



**Air Force**

# Civil Engineer

By Engineers. For Engineers.

Vol. 25 No. 2 Summer 2017



**INNOVATION**   
in **SQUADRONS** 

# Civil engineers: Champions of innovation!



Innovation is a critical capability that the civil engineer enterprise must foster and develop to meet the challenges of today and anticipate whatever may come tomorrow. We recognize that creating an environment in which innovation comes naturally starts with the leadership and Airmen within our squadrons. Our squadron commanders have a responsibility to encourage collaboration and provide resources so that one Airman engineer's idea may become the next breakthrough solution that's implemented across the Air Force enterprise.

"Squadron commanders ... that's the last time you have an impact individually ... that organization will have the personality of the commander. This is where the culture of the Air Force resides, that's where a lot of the innovation comes ... at the squadron level," said Gen. David L. Goldfein, Air Force chief of staff.

Airmen engineers, by nature, are incredible problem solvers. They take what they know from what they experience every day and develop new, unique ways of addressing everyday challenges. We need to foster that creativity

and empower our Airmen engineers to work together to develop their ideas. The Summer 2017 CE Magazine — Innovation in Squadrons — celebrates the innovative achievements of our Airmen engineers. We value your effort and commitment to the CE enterprise.

In this issue you'll learn about the San Antonio Lean In Circle, which comprises women across the Air Force from the Air Force Civil Engineer Center, the AF Personnel Center, AF Installation and Mission Support Center and the San Antonio River Authority. Inspired by Sheryl Sanberg's book "Lean In: Women, Work, and the Will to Lead," these women formed a group to encourage and empower each other to serve as leaders.

You'll also read about how Kunsan Air Base, Republic of Korea, developed an innovative way to train Airmen engineers to "fight tonight." To address a gap in hands-on experience replacing high voltage equipment, an operational readiness exercise was developed that enables Airmen to replace transformers during OREs. This provided valuable training that our CE Airmen rarely receive.

After reading the Summer 2017 CE Magazine, I hope squadron commanders and Airmen engineers will be inspired to take action. Seize the opportunity to share your ideas and collaborate with your fellow Airmen. The future of the CE enterprise will be built upon your achievements.

Engineers lead the way!

**Timothy S. Green**  
Major General, USAF  
Director of Civil Engineers

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Senior Airman Vincent Graziano uses a tablet computer to take notes while Airman 1st Class Jose Razo completes an onsite inspection on Spangdahlem Air Base, Germany. (U.S. Air Force photo/Staff Sgt. Ravon McCoy)

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# Prime BEEF training refreshes hands-on skills

By Capt. Kyle R. Schafer  
633rd Civil Engineer Squadron

The proliferation of computer-based training has eroded the emphasis upon hands-on training, despite Air Force Instruction 10-210 stating units should make every effort to incorporate realism into their respective home station training, or HST, programs.

As a result, squadron Prime Base Engineer Emergency Force, or Prime BEEF, days have been relegated to computer-based training and Air Force specialty code-specific training, overshadowing the opportunity to promote unit integrity through morale-building events and multidisciplinary cross-training activities. Civil engineers must train the way they expect to fight — they must be innovative, multiskilled, physically fit and prepared for any contingency environment.

In order to better support combatant commanders, the 633rd Civil Engineer Squadron engineering element expanded upon War and Mobilization Plan-1 civil engineer supplemental guidance and developed an annual innovative training agenda that not only maintains, but also strengthens and enhances unit combat readiness. It synchronizes numerous individual and collective HST requirements, including contingency construction, vehicles and equipment, combat skills, field sanitation and health, exper-

ient construction methods, specialty code-specific skills, as well as Basic Airman Readiness and Total Force Awareness Training.

The annual calendar of events encompasses a wide array of repeatable training opportunities that harness the Air Expeditionary Force deployment structure and takes advantage of joint base facilities.

At Joint Base Langley-Eustis, Virginia, these sites include the leadership reaction, confidence, tactical convoy operations and land navigation course; the HMMWV Egress Assistance Trainer and the Engagement Skills Trainer at Fort Eustis; as well as a contingency operations site at Langley known as Raptor Town.

The schedule is oriented around deployment cycles so that training in the months preceding large deployments focuses on time-sensitive tasks including combat arms, records review and computer-based training. The months that fall between primary deployment cycles include large events such as the innovative CE Readiness Challenge and AFSC immersion.

The first CE Readiness Challenge received basewide attention and involved engineer Airmen working through a



**Facing page:** Members of the 633rd Civil Engineer Squadron participate at the Leader Reaction Course during a Prime Base Engineer Emergency Force training event at Joint Base Langley-Eustis, Virginia, April 20.

**Above:** Civil engineers move a pipe across a mote during the Prime BEEF training session, which encourages them to communicate, learn each other's skills and builds confidence.

**Below:** Civil engineers tackle the Prime BEEF leadership reaction course every month to ensure deployment readiness (U.S. Air Force photos/Airman 1st Class Kaylee Dubois)





round-robin of 12 different contingency stations. This innovative, multidisciplinary cross-training included activities such as unexploded ordnance identification; light circuit installation; small shelter system setup; chemical, biological, radiological and nuclear, or CBRN, and mission-oriented protective posture proficiency and post-attack reconnaissance; military grid reference system map identification; set up of an environmental control unit; work order processing; fire department personnel carries and Kiser sled; bathroom fixture repair; vector/pest control; and aircraft arresting.

“In a deployed environment, where you can sometimes be short on manning, you want to have that total Air Force integration Airman, a jack-of-all-trades,” said Lt. Col. Kevin J. Osborne, 633rd CES commander.

The success of this event contributed to the recognition of the Readiness and Emergency Management Flight as a superior performer during the 2016 Air Combat Command Inspector General’s unit effectiveness inspection.

The flight built further on the success of the Readiness Challenge to host a specialty code immersion day, which involved Airmen working through 12 different AFSC-

Members of the 663rd CES participate at an electrical production station during a Prime BEEF training event at Joint Base Langley-Eustis, Virginia, Oct. 25, 2016. At the station, which was one of 12, they punched out and reeved nylon purchase tape through a tape connector. (U.S. Air Force photo/Senior Airman Kimberly Nagle)

specific stations. It immersed junior Airmen and non-commissioned officers into specialty codes from across the civil engineer enterprise and provided cross-training activities such as plumbing mechanics; bucket-truck operation; generator troubleshooting and load balancing; airfield damage assessment and plotting; animal control; Jaws of Life operation; wall repair; and CBRN identification.

“It was a morale booster, and got people out and away from their jobs for a day. It gave them the opportunity to see what others do,” said Staff Sgt. Daniel Muldowney of the 633rd CES Emergency Management Flight. Senior NCOs and officers also taught courses in troop-leading procedures, the contract augmentation program, military decision-making process and disaster and attack planning and preparation.

The deterioration of home-station training into a series of computer-based courses does not adequately prepare our engineers with the hands-on skills required within deployed environments. This revitalized and innovative Prime BEEF program has forged a highly skilled, agile military-combat support civil engineer force, capable of rapid response in support of combatant commanders and other worldwide contingency operations.



## Empowering Airmen builds

# a culture of innovation

By Capt. Brigham Moore  
52nd Civil Engineer Squadron

The 52nd Civil Engineer Squadron on Spangdahlem Air Base, Germany, is bustling with innovative ideas. So much so, it recently contributed to the 52nd Fighter Wing’s winning the U.S. Air Forces in Europe-Air Forces Africa’s third annual Innovation Madness contest.

The wing submitted 62 ideas for innovation, saving the Air Force \$18 million and 145,000 man-hours. The 52nd CES contributed 78 percent of the cost savings and 40 percent of the manpower savings.

Who generated those ideas? Airmen. Airmen who are empowered with strategic vision and an opportunity to innovate.

### Innovation Madness

Previous years’ contest submissions included Taxiway Tuesdays, a full in-house LED taxiway light replacement project by the 52nd CES electric shop. It saved 400 man-hours annually, uses 75 percent less power annually and extends a light’s life from months to years.

Another submission was the Mobile European Utilities Systems Trailer, which helped overcome a unique training gap within Pipeline Tech School. The project saved the Air Force \$85,000 a year in training and wasted material expenses. The 52nd CES Explosive Ordnance Disposal Flight teamed with survival, evasion, resistance and escape personnel to eliminate each other’s training gaps and saved \$42,000 a year in travel and course costs to maintain deployment readiness of EOD Airmen and Spangdahlem’s F-16 pilots.

