

Construction Challenges on Oahu

By Garett Muranaka, Hawaiian Electric Co., and Mitch Cowen, HDR



Construction crews prepare to replace an old structure on ridge with remote access.

Editor's Note: In observance of National Energy Awareness Month (October), this article excerpt on Hawaiian Electric's efforts to modernize its transmission structures is reprinted from T&D World (February 2019) by permission. The full article is available online.

Hawaiian Electric Co. has nearly 1300 structures on its 28 138-kV transmission circuits that span the island of Oahu. The system is isolated with no interconnections to other utilities. A single structure failure should not cause customer outages, but the system is at an increased risk for overload and outages if additional failures occur. The 138-kV transmission structures generally are one of the following types: wood poles, steel poles, aluminum frames, and steel or aluminum lattice towers. The wide variety of structures is needed for the topography of the island, ranging from mountain ridges, valleys, side slopes and urban areas.

Steel and wood poles comprise most of the structures, typically located in the mountainous areas of Oahu. Currently, more than 35% of the transmission structures have been in service more than 40 years and nearly 20% have been in service more than 50 years. Because of its aging transmission infrastructure, Hawaiian Electric has begun replacing the existing transmission structures.

Concern Areas

When locating structures on Oahu, there are environmental and cultural concerns. Much of the mountainous areas are designated conservation districts. Structures modified or replaced in this area must be approved by the state of Hawaii.

Another consideration in locating and replacing transmission structures are species protected by the Endangered Species Act of 1973. To perform work in areas where suspected endangered species are located, a biological study must be completed prior to starting the work. Should endangered species be present in the work area, a plan to relocate or ensure they are protected during work activities must be approved by the Hawaii Department of Land and Natural Resources (DLNR).

Hawaii also has many areas categorized as culturally significant because of their ties to Native Hawaiians. These areas may have been burial grounds, sites where religious ceremonies were held or sites where items of historical significance were found. Any ground disturbance in these areas requires an archaeological monitoring plan approved by the State Historic Preservation Division (SHPD), and an archaeologist must be on-site while work is being performed.

Access and Accessibility

In addition to the environmental and cultural challenges, right-of-way (ROW) agreements can be difficult to obtain. As with most construction, the ability to acquire new rights-of-way adjacent to an existing line is preferred to ease construction restraints. However, it is becoming more problematic and costlier for utilities across the United States to purchase ROW. Imagine how much harder this can be on an island were land is held at a very high premium, essentially eliminating that option. With adjacent property difficult to procure, structures must be installed as close to the existing centerline as possible.

Outage and system limitations because of the closed transmission system require the line to be placed in service every night. Hawaiian Electric does not have the ability to rely on another utility to help provide backup and

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ACECH Graduates its Inaugural 2019 Class of Emerging Leaders



ACECH Graduates its Inaugural 2019 Class of Emerging Leaders

The American Council of Engineering Companies of Hawaii (ACECH) Emerging Leaders Program graduated its inaugural class of 19 emerging leaders on September 18 at the Manoa Innovation Center. The program was started in 2018 to provide in-depth leadership training and development for ACECH member firm's emerging engineering leaders. Nine individual sessions were conducted over a 16month period, with each session consisting of an all-day workshop including topics ranging from personal mastery, leading high-performing teams, marketing and business development,

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NEXT ASME-HAWAII GENERAL MEMBERSHIP MEETING

Date: September 17, 2019 (planned)

Time: from 5:30 pm to 6:45 pm

Place: at Johnson Controls, 550 Paiea Street, Suite 210, Honolulu, HI 96819 (directions found on the Hawaii Group website)

Agenda: A copy of the agenda will be on the Group website when available. The Group is planning on having a graduate student report on his or her research project.

The notes of meeting will appear in the November Wiliki.

As usual, all members, students and guests are invited and encouraged to attend our meetings. There are always lots of complimentary refreshments. Please contact Chairman Froilan Garma for directions and for more information, such as parking. This Johnson Controls office is located by the airport making it a more convenient location for members driving in from West and Central Oahu, and Pearl Harbor.

ASME HAWAII GROUP LEADERSHIP TEAM (GLT) 2020-2021

The Hawaii Group GLT is seeking ASME members who can be part of the GLT for the 2020-2021 term. According to ASME Group Operation Guide (Section bylaws), each Group leadership position on the GLT shall be nominated for a 1-year term, with IDEALLY a maximum of 3 consecutive years of service in the particular position. The current GLT members would have to be recycled following ASME Group Operation Guide, if there are no volunteers. The terms start on July 1 and end on June 30. It is not too early seeking volunteers to help lead the Hawaii Group.

