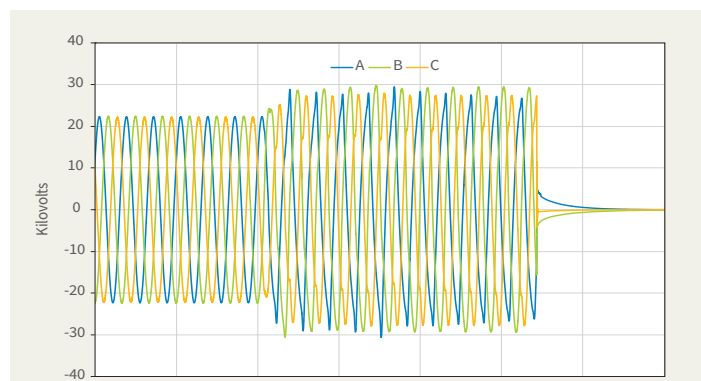
Because of this finding and following extensive research on updated practices, the upcoming release of the revised IEEE 1547 standard provides an update for overvoltage simulations. While still in draft mode, the



upcoming allowable voltage ranges provide slightly different windows of time for allowable overvoltages. Using the revised criteria, the results were acceptable, considering the inclusion of the SPOV relay.

In addition to the technical requirements for PV site interconnection that came from the study, JEA had to consider other outcomes. JEA reflected on this study to consider how study methods could be adapted to gain efficiency and accuracy in performing future impact studies. One study method JEA is discussing currently relates to the risk of islanding screening.

While various methods are used in the industry, this study found that heavy penetration alone did not necessarily trigger islanding concerns, based on industry standards. However, this heavy penetration can result in overvoltage concerns, which generally are not considered in the islanding screenings in the industry. Going forward, this is a trigger for JEA to adopt into its screening criteria as well as the new criteria coming in the expected revision of IEEE 1547.



[Transient Analysis Shows Instantaneous Voltage at the PV Point of Interconnection During Circuit Load Rejection.](#)

PV Future

Overall, the study demonstrated that by giving attention to some small differences in inverter settings, the utility could avoid potential power quality problems later. The study results also confirmed the importance of utility engagement in areas such as interconnection standards. These standards may impact future interconnection

requirements as well as the testing and certification procedures for inverter-based generation. While this study focused on a utility-scale solar project, the results also will apply to smaller systems, such as net-metering customers, as a high number of customers on a single circuit would create similar impacts.

JEA continues to participate with various leaders in the industry, including consultants and DER-focused agencies, to investigate the impacts and opportunities of interconnecting large amounts of solar generation on the electric power system in an effort to build a sustainable future for the utility and its customers.



McCoys Creek Restoration

by Kay Ehas
CEO, Groundwork Jacksonville

The City of Jacksonville (City) has budgeted approximately \$60M over the next three years to turn McCoys Creek from an unsightly nuisance into a nature-based recreational jewel that will attract local residents and visitors. Long listed as the City's #1 Priority in the Local Mitigation Strategy due to consistent flooding, the project aims to not only reduce flooding but to also improve water quality, clean up contamination, establish habitat for fish and wildlife, and provide recreational opportunities.

McCoys Creek is one of two creeks (along with Hogans Creek) that are part of the Emerald Necklace. The Emerald Necklace is envisioned as a greenway that connects the urban core neighborhoods surrounding Downtown Jacksonville to parks, schools, Downtown and the St. Johns River.

Current Condition

The McCoys Creek Watershed is approximately 3,800 acres with 9,500 property parcels. The project area is 2.8 miles long from Hollybrook Park to the St. Johns River and encompasses 140 acres of land. The creek is influenced by tides and experiences a mixture of fresh and salt water.

The creek routinely floods during rainfall events, often affecting roads, and sometimes homes and businesses as well. Within the McCoys Creek Watershed, 26 local roads currently flood during a five-year storm event and do not meet Level of Service (LOS) standards according to the City's Master Stormwater Plan. Most notable of these is McCoys Creek Boulevard which runs along a section of the creek. Approximately 542 structures are at risk of flooding within the McCoys Creek area and dozens flood more than once per year. Past storms close off roads important for emergency response, and submerge force mains and affect pumping stations more than once per year, and Hurricane Irma caused massive flooding in the area.