The bar was set high with those submissions, and the 52nd CES rose to the challenge, submitting 14 innovations in 2016. Submission highlights include:

- An Activity Management Plan, or AMP, Validation Process — a process and spreadsheet tracker — used by technicians and craftsmen to fact check Sustainment Management System-generated maintenance tasks, scheduled projects and other data. Requirements are then prioritized using both the SMS algorithm and objective (human) decision-making to eliminate or

postpone work execution until the proper time within an asset’s lifecycle. The AMP Validation Process identified \$59 million over the seven-year investment schedule (\$14 million in 2016) that was invalid or projected too early.

- The Spangdahlem Fire Department overcame a \$128,000 training requirement for certification by bringing two courses to Spangdahlem and conducting mass instruction and training during the duty day and avoiding overtime costs and temporary duty costs.



Senior Airman David Ratz uses a tablet computer to conduct inventory and take notes in a mechanical room on Buechel Air Base, Germany. (U.S. Air Force photo/Master Sgt. Kyle Warnock)



- Senior Airman Jahairy Casado in customer service re-tooled the AF Form 332 process for all facility managers across the installation to eliminate paper copies and expedite coordinating agency reviews, saving 312 man-hours annually.

### Creating the culture

The Innovation Madness campaign is not the catalyst that started the innovation in the squadron, but rather was a place to substantiate the creativity of 52nd CES Airmen. The innovation spawned from leadership at all levels and spread across the wing. Locally within the squadron, leaders took the challenge and gave it to Airmen to own. Most of the submissions in 2016 came from Airmen in the rank of staff sergeant or below.

Empowering Airmen with the right training and the right tools was a significant part of the overall cultural change. For example, as early as summer 2015, some 52nd CES Airmen were heavily involved in BUILDER and SMS condition data entry to meet an Office of the Secretary of Defense mandate through Facility Assessment Teams, or FAT, and supplemented by contractor support. After analysis of the FAT, we trained all Airmen, equipped them with 21st century tools, including ToughBook tablets, and gave them purpose in data collection by asking them to consume the data. The FAT was trimmed, and the 52nd CES realized about \$1.2 million worth of manpower reintegrated into shops with skills and tools to get the job done.

Airmen with the 52nd CES identified shortfalls in data from a contractor and eliminated the need for a \$300,000 roof renovation. Staff Sgt. Nicholas Wengert identified a series of electrical panels in bad shape and proactively fixed the issue on the shop's timeline rather than having to respond to an after-hours call. Senior Airman Marisol Zamora, working on linear segmentation, identified a \$4 million unplanned requirement for a major utility-line replacement based on installation history and material type. Further creative investigation into the condition seated the replacement project into the appropriate fiscal year.

### Keeping up the trend

Innovation has become part of the way the 52nd CES does business. Airmen at all levels are empowered to challenge the status quo and come up with new ways to work smarter and more efficiently. The culture of innovation is alive in daily conversations and is fueled as superintendents showcase and defend ideas presented by their Airmen among their flights.

Recently, during enterprise-wide CE Operations Flight of the Future discussions, the 52nd CES operations superintendent shared the AMP manager alignment used at Spangdahlem. The 52nd CES AMP managers include operations superintendents, who may engage the entire operations workforce to accomplish good asset planning

and management of the base's built infrastructure. Inserting superintendents into the structure as AMP managers is proving to be a huge win. Airmen within requirements and optimization and engineering are engaged as they always have been, but now a long-needed collaboration with operations' craftsmen has begun.

Finally, innovation isn't stopping. Airmen of all levels at Spangdahlem just keep pushing the frontier of the AMP, BUILDER, operations engineering, training and other facets of CE. These Airmen are innovating and striving to build the CE squadron of the future as they see it written out and explained from higher headquarters and the Air Force Civil Engineer Center.

Let your Airmen innovate. Join the fun and think forward.

**Editor's Note:** Moore is the operations flight commander at Spangdahlem Air Base, Germany. He is a professional engineer licensed in Utah.



Taxiway Tuesdays, a previous contest entry, led to the replacement of traditional taxiway lights with light-emitting diodes. The project is saving 400 man-hours and uses 75 percent less power annually. (U.S. Air Force photo/Staff Sgt. Christopher Ruano)

# CE DASH

Technical support for CEs in the field

By Randy Brown  
Director, Air Force Civil Engineer Center

Air Force civil engineering as we know it has changed. Transformation has made us leaner, systems are more complex, and our jobs are challenging. We needed to find a way to help you get answers quickly and accurately.

About a year ago, the Air Force Civil Engineer Center Corporate Board started brainstorming to enhance delivery of technical support to our installations and warfighters. Representatives from across AFCEC worked together to review and identify solutions to this problem. Ultimately, we decided on a web-based, self-help technical-support tool to quickly distribute relevant information to the field.

In October, the AFCEC Operations Directorate jumped at the opportunity to engage our vision and tackle our challenges with information sharing. The directorate has the greatest number of subject matter experts within AFCEC, so we started there. Our solution has since grown to include information on services and topics across AFCEC.

CE DASH has emerged as the name for our new SharePoint site, focused on providing technical support designed with the field in mind. It's a sister site to eDASH, the Air Force's incredibly successful one-stop-source for environmental and sustainability programs, which launched across the enterprise in 2010.

The framework behind CE DASH is simple — provide the resources that every agile engineer needs in a simple-to-navigate online site. Civil engineers will find information on a variety of subjects, from fire protection to pavements, all easily searchable by either the A-to-Z index of service and topic areas or by keywords if looking for something very specific. It is civil engineering resources at their fingertips. CE DASH will constantly evolve with time as AFCEC and other stakeholders in the field identify knowledge requirements and define new or revised policy and guidance.

The Reachback Center at Tyndall Air Force Base, Florida, plays center stage in this effort, moving beyond phone calls and emails to become a robust online component of CE DASH. Easy inquiry submittals and a database of frequently asked questions are just a few RBC tool highlights.

I am excited, as I am sure you will be, to see this fantastic 24-hour service we provide to the field spruced up with some new bells and whistles.

Your CE DASH experience will lead you to discover comprehensive resources for innovative Airman and collaborative tools aimed at providing two-way communication between the field and AFCEC. You can sign up for alerts on your topics of choice to ensure you get the most up-to-date information as it becomes available.

CE DASH is constantly growing; what you see now is only the beginning.

If you haven't been there yet, try CE DASH. Use one of the search features, check out the RBC online tool, or indulge in an in-depth read of your favorite technical support topic. This year, we will work to spread the word, continue to populate the site and build additional CE DASH tools. Be on the lookout for a speaker series and other announcements to learn more. We are proud to support you in the field, and you make a difference to our Air Force every single day.

Engineers lead the way!

Try out CE DASH at <https://cs.eis.af.mil/sites/10159/> (common access card-enabled; select your email certificate to access).





## Kunsan fosters innovation by training Airmen to fight tonight

By Maj. Josh R. Aldred  
Air Force Civil Engineer Center

In an August 2016 policy memo, new Chief of Staff of the Air Force Gen. Dave Goldfein outlined his No. 1 focus area and championed a bottom-up approach to foster innovation within Air Force squadrons. Goldfein reiterated that the squadron is the beating heart of the Air Force and we holistically succeed or fail in accomplishing our mission if we do not develop, train and build Airmen.

In light of Goldfein's focus area and the theme of this issue, I would like to highlight a great innovative practice that was initiated by one of my former Airmen at Kunsan Air Base, Republic of Korea, an installation with a critical deterrence mission less than 200 miles from the Korean demilitarized zone.

The story begins with a civil engineer maintenance inspection and repair, or CEMIRT, team staff assistance visit to Kunsan in summer 2015 to evaluate the installation's electrical infrastructure. Kunsan is adjacent to the Yellow Sea, and the proximity to the ocean results in high levels of corrosion, including the metal casings for the transformers.

Airmen from the 8th Civil Engineer Squadron replace a transformer during the exercise as part of Beverly Pack 16-1 at Kunsan Air Base, Republic of Korea, in October 2015. The exercise tested the ability of Airmen to respond to real-world situations. (U.S. Air Force photo/Senior Airman Dustin M. King)

In the final assessment report, the CEMIRT team identified 79 high-voltage transformers that were severely degraded and required immediate replacement.