ASME HAWAII WEBSITE

The Hawaii Group GLT will be considering shutting down the Group website (www.asmehi.com/). The ASME Group Operation Guide is written, "To prevent the proliferation of the unintended uses of the ASME trademark, as well as to ensure compliance by all Society units with copyright laws, licensing permissions, and privacy protection, no other public websites shall be used for official Group communications." All Groups are encouraged to set up Group Pages on the Society's website, ASME.org. The use of social media sites, such as Facebook and LinkedIn is permitted to assist in group sharing and interaction.



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Aloha AACE members! Be on the lookout for our next Social Event in the middle of October! Project Control Professionals and friends are welcome to join us at the upcoming event sponsored by Encore Group. Further information is available via AACE Hawaii Section website and announcements. Attendance will be limited so RSVP quickly at aacehawaiisection@gmail.com.

Our local Board Meetings are held monthly. Feel free to contact us with suggestions or interest. For more information, please visit our website www.aacehawaii.com.



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Astronaut Lacy Veach Day of Discovery set for Oct. 26 at Kamehameha Schools Kapālama Campus

Free science event inspires & equips next generation of explorers

Registration is now open for the 18th annual Astronaut Lacy Veach Day of Discovery to be held on Saturday, Oct. 26, 2019, 7:45 a.m. to 12:30 p.m., at the Kamehameha Schools Kapālama Campus. To register for the event and the full workshop schedule, visit: http://www.spacegrant. hawaii.edu/Day-of-discovery/index.html.

The free science event, which honors the life and legacy of the late astronaut who grew up in Honolulu, is designed for students in grades 3-12, parents, and educators of all grade levels, with more than 20 hands-on, interactive workshops covering science, technology, engineering and math topics.

Nainoa Thompson, president of the Polynesian Voyaging Society, and NASA astronaut Joseph M. Acaba are the featured keynote speakers. Acaba, an educator who taught high school science and middle school math and science before his arrival at NASA, is also the first astronaut of Puerto Rican heritage. The California native has logged 306 days in space on three flights.

Thompson, who went to school with Veach, connected students in Hawai'i with the crew of the space shuttle Columbia when both men were on expeditions in 1992 -Thompson on the ocean aboard the voyaging canoe Hokule'a and Veach orbiting aboard Columbia. in space The conversations between the students and crews on both vessels highlighted the importance of exploration.

Born on Sept. 18, 1944, Charles Lacy Veach graduated from Punahou School and received an engineering degree from the U.S. Air Force Academy. He had a distinguished career in the U.S. Air Force as a fighter pilot before joining NASA, where he flew on two space missions and logged 436 hours in space. Veach died Oct. 3, 1995, in Houston, Texas. He would have been 75 years old this year.

Astronaut Lacy Veach Day of Discovery is sponsored by Hawaiian Electric, Kamehameha Schools and the Hawai'i Space Grant Consortium with support from the Chatlos Foundation, NASA, and the family of Lacy Veach.



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NEXT EXECUTIVE COMMITTEE MEETING

October 16, 2019, 11:30am, CSM Baseyard -99-989 Iwaena St

10th BIENNIAL COLLECTION SYSTEMS CONFERENCE

Wednesday, November 20, 2019 Date: Location: Koolau Ballrooms Kaneohe

This year, HWEA has teamed with the Western Chapter of the North America Society for Trenchless Technology (WESTT) to provide an exciting joint conference. The conference will include a wide variety of topics related to wastewater collection systems and buried infrastructure with an emphasis on: current collection system technologies, assessment, rehabilitation and operation. Other presentation topics include:

• Collection System Design (including pump stations)

 Trenchless Construction/Rehabilitation and Condition Assessment Methods

• System Operations, Maintenance and Troubleshooting

- Conventional Construction/Rehabilitation Methods
- Collection System Assessment
- · Safety Issues
- Regulations/Enforcement
- New Technologies
- Management and Administration of Systems
- **Operator Certification** ٠



The price for the ads will be based on a $1\frac{1}{4}$ " x $2\frac{5}{16}$ " module size which is 1/24th of the page, and be \$20.00 per month with a 15% DISCOUNT for a 6-MONTH RUN.