McCoys Creek was channelized and bulkheaded in the late 1920s, which led to placing development in flood-prone areas and destroying the nearby floodplain and wetlands, thus also destroying critical habitat for plants, fish and wildlife. The pre-development condition has been replaced with over a century of



[McCoys Creek in 1917](#)

progressive valley fill to eradicate the natural floodplain. The once meandering bankfull channel has been entirely replaced with straightened ditches and bulkheaded

canals. Extensive reaches of the artificial canal system have progressively in-filled with sediment since the 1940's, and most of this sediment has formed bars that have been colonized by a combination of weedy native and non-native vegetation. The bulkheads are failing in places. The former tidal stream found along the lower half of the project area no longer has a marsh platform, and the channel connection to the St Johns River has been relocated and buried by a culvert that poses a formidable barrier to fish passage. There are numerous street bridges that cross the creek that are too narrow and have led to bank erosion.

Project Scope

The McCoys Creek project encompasses many elements including:

- Creek channel improvements and restoration
- Closure of the frequently flooded McCoys Creek Blvd.
- Replacement of King and Stockton Street bridges to accommodate channel improvements and improve roadway level of service
- Remediation of existing ash contamination
- Creation of a recreational trail park, including a paved bike/pedestrian trail
- Additional recreational amenities, such as play pods and kayak launches



[McCoys Creek Blvd. at Nixon St. - Conditions After Normal Rainfall](#)

(Photo Credit: News4Jax)



The Partnership

The City of Jacksonville has partnered with Groundwork Jacksonville (GWJax) for the creek restoration part of the project. GWJax is a partnership with Groundwork USA, the EPA and the National Park Service. GWJax, a 501(c) 3, is one of 20 trusts within the Groundwork USA network and was created in the fall of 2014 specifically to help the City remediate and restore Hogans and McCoys Creeks as the two water bodies that encompass the “Emerald Necklace” and the adjacent land and create the long envisioned Emerald Necklace.

The solution proposed by GWJax, and embraced by the City, will provide natural channel design and bioengineering treatments for restoring stream and wetland habitat while also achieving the City’s goals for flood mitigation. It will serve as a demonstration project for the City, region, and beyond in the implementation of natural channel design and the associated water quality benefits.



[Characteristic Tidal Inlet Creek with Marsh](#)

Benefits of Natural Channel Design

Regulatory

There is a precedent in other states for using Urban Stream Restoration as a Best Management Practice (BMP) for nutrient and sediment removal. Based on recent case studies, nutrient removal cost effectiveness of stream restoration is similar to, and sometimes better than, that of detention ponds in urban settings. One such case study was based on the St. James River in Virginia. Additionally, the Chesapeake Bay TMDL Special Condition Guidance addresses the calculation of pollution reduction credits from BMPs related to urban stream restoration. Stream restoration is not typically conducted solely for water quality improvement; however it could be justified for that specific singular

purpose in some settings. In addition to water quality benefits, stream restoration provides connected fisheries habitat, recreation corridors, flood conveyance, and increased property values.

The City and GWJax are partnering with the Florida Department of Environmental Protection (FDEP) to evaluate the use of the McCoys Creek restoration as a demonstration project to monitor for water quality benefits associated with Urban Stream Restoration and natural channel design.

Demonstrated Benefits

Urban Stream Restoration projects, similar to the proposed plans for McCoys Creek, have demonstrated water quality and habitat improvement benefits, such as:

- Restored sinuosity – water does not leave the system as quickly, which increases residence time and subsequent nutrient cycling. Water is better oxygenated as well as it travels around bends in a turbulent flow pattern.
- Restored connection with the floodplain – during an overbank event, water from the channel can reach the floodplain where additional nutrient attenuation can occur.
- Restored/Stabilized banks – decreases erosion/excessive sedimentation into the stream. Excess sediment smothers aquatic biota.
- Restored In-stream habitat – provides habitat for native plant and fish species. Improves nutrient cycling and sediment transport by allowing water to flow through a variety of in-stream features such as pools, riffles, bends, and large woody debris.
- Restored sediment transport regime – decreases excessive sedimentation into the stream.

This project will also have resilience value for the neighborhood and the City. This value can be seen in two ways:

- The project’s resilience to relevant and potential shocks and stresses: Natural channel design requires less long-term maintenance and holds up better over time compared to more hardened solutions. The trees and plants grow stronger

McCoys Creek Restoration (Cont.)

by Kay Ehas
CEO, Groundwork Jacksonville

over time compared to structures that can weaken over time.

- The services that the project delivers which contribute to overall City resilience: The natural channel design approach will be designed for a comparable or greater level of flood protection service as compared to the traditional structured stormwater concepts envisioned in the City's Master Stormwater Management Plan.

Treatment Mechanisms

The anticipated water quality benefits for the McCoys Creek project will be achieved through treatment mechanisms such as:

- Increase denitrification via hyporheic exchange and via addition of carbon sources such as woody debris and/or macrophytes into the stream to stimulate microbes for nutrient metabolism (and subsequent removal).
- Reduce nutrient contribution from sediments by stabilization.
- Enhance wetland floodplain treatment.