Delivery times for parts shipped from the United States averaged six to eight weeks for general shop supplies and was exponentially higher for more complex items such as electrical components. Because of the supply-chain issues and difficulty in quickly purchasing National Electrical Code-compliant transformers locally, we kept a handful of spare transformers in storage. The 79 highly degraded transformers added up to approximately one-fourth of all transformers on base and an innovative solution was required to source new transformers and schedule power outages to individual facilities.

Senior Master Sgt. Jean Guy Fleury was a member of the wing inspection team and had been looking for new ways to test our young civil engineer Airmen during Kunsan's bimonthly operational readiness exercises, or OREs, and ensure that they were ready to "fight tonight." He had

noticed that many of our young electricians had very little hands-on experience replacing high-voltage equipment and most had never replaced a transformer during their time in the Air Force.

Armed with this knowledge, Fleury added an exercise inject to simulate a facility power outage and drive a transformer replacement while our Airmen were in chemical protection gear. After the first successful ORE transformer replacement in October 2015, this innovative practice was instituted into every ORE at Kunsan, using a handful of new and gently used spare transformers residing in storage.

The green light to continue transformer replacements during OREs was a vote of confidence from our wing leadership. Our civil engineer operations team, with valuable insight from Fleury, was determined to find an innovative solution to replace the degraded transformers quickly and provide additional training to our Airmen. After a little research, we found that we could apply for Republic of Korea sustainment funds to purchase the transformers from a Korean manufacturer, specify them to be code compliant, and have our Airmen replace the transformers during OREs and through scheduled power outages to gain additional training.

This method eliminated the need to program the transformer replacements and compete for funds on the Air Force installation priority list. This approach also significantly reduced the delivery time to receive the transform-

ers and facilitated improved and timely maintenance and sustainment since replacement parts could be sourced locally versus having to be shipped from the United States. Most importantly, this approach provided valuable training that our Airmen rarely receive at stateside locations. Finally, we used a multicraft approach to leverage resources from multiple shops to maximize training opportunities for all our Airmen.

Kunsan was a great place to initiate this idea because of the high level of turnover associated with a remote assignment and the ability to incorporate realistic training into our exercise scenarios.

Ultimately, Fleury's innovative idea to schedule transformer replacements in conjunction with OREs was recognized as a best practice by the Pacific Air Force's inspector general team during a unit evaluation inspection in March 2016. With the constrained resources and capabilities we see at the installation today, our CE community needs to foster innovative tactics to maximize training opportunities and grow our young Airmen. I salute Fleury for his innovation and hope his leadership will be an example of the power of a great idea.

**Editor's Note:** Aldred is the deputy director of AFCEC's Energy Directorate. He is a professional engineer, licensed in Arizona, and a certified project management professional. He holds a doctorate in civil engineering from the University of Texas at Austin.



Senior Master Sgt. Jean Guy Fleury developed a way to give civil engineers much-needed, hands-on experience replacing transformers by including the simulation of a facility power outage in an operational readiness exercise. Civil engineers in full chemical protection gear now replace aging transformers on Kunsan Air Base, Republic of Korea, during each exercise. (U.S. Air Force photo/Senior Airman Dustin M. King)



# Air Force changes cost-estimating methods for MILCON, FSRM

By Scott Ward  
Air Force Civil Engineer Center

In August 2016, the Air Force Civil Engineering Board approved the Cost Estimating Improvement Program. This major initiative upgrades the civil engineering community's cost work in support of military construction, or MILCON, and Facilities, Sustainment, Restoration and Modernization, or FSRM, projects.

CEIP is part of an overall project requirements initiative the Air Force Civil Engineer Center is championing to improve project scope, schedule and cost. As a component of the overall initiative, CEIP was developed as a direct response to accuracy problems in cost estimating that have challenged the Air Force on several major capital projects in recent years. Root factors are a lack of training in cost-estimating or engineering work, no designated formal cost-estimate review process and inconsistency with cost-estimating tools used.

The core CEIP elements are:

- New Air Force Cost Estimating and Cost Engineering courses given by the Air Force Institute of Technology.
- Authorized Air Force estimators using standard, transparent estimating methods.
- Use of only Department of Defense-authorized cost-estimating tools.
- A demonstration of the reviewer/approver program.

Each of these elements is explained briefly below and will soon be published in a new Air Force manual.

**New AFIT coursework:** New Air Force Cost Estimating and Cost Engineering coursework was developed to provide unparalleled value. A tiered curriculum of four courses is in place with each one targeting different audiences with unique objectives and requirements. In developing the coursework, insights and expertise was drawn from operations engineers, project managers, programmers and leaders at the staff and base-levels to ensure the courses addressed the specific skills and needs of the civil engineer project processes. The curriculum is tiered to increasing levels of experience and academic backgrounds and progresses in intensity.

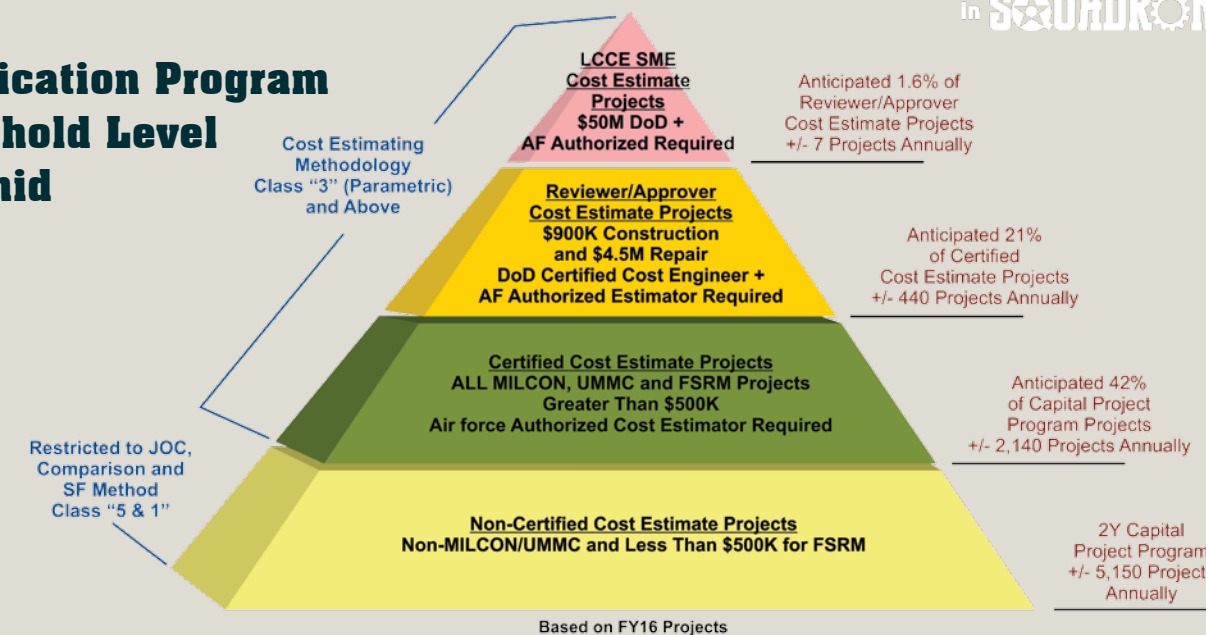
The training aligns the CEIP education component with the Air Force objective to increase the rigor of its project

packages. To date, the school has conducted 10 offerings of these courses. Feedback has been overwhelmingly positive. The students have commented with a resounding request: "More!" Check out the AFIT website, [www.afit.edu](http://www.afit.edu), for training dates and locations. The courses are:

- **WENG 200 — Scoping and Estimating.** This 16-hour course empowers operations technicians to use initial requirements to flesh out a project scope and utilize Class 3 estimate generating the program amounts used by AFCEC and the Air Force Installation and Mission Support Center to approve and fund a project.
- **WENG 400 — Life Cycle Cost Estimating.** This 40-hour course empowers design and construction professionals to develop reliable estimates and cost analyses for projects. Students learn to develop a Class 3 estimate generating the program amounts used by AFCEC and the Air Force Installation and Mission Support Center to approve and fund a project.
- **WENG 402 – Cost-Estimating refresher.** This course will be on the TRACES Portal. Airmen who hold valid certificates for WENG 400 Life-Cycle Cost Estimating must renew these certificates every three years. Continuing development and involvement in cost-estimating and engineering work and the refresher are components intended to develop and build a more experienced core of cost professionals.
- **WENG 500 — Cost Engineering.** This 24-hour, resident course teaches experienced design and construction professionals to analyze and troubleshoot project costs in preparation to become DOD-certified cost engineers and act as higher-level reviewers and approvers. It reviews the Tri-Service Cost Engineer certification, guiding self-study for the subsequent certification exam. Students will analyze a project package to assess the basis of estimate, review the detailed costs for accuracy and conduct a risk analysis of the package. WENG 400 is a prerequisite.