For questions or additional information contact: Tom Myers (203-2660, tmyers@ brwncald.com), or Sheryl Nojima (521-0306, snojima@grayhongnojima.com)



PO. Box 1901, Honolulu, HI 96805-1901 An association for Hawaii's Engineers and Architects

WEB address: www.eahawaii.org

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EAH's meeting location is Room 301 in the Topa Tower downtown Honolulu 745 Fort Street. Validated parking is available (enter from Nimitz). Visit eahawaii.org for directions and a map and any Program schedule or meeting location updates.

Meetings are held 2 times per month on Fridays. Meetings start at NOON and have ended PROMPTLY at 1:00 pm for over 110 vears.

All are Welcome. Lunch is \$10.00 for Members, \$12.00 for guests and \$5.00 for students. Drinks and refreshments are complimentary. Brown baggers welcome. \$2.00 donation is gratefully appreciated if not having lunch.

2019 October EAH Program

Program Chair: Phil Blackman Up Coming Meeting:

Fridays, October 4th and 18th

Speakers: TBA Visit eahawaii.org Meeting Notes August 9, 2019

Speaker: Katie Stephens – Associate AHL Design

Subject: "50th Anniversary of the Hawaii

Ms. Stephens was on the 50th Anniversary committee for the Hawaii State Capital. As part of the anniversary they wanted to find the time capsule, but there was no known record of where in the capital building it was located. Katie discovered its location relatively easily by doing a newspaper search for "Hawaii Capital Time Capsule". One of the first hits was Honolulu Star Bulletin March 17, 1969 "Cornerstone's a capsule of the Hawaii of today". Somewhat of a disappointment, was that the news article listed everything that was placed in the capsule, thus no mystery on opening the capsule. Some of the things in the capsule were pictures of the legislature, a business directory, and pictures from around the State. The capsule was a sealed copper box. Katie explained the new capsule will be stainless steel. They plan to place similar items back into the capsule with updated pictures from around Hawaii, but they will also place some items without revealing what they are. Katie also talked design development about and construction of the capital. She noted the offices do not have backdoors, i.e. legislators are expected enter and leave via public doorways to promote open government. Also, the Armory now next to Iolani Palace was actually relocated stone brick by stone brick from the Capital Site.

Meeting Notes - August 23, 2019

Speaker: Jon Okuma President - COO **Pioneer Electric**

Subject: "Smart LED Wireless Lighting Controls"

Jon Okuma demonstrated just how advanced LED Light Controls has become. A single LED lighting brain or computer control can manage and control hundreds of LED lighting fixtures. Each light fixture communicates wirelessly with its neighbor lights forming a mesh grid. The system doesn't use Wi-Fi and is actually more reliable then Wi-Fi because of the grid configuration which provides dozens of possible paths for messages to travel through the grid network to the various lighting devices. The brain can control the individual light schedule, its brightness or dimness and even its color. Of course there can be significant energy savings with LED light fixtures and the ability to control output levels and scheduling provides even more energy savings. Paybacks can be in just a few years depending on what type of lights are being replaced. The lights can also help to meet current State energy codes. Control can also be remote or off-site via cellphone.



Website: hawaii.apwa.net

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EXECUTIVE COMMITTEE MEETING

Last held: September 3, 2019

Next meeting: October 2, 2019

ASCE HAWAII SECTION DINNER MEETING Program: T.B.D.

Check our website at ascehawaii.org for updates and an email will be sent out to membership with more information.

I.B.D.
T.B.D.
HASR Bistro
5:30pm Social Time
6:30pm Dinner
7:00 Program
Multi-entrée buffet
\$35.00 for ASCE Members
\$40.00 for Non-Members and
Guests
\$20.00 for ASCE Student Chapter
Members

COMMITTEE POSITIONS

ASCE Hawaii is looking for volunteers to fill the following committee positions: History & Heritage Chair, Communication Co-Chair, Advocacy Captain, OahuMPO and Student Practitioner Advisor. If you are interested or have questions on any of these positions, please contact President Jason Kage, jkage@ascehawaii.org.

MEMBERSHIP

If you haven't already done so, please renew your ASCE membership. You can renew your membership at www.asce.org.