Goals and Next Steps

GWJax is overseeing development of a conceptual design for the McCoys Creek corridor, including recommendations for stream restoration. This first step in the design process aims to establish a vision for the creek that will:

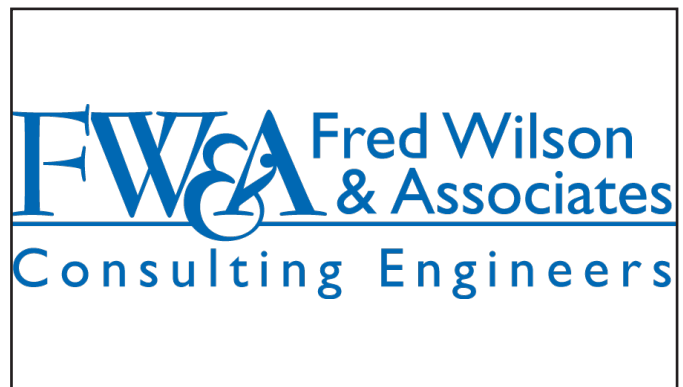
- Create green space and green infrastructure;
- Connect the creek back into the community and vice-versa;
- Incorporate flood mitigation measures to the extent possible in the design;
- Create habitat for wildlife and fish;
- Create a natural



[The Myakkahatchee \(North Port FL\) - A Natural Creek](#)

amenity along the proposed multi-use path and for the larger community; and

- Turn an environmental concern into an environmental asset
- Identify spaces for recreational/park activity
- Restore as many natural stream functions as practical given the corridor and watershed constraints.



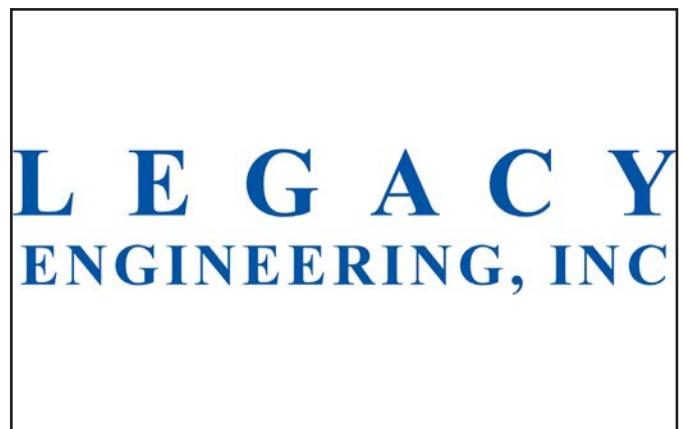
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Construction Career Days

Sixth Annual Construction Career Days Continues to Grow

by Monica Reifeiss, Atkins



Northeast Florida Construction Career Days (NE FL CCD) will soon hold its sixth annual event, February 26-28 at the Jacksonville Equestrian Center. Since the beginning, Northeast Florida CCD event has grown significantly in sponsorships, partnerships and participation from the area schools. Partner agencies and organizations responsible for the event include the Florida Department of Transportation (FDOT), the Florida Transportation Builders Association (FTBA), Federal Highway Administration (FHWA), Consultants, Utility Companies, Colleges / Universities and Contractors.

Since the start of Northeast Florida's participation in CCD in 2014, our partnerships with the industry have continued to grow. In 2019, with one fundraising event left to go, our sponsorship committee members have exceeded their goal of \$120,000. A golf tournament was held in early November and the inaugural clay shoot is scheduled for February 7. The funds raised between these two events will fund the scholarships for 2019.

Northeast Florida's FDOT District Two encompasses 18 counties covering nearly 12,000 square miles, spanning from coast to coast. When District Two began holding their CCD, the event was only for three counties, Duval, Clay and Nassau. This year, the event is welcoming high schools from 11 counties in District Two as well as the Florida Youth Challenge (FLYCA) and the Suwannee Florida Sheriff's Boys Ranch and it is projected that more than 2,000 students and chaperones will be participating.

While the knowledge and insight provided during this event to these juniors and seniors is invaluable, something else this event provides is exposure to

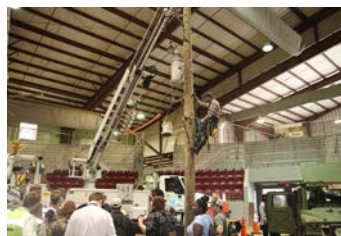


industry leaders, employees and engineers...opening their eyes to possible careers after leaving high school or moving on to college.