**Air Force certified projects:** CEIP establishes the designation of "certified projects," all facility projects with work over \$500,000. They have two basic requirements: The estimate must be done by an authorized Air Force cost estimator and the project must utilize either PACES or TRACES Portal Parametric estimating tools. AFCEC forecasts about 2,000 projects will be "certified projects" yearly based on past project data.

## Certification Program Threshold Level Pyramid



**Authorized Air Force cost estimators:** Authorized Air Force cost estimators have successfully completed WENG 400 Life-Cycle Cost Estimating. Upon successful completion, Airmen will receive a certificate valid for three years, gaining access to TRACES Portal standardized cost-estimating tools. An estimated 700 Airmen across the civil engineer community will need to complete WENG 400. Key facility project staff who should become authorized Air Force cost estimators include contracting officer representatives involved with facility contracts or modifications; design and construction management executing agents; Air Force Comprehensive Asset Management Plan, or AMP, managers and sub-AMP managers; planners who create requirements documents; MILCON and FSRM program managers and staff; subject matter expert disciplines that support cost work and life cycle cost analysis; Asset Visibility Team members; others involved in DD Form 1391 development, creation of IGEs; and technical scope and cost program reviewers and approvers.

In the next six months to a year, Airmen can look forward to a new Tri-Service Automated Cost Estimating Systems, or TRACES, portal. This next-generation system will replace stand-alone desktop cost-estimating tools, like PACES or other programs, with common web-enabled tools. A key feature of the portal is a project directory that provides reference access to Air Force projects and U.S. Army Corps of Engineers and Naval Facilities Engineering Command project information.

**Reviewer and approver:** Reviewer and approvers provide quality assurance for project estimators. These Airmen are DOD-certified cost engineers appointed to officially give "concurrence" or potentially "non-concurrence" on cost-estimating work for Air Force infrastructure projects.

Formal reviewer and approver analysis will be done when a project exceeds the installation approval thresholds of \$900,000 for construction or \$4.5 million for repair, all

MILCON and unspecified minor military construction projects. Appointed reviewers and approvers are more experienced, have completed WENG 400 and WENG 500, and are DOD Certified Cost Engineers.

AFCEC forecasts that roughly 450 projects will go through the reviewer and approver process each year. Under an initial trial period, a limited number of continental United States projects will be reviewed by the more experienced reviewers and approvers.

### What's next?

Key steps now include having the draft Air Force manual published, the TRACES Portal to come on-line and Airmen to complete training requirements.

Periodic cost-engineering training and process calls will be held with estimating staff to organize detailed business rules and begin building and reviewing estimates. During fiscal year 2017 and fiscal 2018, Airmen involved in project cost elements should obtain a WENG 400 certificate, allowing TRACES Portal access. Existing PACES holders must also successfully pass WENG 400 or risk losing their PACES licensed seat.

Want more information? Visit CE DASH and AFIT Registration websites. Watch the CEIP Introductory Video, on mil-suite hosted by Maj. Gen. Timothy Green.

**Editor's Note:** Ward is a licensed professional engineer in Georgia and is a certified cost engineer. He is the subject matter expert for life cycle cost engineering and serves in AFCEC's Operations Directorate.

The author thanks Tom Glardon, licensed professional engineer in Florida, Wyoming and Ohio, and a tri-service certified cost engineer; and Capt. Sean-Michael Kelly from the Air Force Institute of Technology Civil Engineer School for assisting in the development of this article.





## Firefighters improve first-responder interoperability, training partnerships

By Senior Master Sgt. Dion Bullock  
355th Civil Engineer Squadron

Innovation has become the cornerstone of 355th Civil Engineer Squadron Fire Emergency Services on Davis-Monthan Air Force Base, Arizona, when it comes to first-responder interoperability and training with neighboring fire departments.

The Commission on Fire Accreditation International officially recognized the Davis-Monthan's FES as an accredited organization March 22. The path to accreditation was a catalyst for comprehensive improvements to capabilities and connectivity with the local community.

When 355th CES firefighters set a goal to improve their department's performance, the team didn't simply update program binders or train to no end. Instead, to bring their aspirations for excellence to reality, they took on the rewarding challenge of becoming an accredited department. According to the commission, the process and purpose of accreditation is one of "comprehensive self-assessment through a quality improvement model, which leads to a more efficient and effective emergency organization." This in-depth process has tested many fire departments across the Department of Defense and public sector and placed them on a path of professional growth and innovative thinking.

In early 2015, all members in the flight became stakeholders in the process of inspecting and self-assessing the vari-

ous components, capabilities, services and equipment that they provide to the base and local community. The team started by gathering and analyzing data for service levels from prior years. The evaluation results were compared to the department's current service level and internal performance to identify gaps in meeting community needs and strategic goals.

The results from that detailed process would provide the foundation for some of the department's creative solutions, mirrored against current research and industry best practices. In addition to reviewing past performance, every aspect of the department's composition had to be measured to a set standard. To do all this, all divisions within the department (management, administration, operations, fire prevention, training and health and safety) were subject to 252 performance indicators, each of which contained four elements.

Innovations by the fire emergency services Airmen include:

**Land mobile radio and communication platform:** Pima County emergency responders recently opted to change an antiquated communications system to a real-time single system called the Pima County Wireless Integrated Network, which provides service to a 55-agency communications cooperative in an effort to improve interoperability throughout the region. However, the Davis-Monthan AFB

fire department was left without communications because of hardware problems and the lack of an inter-governmental agreement authorizing participation in the network. The base is in a rich environment in terms of emergency services resources and maintains mutual-aid agreements with a number of neighboring jurisdictions; therefore, losing communications capability was detrimental to not only the responders, but all who work and live on base.

Through the Air Force Community Partnership Initiative's Safety and Emergency Response Work Group, the department acquired 22 Motorola APX 7000 XE dual-band radios, programmed with the required channels, to communicate with first responders throughout the region. In addition to the radios, the base entered into a memorandum of agreement with Pima County to ensure the viability of the program. Today, the community is reaping the benefits of first responder interoperability.

**Regional fire training center:** Through personnel buy-in and personal ownership, firefighters on Davis-Monthan AFB have capitalized on innovative training opportunities while partnering with local first responders. The Davis-Monthan Fire Emergency Services Regional Training Center hosts up to 12 different fire departments and more than

500 firefighters a year from across the region. Training includes a multitude of different disciplines ranging from class A and B firefighting, confined space, auto extrication and forcible entry. By partnering with neighboring departments, Air Force personnel are able to be paired with community counterparts during live-fire training evolutions.

The Air Force Fire Emergency Services does an incredible job providing fire protection and suppression for its fixed facilities. That, coupled with a robust training and community risk-reduction program, reduces the opportunities for Air Force firefighters to engage in real-world firefighter activities.

By partnering with veteran civilian firefighters from neighboring departments, both agencies gain tactics from each other's firefighting experiences. This training also includes Air Force firefighters showcasing their experiences during live fuel fires and aircraft familiarization classes. Local departments welcome the opportunity to hone their firefighting strategies and tactics on the petroleum-based live-fire training and aircraft familiarization classes.

**Editor's Note:** Bullock is the deputy fire chief for the Davis-Monthan AFB, Arizona, Fire Emergency Services Flight.



**Facing page:** Tech. Sgt. John De La Cruz discusses firefighting tactics and strategies between agencies in Tucson, Arizona. **Above:** Tech. Sgt. John De La Cruz, a station captain with the Davis-Monthan Fire Department, provides instruction during a live-fire behavior class on the Arizona base. (U.S. Air Force photos/Airman Frankie Moore)



# Facility assessment vehicles could solve roof-inspection shortfalls

By Master Sgt. Sherman D. Armprester  
786th Civil Engineer Squadron

The United States Air Force requires that civil engineers inspect the roofs on all installation facilities every year. Meeting that requirement has proven impossible on Ramstein Air Base, Germany, and other bases.