ASCE JOB LISTINGS

The following job listings are currently posted on the ASCE Hawaii Section website:

 Booz Allen Hamilton (Senior Civil Engineer and Wastewater Specialist)

• City and County of Honolulu (Civil Engineer V (Geotechnical), Civil Engineer III, V, VII, Mechanical Engineer V)

• HartCrowser (Geotechnical Engineers -Principal Level & Project Level)

• Kennedy/Jenks Consultants (Project Manager, Staff Engineer for Honolulu Office and Staff Engineer for Hawaii Office)

 Nagamine Okawa Engineers Inc. (Structural Engineer)

• PGH Wong (Change and Claims Manager, Change and Claims Specialist, Civil/Building Inspector, Office Engineer, Scheduler)

 SSFM (Civil Engineers V, Structural Engineer IV)

• US Army Corp of Engineers (USACOE) (Interdisciplinary Project Manager, GS-12)

• Zane & Associates, LLC (Facility Planners) For further information, please visit http://www.ascehawaii.org/job-listings.html.



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YMF General Meeting

The next YMF general meeting is scheduled for Wednesday, October 2nd, 2019 at 6:00 pm at Underdogs Sports Bar & Grill. If you are interested in attending and learning more about the various professional, social and service opportunities available through YMF, please contact YMF at ymf.hawaii@gmail.com.

GPRM Prestress Facility Field Trip

On Saturday, August 24th, YMF took their first field trip of the year to the GPRM Prestress Facility in Kapolei. GPRM Prestress is responsible for providing precast/prestressed pieces of buildings, bridges, roadway panels. They also provide many different architectural finishes based on a client's needs. Some of their past projects include set pieces for the Army training, concrete panels for H-1 freeway and their recent work on the Pali Highway tunnels.

The YMF members started the morning by taking a walking tour of a portion of GPRM's 17-acre site where they were shown the various building pieces and equipment that are used to pour, form, and apply the architectural finishes for the concrete. Later, they convened in the conference room and were provided with light refreshments and were shown photos and plans of various projects GPRM has worked on. Thank you to Milli Domae for coordinating and leading the tour and to the rest of the GPRM staff for having us!





PO BOX 3348, HONOLULU, HI 96801 Web Page URL http://www.seaoh.org

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PREVIOUS BOD MEETING

September 4, 2019

General Membership Events

For all events see seaoh.org

 SEAOH Convention 2019 Registration is Open – Dates are set for October 18-20 with the main convention activities being held at Alohilani Resort in Waikiki.

• The SEAOH 50th Anniversary Celebration will be held at the Hawaii Convention Center on Saturday, October 19th, hosted by Ashraf Habibullah of CSI. This event is free for all SEAOH members, associates, sponsors, structural engineering firm employees, friends, and family.

 This year's convention will feature a Mentorship Event on Saturday, October 19 at the Hawaii Convention Center (more details to follow). The event will give young engineers and students an opportunity to learn what other professionals do and how they interface with structural engineers from experienced professional mentors from other design and construction fields. This event is open to all young structural engineers, designer, and students(SEAOH membership not required).

 Registration is open for the Annual SEAOH Scholarship golf tournament. The Tournament is scheduled for November 1st at the Hoakalei Country Club.

· We are currently accepting applications for the SEAOH Scholarships to be awarded at the golf tournament. students entering or currently attending an accredited college or technical school as full-time students. The scholarships are intended to encourage Hawaii's youth to continue studying at an accredited 2-year or 4year college or technical school.

Next BOD Meeting on October 2, 2019. For information, contact SEAOH President; Kevin Nakamoto knakamoto@ssfm.com

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Construction Challenges on Oahu, From Page 1

system redundancy. To increase construction efficiency, the new structures must closely match the conductor geometry of the existing structures. During construction, this prevents phase-to-phase clearance issues and lineangle changes could potentially exceed the design parameters of the existing structures.

To compound this further, the double- and triple-circuit structures are being split to individual parallel single-circuit lines, to decrease the quantity of outage conflicts between circuits connecting the same substations. All circuits attached to the structure being replaced require outages for the duration of construction. Renewable energy source interconnections are increasing on the transmission circuits, making intermittent curtailment a growing concern because it impacts work scheduling.

Environmental durability is a factor when determining structure types. Oahu is home to many climate zones and the same transmission line may cross through several, if not all, of them. Coastal regions with high levels of salt corrosion and shallow water tables, tropical areas with high volumes of rain and humidity year-round, dry desert-like areas with substantial levels of very fine dust and high levels of ultraviolet radiation— all these environments must be considered. Rotting wood poles and corroding steel structures long have been a problem. In addition to weather, insects are prevalent. Termites in Hawaii have a particularly aggressive appetite for treated wood poles.

After all the challenges have been addressed, crews still must get to the structures to replace them. Accessibility to transmission lines and structures is arguably the biggest factor to consider. A large percentage of transmission structures on Oahu are in remote areas that cannot be accessed by vehicles.