Northeast Florida CCD continues to provide scholarships for students who have attended. Since 2014, 46 scholarships have been given out. The scholarship amounts have ranged from \$500 to \$1000 for vocational/apprenticeship and college assistance. In 2018, eight scholarships were awarded, four for college assistance and four for vocational apprenticeship.

Greg Evans, FDOT District Two Secretary for Northeast Florida, expresses the importance of the Construction Career Days event: "It's not just a three-day event, it's an all-year event with us. The levels in transportation funding are levels unheard of and this is our opportunity to give back to our communities and say to our kids - Hey! When you enter the workforce, we've got an opportunity for you. This is an opportunity for our kids to come out and say, Wow! There are a lot of things going on in transportation I had no idea about."

This event would not be possible without the hard work of committee members, learning lab/equipment providers, exhibitors, sponsors and event volunteers. If you would like to be a part of this amazing event, please visit our website; www.nflccd.com.





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Largest Robotics Tournament in Region's History in Jacksonville on February 23rd, 2019

by Mark McCombs
Founder, Renaissance Jax, Inc. – FIRST LEGO League Affiliate Partner for Northeast FL

Chances are, if you or someone you know has a kid in school right now, you're probably well aware that competitive youth robotics – specifically FIRST Robotics – is an awesome opportunity for that student. For the last 5 years, FIRST Robotics teams for K-12th grade students have been growing all over the region. The region's Affiliate Partner, Renaissance Jax Inc. has grown in scale to support close to 4,000 student participants this year competing in dozens of events with a culminating event at the Prime Osborn Convention Center. The Renaissance Jax Championship will see 120 teams competing in 3 different divisions with winning teams gaining access to the coveted World Festival in Houston, TX at the end of April.

This large event will showcase the work that students have put together since August when the season's challenges kick off each year. There is a K-4 FIRST LEGO League Jr. Expo, a FIRST LEGO League Regional Championship for 4-8th grade teams, and a FIRST Tech Challenge Statewide Championship for teams comprised of 7th-12th grade students. Major sponsors this year are Georgia Pacific, Miller Electric, and JEA – all companies that are looking for the technical talent that is growing locally to become their future workforce.

If you've never seen a FIRST Robotics event in our area – we'll clue you in. Picture this: over 100 NASCAR-style pit areas where the teams are all working on maintaining their robots prior to competition while the DJ pumps up the room and people are dancing. While it looks like a sports event, one big difference is that all of these teams rose to the top by helping other teams. For a robot competition where you play in alliances, you might be with a team one round and against them the next round so helping everyone play in good shape is really important.

There are with rooms where research project presentations are put to the test in front of judges, team work challenges where other judges will have the groups demonstrate their Core Values, and a thorough Robot Design judging session. The event is an all-day affair with stadium style seating and is open to the public!

Check out www.renaissancejax.org/championship for more information about the Championship event.



[Above and Below: These are Future Leaders, STEM Professionals, and Workforce](#)

(Photo Credit: Toni Smailagić)



Renaissance Jax began growing the region's FIRST Robotics programs with the belief that a critical mass of students with hands-on experience in computer programming, autonomy, mechanical systems, and creative problem solving will be significantly more employable for jobs that are available today and in the very near future. We aim to produce opportunities for students at a scale that allows companies to plan for more employment options in Jacksonville and the surrounding area within the next 5-10 years. The FIRST Robotics Progression of Programs has 4 distinct programs that gives k-12 students the opportunity to



design, build, and program robots for competition. High school participants gain access to over \$80 Million in scholarship money.

Employers from all over the world are beginning to ask applicants if they were on a FIRST team as part of the application process, and companies like Lockheed, Boeing, Qualcomm, and Rockwell Automation are investing heavily in the growth of the programs to promote the global STEM pipeline.



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2019 E-WEEK CALENDAR OF EVENTS

Feb. 13 (Wednesday)

SMPS: Driving the Future of Transportation: The Rise of Smart Corridors - River Club

Feb. 15 (Friday)

ASCE Kick-Off Luncheon - Sheraton Jacksonville

Feb. 22 (Friday)

Engineers Week/ASHE/ASCE/FES/FEST Happy Hour - Engine 15 (Downtown Location)

Feb. 22 (Friday)

Mathcounts - UNF University Center

Feb. 23 (Saturday)

Boy Scouts Community Service - UNF Building 50

Feb. 23 (Saturday)

Annual Awards Banquet - San Jose Country Club

Feb. 23 (Saturday)

First Robotics Tournament

Feb.26-28 (Tue.-Thurs.)

Northeast Florida Construction Career Days - Equestrian Center

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Reminiscing on 2018 E-Week



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