Because of winter weather conditions in Germany, manning and equipment shortages, and safety shortfalls such as roof-tie off points, civil engineers have been completing roughly one-fourth of its annual inspections on the 1,300 roofs on the installation and its geographically separated units. Base leadership tasked the 786th Civil Engineer Squadron's requirements and optimizations section with brainstorming a solution.

The team came up with an innovative concept it calls a facility assessment vehicle, or FAV, otherwise known as a drone.

The FAV would enable a certified operator to inspect several roofs in a short period of time, using video and still photos to capture any visible deficiencies or defects on roof surfaces, flashings, gutters, downspouts and other roofing elements.

Additionally, the FAV would allow the operator to record and upload information digitally or manually to Air Force databases from the inspection location. With changes to CE's preventive maintenance and tracking system, this concept would provide quick and accurate condition-assessment information that could save the Air Force thousands of dollars in man-hours and equipment costs.

The FAV could:

- eliminate the need for additional manning and equipment, such as man-lifts and ladders.
- bypass the need for roof tie-off points and additional harnesses and lanyards.
- enable rooftop inspections during mild inclement weather conditions, which could extend the current inspection window at Ramstein and its geographically separated units from seven months to eight or nine.

Although this idea still remains a concept, the section's team took the initiative to reach out and contact contractors in order to develop a prototype designed for its roof inspection needs. The design included a high-definition

video camera with thermal imaging capabilities, GPS tracking along with three battery packs and a charging station.

Other possible uses for the FAV include:

- inspections of water towers or the piping and discharge fixtures on fire systems in hangars that would normally require a lift.
- linear segmentation of overhead high voltage distribution lines, which already is being used by civilian electrical companies.
- detection of facility heating, ventilation and air conditioning air leaks, lack of insulation and then close the gaps to save energy costs.

If approved, this innovative concept could go a long way in advancing the way civil engineers maintain and inspect installation facilities and utility items for years to come.

**Editor's Note:** Armprester is the noncommissioned officer in charge of the Requirements and Optimizations Civil Activities Management Program with the 786th Civil Engineer Squadron on Ramstein Air Base, Germany. He and his team developed the concept of the FAV.



Tech. Sgt. Jeffrey Santos (from left), Master Sgt. Sherman Armprester and Tech. Sgt. Quentin Rawls share an infrared photo taken with the facility assessment vehicle, or FAV, they designed for facility condition assessments. The FAVs would include thermal imaging, infrared, three battery packs, a global positioning system and a remote control. (U.S. Air Force photo/Susan Lawson)

# Have an idea? Spitball it!

By Maj. Logan Smith  
Directorate of Civil Engineers  
Headquarters Air Force

An idea has the power to change an organization, but first that idea must be heard.

Imagine you are a young, ambitious Airman, enlisted, officer, civilian or contractor, who has an idea. A crazy idea like swarming drones mapping damaged portions of the airfield after an attack, or a rapid runway repair capability that is able to fit in a backpack, or maybe having the ability to incorporate 3-D printed material into our engineers' shops. So what now? Do you tell your supervisor? Maybe you tell your friends. But what happens next? How does your idea transform from a simple thought into an actionable result?

For the first time, your idea can be heard by our civil engineer senior leaders, and you can transform the civil engineer enterprise.

The civil engineer organization is committed to developing agile, innovative Airman engineers who enhance air, space and cyberspace operations. In order to support our Airman engineers, a creative space has been established that empowers individuals to be heard – the "Spitball" session. Just like the creation of this magazine, Spitball sessions were created by engineers, for engineers.

This session is an internally driven concept similar to the "Shark Tank" television show, where anyone has the opportunity to present a developed idea to our civil engineer senior leaders. The purpose of Spitball sessions is to harness passions and enable like-minded people to work together in a collaborative community to transform ideas into actionable solutions. These sessions provide a setting where anyone can share his or her ideas and allow others to provide immediate feedback.

The first Spitball session is planned this summer through the Defense Collaboration Service, or DCS. Once pitched,

the idea will be captured on the "Future of USAF Civil Engineer" milBook site for collaboration and problem-solving. Interested individuals, at any level, are able to view all spitball ideas, join a team and collaborate to further develop the idea.

Just like the "Shark Tank" show, once an idea has been fully developed through this collaborative process, the team leader will have the opportunity to present the idea directly to our civil engineer senior leaders at the Integration Table, which is part of the Civil Engineer Enterprise Governance structure.

So how do you transform an idea into actionable results? You pitch your idea at a Spitball session, further develop the thought with fellow engineers and present your ideas to our senior leaders.

Innovation is a journey of creativity and collaboration that results in the production of out-of-the-box solutions to our everyday problems. Our organization embraces the formation of spontaneous groups that develop original ideas. We strive for an environment that fully supports collaborative problem solving, discovery-driven learning and integrated decision-making. As part of the civil engineer community's efforts to foster this environment, we need your help to transform ideas into results with a bottom-up approach.

Whether you are base-level or assigned to a staff position, our future relies on your visionary ideas as we build a community of collaboration together that will enhance our agile, innovative Airman engineers.

**Editor's Note:** Smith is a military construction program manager for the Directorate of Civil Engineers, Headquarters Air Force. He previously was part of the team that authored the Civil Engineer Flight Plan.





## Predictive flood mapping helps focus CE efforts

**By 2nd Lt. Peter M. Last**  
633rd Civil Engineer Squadron

The sun in a cloudless, Virginia sky beat down on a work detail filling sandbags. During the course of four weeks, 99 Airmen employed teamwork, sand-dispensing machines and raw grit to tackle the monumental task ahead of them. Though not evident from the weather then, hurricane season was lurking just around the corner and with it, a unique threat to Joint Base Langley-Eustis's 653 facilities worth \$2.2 billion at Langley. To prepare, the work detail filled sandbag after sandbag until they reached 35,000.

Because of its position near the East Coast and elevation mere feet above sea level, JBLE faces a particular threat. While the rest of the nation concerns itself with the future consequences of predicted sea-level raise, JBLE experiences such threats constantly.

Hurricanes can produce surges as high as 8 feet above mean sea level in this area, flooding many parts of the base and causing millions of dollars in damage.

"The key to dealing with the threat of rising sea levels is to get out of a reactionary, fix-it-when-it-breaks mindset and think progressively," said Lt. Col. Kevin Osborne, 633rd Civil Engineer Squadron commander. "Langley is as secure

as ever against these natural threats because of our three-pronged approach of preparation, mitigation and recovery."

As many Airmen stationed at JBLE can tell you, preparation involves filling sandbags, lots of them, for use in water-proofing entrances to facilities. But though this method of protecting facilities has been proven by history, it remains as time-consuming as ever in an era when resources, particularly manpower, in the Air Force have been scaled back.

"Basically, we have fewer personnel to work with and more facilities and infrastructure to protect than ever before," said Todd Barnes, 633rd CES deputy operations chief. "To keep up, we use innovative technologies to increase our capability and hone our focus to protect the most important assets on the base."

One of these innovative tools is the result of a partnership with next-door neighbor NASA's Langley Research Center. The predictive, computer-based flood-mapping tool was identified as a benchmark program in a recent unit effectiveness inspection because of its incredible utility. Employing over 18,000 elevation points across the base,



**Facing page:** King Street Bridge on Joint Base Langley-Eustis, Virginia, is buffeted by Hurricane Isabel in September 2003. (U.S. Air Force photo/Tech. Sgt. Ben Bloker)

**Above:** Senior Airman Brent Pope helps remove sandbags after floodwater from Hurricane Irene receded in 2011. (U.S. Air Force photo/Airman 1st Class Camilla Griffin)

**Below:** A vehicle parked at the JBLE marina was engulfed by Hurricane Irene's storm surge. (U.S. Air Force photo/Senior Airman Jason J. Brown)

it identifies facilities in danger of flooding based on storm surge elevations predicted by the National Oceanic and Atmospheric Administration.