Sikorsky helicopter aiding construction of new 138-kV structure in a remote area.

Because of the cultural sensitivities and land rights, new roads rarely can be built. Therefore, helicopters are the primary means available to transport crews, materials and structures to many locations.

Of course, there are limitations to what helicopters can carry safely. For example, a McDonnell Douglas MD500 helicopter generally is used to ferry personnel and equipment to a jobsite when the payload is less than 1000 lb, whereas 3500 lb is the maximum weight that can be transported with a Bell Huey. The Huey typically is used for moving lighter material and foundation concrete. For many years, it was the largest helicopter available to Hawaiian Electric. Occasionally the much larger Sikorsky S-61 helicopter is brought on the island to increase construction efficiency as it can carry up to 7500 lb. The limitations of the helicopters dictate that any new structure must have the ability to be segmented and carried in sections as well as easily framed aerially.

Standard Structures

Having a consistent structure family— with the versatility to support a wide range of wind and weight spans that can be used anywhere on the island, regardless of accessibility— is preferred. In remote mountainous areas, topography governs where the structure is placed instead of the engineered target ruling span. Ridges and peaks are prime spots to locate the structures. However, finding areas large enough with the existing structures in place leaves few options. Structures on Oahu may see span variations as severe as 200 ft on one side and 2000 ft on the other side. Some also must withstand significant vertical changes ranging up to almost 3000 ft in a single span.

With a standard structure type and family, it is easier to train crews, develop material standards and prepare for emergencies. Being in the middle of the Pacific Ocean, where it takes considerably longer to get supplies, Hawaiian Electric has to standardize and prepare differently than mainland utilities, which can obtain poles faster.

Finding a structure that can satisfy Oahu's diverse needs— be self-supporting with a small footprint, corrosion- and insect-resilient, versatile and cost-effective, within helicopter lifting capabilities- all point to steel monopole structures on concrete foundations. Steel tends to corrode and rust in caustic environments such as those found on Oahu, so- in addition to hot-dip galvanizing- corrosion-resistant powder coating is applied to the steel poles to help protect against the environment. Section weights are kept below helicopter maximum lift capacity, and helicopter guides are implemented to aid construction.

The steel poles are also relatively easy to assemble, which is a requirement because new structures must be built within existing easements. Load cases with high wind, broken wire or failure containment were developed to ensure reliability and structural integrity well into the future for Hawaiian Electric's 138-kV transmission system.

Digging Foundations

The utility uses shaft foundations and micropiles for steel pole transmission structure replacements. Where locations are accessible, foundations excavated by vehicle-mounted drills are the most uniform and cost-effective. Foundations inaccessible by large vehicles either are dug by hand or have a micropile foundation. Although labor-intensive and costly, hand digging has a long history in Hawaii for the installation of structural foundation s because of



Crews often have to hand-dig foundations and then transport the debris from the site with a hand line and bucket.

the steep and inaccessible terrain. Uniformity of shafts and production rates depend on the type of material encountered during excavation.

On a typical Hawaiian Electric transmission line project, multiple specialized foundation contractors are used because both accessible and inaccessible foundations are required. Using multiple contractors is cost-effective and enables Hawaiian Electric to reduce a project's length as well as the length of outages on the transmission system.

Planning and Coordination

Helicopter landing zones and staging areas must be acquired during project planning. Flight plans must be submitted to the U.S. Federal Aviation Administration for all helicopter flights. The Sikorsky S-61 heavy-lift helicopter is a restricted category helicopter because of its previous use in the military. This designation means the helicopter is not allowed to fly in or over populated areas, thereby requiring additional planning when choosing landing zones. Road closures also are required when a helicopter transporting a load needs to cross the roads. To prevent additional coordination and permitting as well as increased cost to close highways, materials are trucked to selected staging areas and then flown to the site, eliminating the need to cross roadways and populated areas.

When stringing new conductor, shield wire and optical ground wire (OPGW) are installed on the new structures, many of the same issues are encountered. Helicopters can be used to string the wire in remote areas, but the heavy conductor reels and construction cable trailers exceed the weight limits of the helicopters, so finding locations to stage and string from is extremely challenging in the remote areas of the island. Finding one location to put pulling equipment is difficult enough but finding a second location for the conductor pull cart is rare. Potential locations that will allow vehicle access for fiber splicing are scouted early in the design process. Many times, the largest reels available are used and there is barely enough OPGW left for it to be spliced and coiled at the base of the structure.

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ACECH Emerging Leaders, From Page 1

contracts and risk management, to human resources.