But curtailing time wasted on facilities not in danger is only one way the men and women of the 633rd CES maximize their ability to protect the base from weather events. Door dams are another innovative technology that permit the wholesale exclusion of sandbags. Durable, watertight, easy to use and quick to assemble, this equipment has decreased the number of on-hand sandbags necessary from 50,000 to 35,000 and also drastically decreases time and resources spent deploying, maintaining and recovering flood-protection methods.

Mitigation is the second part of the 633rd CES approach to dealing with storms. Despite JBLE's low elevation, storm surges less than 5 feet, 6 inches can largely be discounted as nonevents because of the sea wall built along 10,000 linear feet of shoreline. The wall's \$4.9 million cost will increase as the rip-rap barrier is extended; however, it has already paid for itself many times over in its protection of facilities.



Coupled with the sea wall is the living shoreline concept where sea grasses are seeded along the shore, providing stability to the earth and preventing more erosion and encroachment of the water. Sustained damages are also decreasing because of a forward-thinking, environmentally informed approach to master planning. Critical infrastructure is being elevated at least 10 feet above sea level while new buildings are held to the same standard. This strategy



already has paid dividends concerning electrical infrastructure, decreasing costly repairs and the time necessary to restore power to the base.

Though the first two spearheads of the JBLE hurricane protection trident are ongoing, recovery is implemented only after an event occurs. Each storm carries a price tag in damage that must be repaired, but the 633rd CES has managed to drastically decrease that cost over the past 14 years. The awesome innovative technologies used to prepare for each event are critical to saving military resources; however, not all good ideas function on a massive scale.

After one particularly vicious storm, an Airman had the idea to tile, rather than paint, damaged walls up to the water line. This decreased cost to repair damage while also speeding along the recovery effort in later storms.

Because of the small difference in elevation across the base, drainage always has been a problem, and many projects are in the works to improve it. The heavy hitter is an innovative storm-pump station on the shoreline. Constructed in 2004 for \$5 million, its four pumps automatically engage to direct water from the airfield at a rate of 7.4

million gallons per hour. The benefit of the system is distinctly evident. It took four days to open the airfield after an event in 2003; it now takes just 24 hours.

million gallons per hour. The benefit of the system is distinctly evident. It took four days to open the airfield after an event in 2003; it now takes just 24 hours.

“In fact, it works so well, we’ve been able to expand the area it handles,” said Sean Call, water fuels systems maintenance foreman. “Additional drainage lines now run from the Air Combat Command campus and other areas across base, speeding the drainage and recovery time of the whole installation.”

Hurricanes come and hurricanes go, but JBLE has been firmly planted on the same spot since 1916. To deal with threats posed by weather, the 633rd CES implements a three-faceted approach involving preparation, mitigation and recovery. Even in times of strained manpower, civil engineers use dedication, hard work and a combination of tried-and-true methods merged with innovative technologies to ensure the base will be projecting air power for many years to come.

**Editor’s Note:** Last is the Air Combat Command deputy chief of civil engineer operations.

# Cybersecurity: Think globally, act locally

By **Tim Nauman**  
Air Force Civil Engineer Center

In the Spring 2017 issue of CE Magazine, we introduced control systems and their critical role in supporting Air Force infrastructure in the article, “Civil engineers are cyberwarriors, too.”

These control systems have been increasingly infused with traditional information technology and integrated into the Air Force Information Network, or AFIN, to enable connectivity, automation and remote monitoring that deliver essential, resilient services to Air Force installations, including power, water and air conditioning. This hybrid integration between the physical environment and traditional IT is a double-edged sword: It provides more efficient operations but also increases the attack surface and vulnerabilities to cyberattacks across the enterprise.

Unmitigated vulnerabilities could be exploited by adversaries, potentially leading to mission failure, extended operational impacts and physical damage to critical infrastructure. They also can provide a foothold for additional attack vectors into the broader AFIN.

Because of the increased presence of cyber capabilities within our portfolio, Air Force civil engineers are charged with mitigating the rising threats posed to infrastructure and supporting control systems as part of our mission to establish, operate, sustain and recover installations. Cybersecurity has become a critical element of civil engineers’ efforts to ensure infrastructure is always available to support the Air Force mission. Air Force civil engineers have been engaged over the last few years to understand the

nature of the challenge and move forward on a plan to respond to the increasing threat against control systems.

Policy and training, including the recently published AFGM2017-32-01, have been developed to provide guidance and actionable ways to help us be vigilant in the cybersecurity of our infrastructure. For further foundational awareness about control systems and the growing threat to control systems, all Airmen can learn about their role in protecting Air Force infrastructure by watching the short video feature “VigilanCE: Cybersecurity of Control Systems” on the Air Force Civil Engineer Control Systems Cybersecurity milBook site.

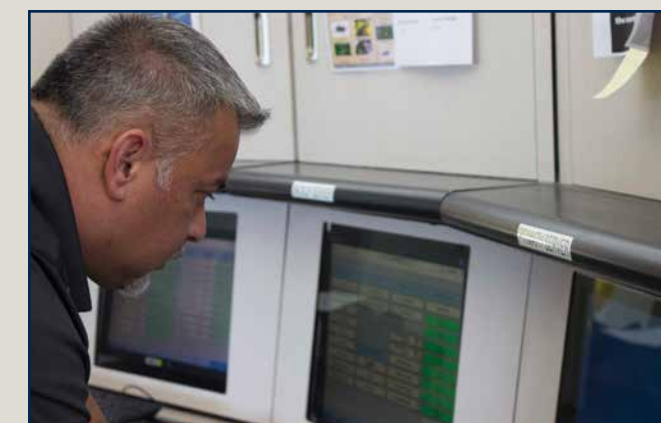
Going forward, additional information, policy and training opportunities will be communicated to the field through avenues such as the milBook site, Commander’s Call Talking Points and CE Magazine.

To further ensure the resilience of our installations, civil engineering is committed to separating control systems from traditional IT networks, an effort requiring extensive planning and customization. The Air Force Civil Engineer Center met this challenge and significantly improved its cybersecurity posture by developing a dedicated network environment for control systems called the CE Community of Interest Network Enclave, or CE COINE. CE COINE, now being installed at Air Force installations around the world, is a Defense Information Systems Agency-approved solution to move control systems off the base area network onto their own logically separate enclave. CE COINE 2.0, which adds intrusion detection, incident response and continuous monitoring capabilities, will be deployed in fiscal year 2018 as an instrumental part of a CE cyber-focused program.

Additionally, AFCEC’s cybersecurity branch provides assessment, certification and accreditation, and mitigation for CE control systems. These efforts will help civil engineer squadrons document the security posture of, and receive an authority to operate for, their control systems.

As is the tradition of Air Force civil engineers, leading the way with cutting-edge innovation has made it possible to ensure the cybersecurity of critical infrastructure, thereby supporting Air Force mission assurance.

All Airmen are cyber warriors ... think globally, act locally.



Eddie Tirotta, an Air Force Civil Engineer Center senior security engineer, works to protect industrial control system devices. (U.S. Air Force photo/Susan H. Lawson)



# the Lost Art of customer service

By Capt. Brent White

7th Civil Engineer Squadron

In recent years Air Force civil engineering processes have gone through technological advancements and new software-based programs have been introduced to replace dated legacy systems. New programs, including TRIRIGA, Builder and PAVER, allow for enhanced asset management capabilities across the civil engineer enterprise. However, because of improved automation to manage programs and years of decreasing manpower, the ability to effectively engage with our customers has become a lost art.

Customer service is at the heart of what we, as engineers, do on a daily basis. Whether it is responding to an emergency water outage, performing preventive maintenance on a facility's air conditioning system or programming a project to correct runway degradation, our expert craftsmen engage with the personnel of the other organizations we serve. The manner in which our Airmen, both military and civilian force, interact with these customers is one of the biggest impactors of civil engineer mission effectiveness. Our Airmen run our Air Force, and for that reason, building strong mission partnerships starts from the bottom up, via each Airman-to-Airman interaction. It is our duty as leaders to ensure this daily interface produces a net positive effect. We do this by encouraging proper and timely communication.

When a craftsman goes to a job site to complete a task, it is imperative that he or she engages with the service requester, before and after working on the job to keep them in the loop. This ensures the requester feels valued and supported, even if we as engineers are unable to fully fix his or her problem that day. Proper communication also helps mitigate potential job-site hazards and enables more efficient mission completion for both the user and the engineer.