"Our inaugural program was met with great demand, with nearly 40 applicants for just half the number of spaces," said Ken Kawahara, 2019-2020 ACECH president. "The students comprising this program represent some of the best and brightest emerging professionals at their respective firms. The future of Hawaii's engineering community is looking much brighter with our first graduating class of emerging leaders," he continued.

Led by Mark Tawara of Manageability LLC and Corey Matsuoka of SSFM International, the objective of the leadership program is to help foster the growth and development of Hawaii's future engineering leaders through a cohort learning/growth model. Through bi-monthly group sessions, pre- and post-session work, and readings, participants will gain awareness of themselves, their peers, and requisite mindsets and skills of effective leaders, in addition to learning best practices for successfully running an engineering practice. Developing emerging leaders now should facilitate smoother succession and transition in years to come.

The Hawaii leadership program was modeled from the American Council of Engineering Companies' national program, the Senior Executives Institute, which just started its 25th class last month. Both Tawara and Matsuoka were graduates of this prestigious program, which spanned 24 months and included intensive multi-day leadership development sessions at locations across the country.

The bi-monthly program format of the first ACECH Emerging Leaders Program spread over 16 months allowed participants to absorb what is learned and apply it to their jobs in the time between sessions. In addition, the time between sessions was also needed for reading course materials and small group assignments.

Applying for the ACECH Emerging Leaders Program included a two-step process consisting of completing an application form with basic information, including contact information, education, employment history, and a brief questionnaire; and participating in a short conference call with the program facilitators.

Graduating from the inaugural class of emerging leaders were Michael Bungcayao (G70), Myong Choi (Bowers + Kubota Consulting), Lauren Doo (Akinaka & Associates), Timothy Goshi (KAI Hawaii), Michael Greer (Wiss, Janney, Elstner Associates), Toby Hanzawa (Gray, Hong, Nojima & Associates), Lara Karamatsu (WSP USA), Brett Katayama (J. Uno & Associates), Chris Kuramoto (InSynergy Engineering), Glenn Kuwaye (Wilson Okamoto Corporation), Logan Lee (MKE Associates), Ivan Nakasone (SSFM International), Dayna Nemoto-Shima (Pacific Geotechnical Engineers), Lennie Okano-Kendrick (Okahara & Associates), Billy Ornellas (Ronald N.S. Ho & Associates), Kimberly Pua (Wesley R. Segawa & Associates), Simone Simbeck (Hart Crowser), Garrett Tokuoka (Austin, Tsutsumi & Associates), and Trevor Vagay (The Limtiaco Consulting Group).

Due to popular demand, ACECH launched its second Emerging Leaders Program consisting of 20 students on September 19. Like the first class, the second class was also a sellout with more applicants than seats available.

For more information about the program, contact Mark Tawara at *mark@manageability.* pro or Corey Matsuoka at *cmatsuoka@ssfm.* com.



Website: www.acechawaii.org

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Director:	Michelle Adolpho
	ECS. Inc.
Director:	Nimr Tamimi
,	Engineering Partners
	5 5

Deadline for **Wiliki** is October 15th

Construction Challenges on Oahu, From Page 6

Vegetation management on Oahu is a continuous process. The tropical climate fosters plant and grass growth year-round. Coordinating vegetation management with both surveying and construction efforts requires frequent progress update meetings. In remote areas, landing zones must be cleared of such vegetation before helicopters can land safely.

Making it Work

Despite all the obstacles discussed, Hawaiian Electric has been able to team up with HDR to develop the groundwork to build a solid structure-replacement program. The truest test for such challenges is the ability to complete a project. Construction is ongoing, but much of the backbone transmission lines that support most of the island have been rebuilt. The Oahu power grid has benefited from a more robust and reliable transmission system that is built to last well into the future.

Garett Muranaka is a licensed professional engineer in Hawaii and has 14 years of experience in the structural division designing overhead and substation structures with Hawaiian Electric Co. He is a member of American Society of Civil Engineers (ASCE) and is currently on the ASCE Manual of Practice 74 Guidelines for Electrical Transmission Line Structural Loading committee and the ASCE Manual of Practice 104 Fiber Reinforced Polymer Products for Overhead Utility Line Structures committee.

Mitch Cowen is a project manager with HDR. He has 12 years of experience with overhead power delivery, including routing and permitting support, line design, structure determination and creation, material selection and procurement, drawing creation and field construction support. Cowen received a mechanical engineering degree from Montana State University.

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