The importance of this concept can be difficult to communicate across all levels of a civil engineer squadron. However, and very fortunately, we have some incredibly sharp Airmen in our profession. The requirements and optimiza-

tion team with the 7th Civil Engineer Squadron on Dyess Air Force Base, Texas, recognized this challenge, but chose to see the difficulty not as a hindrance, but as an opportunity. Over the course of several months, the men and women of the 7th CES partnered with the 436th Training Squadron and Deputy Director of Civil Engineers Edwin H. Oshiba to develop a training aid designed to communicate the how-to's of proper customer engagement.

The resulting video, which is being distributed to schoolhouses, does so in a relatable and time-effective manner and has been a fantastic example of Airmen innovating in squadrons. The intent is to introduce this video as a topic of discussion in civil engineer technical training environments to foster the discussion on the importance of good customer engagement.

Engineers will gain a better understanding of mission impacts of the work they are performing by interacting with the customer. In addition, engineers will be provided the opportunity to articulate the skills we provide to our customers along with the expected timelines associated with scheduled work. Our job as engineers is not only to address the problem we are trying to solve but also to communicate what we are doing with a can-do, will-do attitude.

With this, motivated and innovative Airmen are not the only necessary component of good customer service. Leadership buy-in and engagement is absolutely vital. By staying engaged and fostering an environment that encourages good customer service, we can continue to lead the way by improving our organizational operation capabilities through focused communication.

**Editor's Note:** White is officer in charge of operations engineering for the 7th CES on Dyess Air Force Base, Texas.

The author thanks Lt. Col. Shamekia Toliver, a professional engineer licensed in South Carolina, for assistance in developing the article.

# TECH-SAVVY CE'S STAY A STEP AHEAD

By 1st Lt. Mathew Nicholson

8th Civil Engineer Squadron

The structure of Air Force civil engineer squadrons continues to rapidly transform, and our Airmen are being exposed to different systems and requirements to meet new demands. Many of these systems are time-consuming to learn and operate, but the output is information that can be manipulated and used to solicit for funding and answer key infrastructure questions from leadership.

Fortunately for the Air Force, our young generation of tech-savvy Airmen has developed tools to use this information to work smarter, not harder.



Airmen in the requirements and optimization section of the 8th Civil Engineer Squadron at Kunsan Air Base, Republic of Korea, have developed innovative ways to overcome challenges. (U.S. Air Force photo/Chief Master Sgt. Philip Donoho)

## Forming the Kunsan system

At Kunsan Air Base, Republic of Korea, the 8th CES requirements and optimization, or R&O, section is composed of 16 personnel, fewer than the optimum manning recommended by the Air Force Civil Engineer Center. The team was challenged to figure out a system to execute its jobs more efficiently. By investing in training, shop representatives in the section advanced their spreadsheet-utilization skills so they could better manipulate the data available from Sustainment Management Systems and the next generation IT system, TRIRIGA.

These programs produce spreadsheets with information that can be quite overwhelming as raw data output to the average observer; however, Airmen who have been taught to manipulate this data have built systems to present this information in a more user-friendly manner.

## Manipulation of BUILDER data

BUILDER is an Army sustainment management system adopted by the Air Force to store condition information for infrastructure assets. Airmen at Kunsan AB built a spreadsheet that transforms BUILDER and TRIRIGA outputs into

an easily searchable format and converts information into analytic reports. Old techniques included logging into BUILDER and going building by building, copying each asset's information from the system by hand. A faster solution was needed.

Using reports in BUILDER, Airmen designed a way to manipulate data to get the condition of these buildings effortlessly. What once was a three-hour task became a 15-minute effort. The R&O Airmen didn't stop there. They continued their methods to show the infrastructure condition of all base assets, showcasing this information in various pie charts to illustrate to wing leadership condition concerns the squadron faces with their assets.

Obtaining asset conditions easily and efficiently for leadership was valuable, but the true significance in this information was showcased during the development and organization of the Base Comprehensive Activity Management Plan, or BCAMP. Engineers incorporated the BCAMP scoring model into their spreadsheet so they could both carefully score pre-existing assets on the BCAMP and identify potential projects.

This infrastructure analysis tool has provided civil engineers the ability to proactively place failing assets onto the BCAMP for funding before they fail or are reported to the squadron through a service request. The end result was a comprehensive development of the installation infrastructure requirements built on both infrastructure assessments and user inputs. And, more Kunsan AB projects were being funded.

This tool has become an invaluable asset for R&O at Kunsan AB. As the operations engineering element continues to be restructured, this tool allows Airmen to validate requirements, verify assessments and create project files to allow the base to be a step ahead of failing infrastructure.

We've shared this tool with operations flights across the Air Force, and other bases modified it to suit local leadership needs. This tool is one of many in development, utilizing data produced from our enterprise information systems. Our increased justification for centralized funding and rationalization of preventive maintenance will continue to push the analytic innovation of our smart, tech-savvy Airmen, revitalizing their squadrons, one project at a time.

**Editor's Note:** Nicholson is the requirements and optimization officer in charge for the 8th CES at Kunsan AB, Republic of Korea.





# Merging two 'unloved' technologies results in enhanced firefighting capabilities

By Kerry Bakker  
673rd Civil Engineer Squadron

Any firefighter on Joint Base Elmendorf-Richardson, Alaska, will tell you it's never good when Fire Chief Dave Donan wanders through one of the fire stations.

This is especially true when he goes into our fire truck maintenance bays and strikes up a conversation with lead emergency vehicle technician Oral Scott. Even though Joint Base Elmendorf-Richardson, or JBER, had already been successful mounting a Pyrolance on a Striker 1500 aircraft rescue firefighting, or ARFF vehicle, the fire chief wasn't satisfied. He recognized a need to have a Pyrolance located on a more agile vehicle, so he asked Scott, "What if we mounted a Pyrolance on a (rapid intervention vehicle)?"

In 2012, the Air Force Civil Engineer Center fielded over 200 Pyrolance systems across the field. The Pyrolance is a handheld ultra-high pressure, or UHP, penetrating firefighting system. It uses innovative technology that mixes granite abrasive material with a high-pressure (1,500 pounds per square inch) stream of water. The high-pressure stream is used to penetrate materials such as wood, steel, concrete and composite aircraft materials and rapidly cool any fire behind the material. The Pyrolance is powerful enough to penetrate a concrete wall or three-quarters-inch thick plate of steel in 55 seconds.

Unfortunately, these 750-pound behemoths were shipped to flights with little guidance, so it was left to local fire

**Above:** The U.S. Air Force Pierce rapid intervention vehicle carries a lot of capability in a small, agile package. The final product is ready to respond 24/7 to support a variety of JBER's fire rescue missions. (U.S. Air Force photo/Kerry Bakker)

chiefs to figure out what to do with them. Many still sit in their original shipping crates.

A year earlier, the Air Force fielded the first-of-its-kind UHP RIV. The RIV carries 400 gallons of water and 56 gallons of foam and was designed to do just what its name implies; rapidly respond and extinguish an aircraft fire. UHP technology, when combined with water and Class B firefighting foams, perform approximately 3.5 times more effectively than conventional ARFF vehicles equipped with low-pressure foam application systems. However, for all the promise the new technology holds, the RIV has not been widely accepted across the field for a variety of reasons; one being the fact the vehicle arrives within 400 pounds of its gross vehicle weight before equipment is added.

So the question became why would you want to combine these two "unloved" pieces of equipment? In typical JBER style, the answer was "why not?" So the challenge was on!

Knowing the RIV was already approaching its max weight, we had to come up with a way to "skinny down" the Pyrolance. Scott figured out the RIV's UHP pump discharged almost the same as the Pyrolance's pump, so he was able to eliminate the Pyrolance's gas engine, UHP pump, fuel tank and factory-mounted frame. Lastly, we replaced one of the RIV's heavier hand lines with the lighter 200-foot Pyrolance hand line. We found that eliminating the redundant com-

ponents shaved 730 pounds off the Pyrolance's weight, thus only increasing the RIV's weight by 20 pounds.

The rest of the engineering and fabrication work was left in the reliable and talented hands of Scott. When he finished, not only did the Pyrolance operate perfectly, but also, it looked like it was a factory installation.

So what did we gain? We gained the ability to rapidly employ a unique and effective piece of equipment whether it be at the scene of an aircraft incident or a basement or attic fire.

Several bases have mounted the Pyrolance in pickup trucks or trailers, neither of which is a first attack-response asset. We wanted to ensure our Pyrolance was available to our firefighters immediately; mounting it on the RIV met

**Right:** Plenty of room was available to mount the internal Pyrolance components behind the control panel.  
**Below:** The RIV and Pyrolance control panels are placed close together for ease of operation. The existing hand line compartment door was modified with a clamshell opening to facilitate Pyrolance storage. The Pyrolance engine controls were removed and the control panel was mounted above the hand line compartment. (U.S. Air Force photos/Kerry Bakker)

that need plus it allows us to discharge firefighting foam through the Pyrolance for an added capability.

The moral of this story is that it's not always bad when the fire chief wanders through the station and starts asking questions. But he doesn't need to know that.

**Editor's Note:** Bakker is the assistant fire chief with the 673rd Civil Engineer Squadron Fire Emergency Services Flight at Joint Base Elmendorf-Richardson, Alaska.





## Technology certification program aids energy managers

By Paula Shaw

Air Force Civil Engineer Center

The Department of Defense must meet aggressive goals to reduce energy consumption. It can be very difficult for energy managers to meet these goals while simultaneously meeting the requirements of large, often mission-critical installations or facilities.

New technology can be a means to improve performance related to energy consumption; however, with the extensive array of innovative technologies available, identifying those most beneficial for a given installation can be difficult. Further, once identified, obtaining these leading-edge products can be challenging for energy managers.

One way to help managers find proven, effective products is by using the results from an Environmental Security Technology Certification Program, or ESTCP, demonstration. ESTCP is the DOD's technology demonstration and validation program. Its energy and water program area focuses on harnessing science and technology to improve energy and water resiliency and enhance mission capabilities. It also promotes innovations throughout the DOD.

By annually soliciting and funding new technology projects, ESTCP aims to identify and demonstrate the most promising innovative and cost-effective technologies that address goals and requirements for energy security while reducing consumption. Topic areas are identified to meet high-priority needs and are solicited from the federal government, academia and industry. Selected technologies are then demonstrated at DOD operational sites. Results of these pilot projects can help assure DOD managers that an innovation is sound, dependable and cost effective.

ESTCP is developing resources to streamline the process of discovery, validation, presentation, specification and procurement. An effort to develop those resources began with a comprehensive review of over 100 previous ESTCP demonstrations. A small set of successful demonstrations



were selected to test the concept of a "Tool Suite" designed specifically to assist managers in identifying, funding and implementing new technologies.

These tools are intended to help streamline the process of selecting and implementing new technologies and serve as a resource to address questions that may arise during the procurement process. The Tool Suite is anticipated to be available this summer on the ESTCP website.

An Air Force project used in the pilot effort was project EW 201151 — "Exhaust Hood and Makeup Air Optimization." This project demonstrated the optimization potential of exhaust flow hoods and related makeup air units, located in several U.S. climate zones by use of demand controlled ventilation, or DCV, technologies. DCV technologies operate by monitoring cooking activity and automatically modulating exhaust airflow.

DCV systems were installed on main kitchen hoods at the dining facility at the U.S. Air Force Academy Preparatory School in Colorado and at the food court at Ellsworth Air Force Base, South Dakota. Greenhouse gas emission and energy reduction goals were met at both locations.

There are over 1,000 Air Force dining facilities serving and supporting personnel around the world. In many of these facilities, as well as in other DOD kitchens, exhaust hoods are often used over cooking areas. These exhaust systems have flow rates that range from a few thousand cubic feet per minute to as much as 50,000 CFM. Operating the exhaust hood equipment in an unregulated manner may waste large amounts of energy and result in uncomfortable working conditions. Using systems such as DCV technologies can more effectively manage energy use and air quality in these facilities.

For more information visit <https://serdp-estcp.org/Program-Areas/Energy-and-Water/Energy/Conservation-and-Efficiency>.

**Editor's Note:** Shaw is a professional engineer licensed in Texas, and holds a Leadership in Energy and Environmental Design AP certification from the U.S. Green Building Council.

The author thanks Stephanie Lawless, project analyst at Noblis, and Joan Senio, a certified project management professional and a senior principle at Noblis, for contributing to the development of this article.

Exhaust hoods installed at the dining facility at the U.S. Air Force Academy Preparatory School in Colorado reduced energy consumption as well as greenhouse gas emissions. (U.S. Army photo/David Underwood)

## Light emitting diodes may power the future of water treatment

By Maj. John E. Stubbs

Air Force Institute of Technology

Water is a resource we often take for granted, yet we must have it readily available to sustain life and carry out mission-critical operations. Water is used not only for hydration, but also for food preparation, medical treatment, hygiene, construction, decontamination and many additional tasks. There is no doubt that an adequate supply of clean, safe drinking water is critical to the success of U.S. forces carrying out operations worldwide.

In 2013, the U.S. Air Force published an energy strategic plan that identified water as a critical asset and incorporated water into a strategy seeking to balance resource consumption, production and conservation. The plan notes that the Air Force consumes around 27 billion gallons of water per year at an annual cost of \$150 million, and energy utilized in water treatment and delivery is closely tied to an overall \$9 billion annual energy cost. Furthermore, the plan established a "net zero initiative" for the enterprise whereby an installation consumes no more energy than is generated on the installation, and potable water demand is reduced by capturing and reusing, repurposing or recharging an amount of water that is greater than or equal to the volume of water the installation uses.

In an operational environment that seeks a balance among reduced spending, resource conservation and sustained operations around the globe, the Air Force should consider emerging technologies for water treatment that provide water supply while simultaneously reducing energy costs. One such technological advancement is the use of energy-efficient ultraviolet light emitting diodes as a replacement for high energy consuming mercury vapor lamps in advanced oxidation processes utilizing hydrogen peroxide. Although UV LED-based water treatment is now possible, little data has been available on the use of UV LED/hydrogen peroxide for the destruction of soluble organic pollutants that may threaten our water supply.

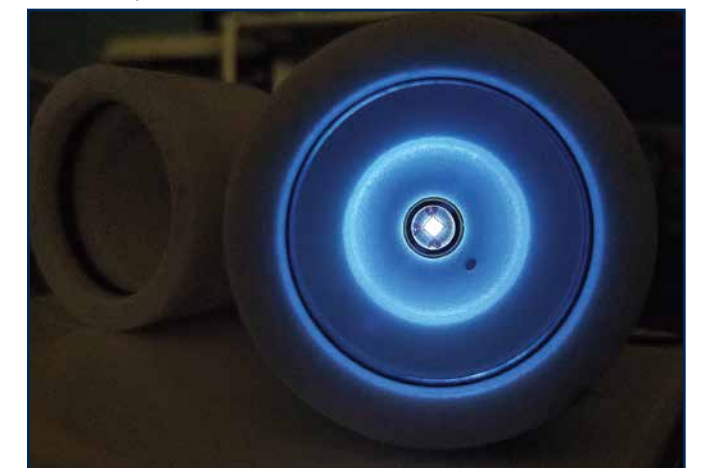
Current research at the Air Force Institute of Technology has expanded this work to a greater number of soluble organic compounds in order to improve the fundamental understanding of the advanced oxidation processes as they relate to LEDs. UV LEDs are currently being used in bench-top water treatment reactors to test the effect varying parameters, such as optical output power and hydrogen peroxide concentrations, have on resultant degradation and destruction of pollutants. To date, the reactor has been used to degrade six dye compounds (like those commonly seen in food and beverage waste streams) and

five chemical compounds (including fuel contaminants, pesticides and explosives constituents).

Much insight has been gained into the underlying kinetics that affect the ultimate destruction of these compounds and the effects that adjusting reactor parameters has on those kinetics. All of the dyes and chemicals tested showed significant degradation, and many saw greater than 90 percent destruction with optimized reactor parameters. Furthermore, by relating the molecular structures of these compounds to their degradability, we may be able to develop a predictive ability for degradation of compounds that have not been tested, based solely on their molecular properties.

The reach of the U.S. military has grown in recent decades, and it is a foregone conclusion that access to clean, safe drinking water will remain a critical requirement for sustained operations. As we seek to balance fiscal constraint with global engagement and adopt a net zero mentality, can LEDs lead the way in reducing water treatment costs in coming years? Time will tell, but the opportunity may be closer than we realize.

**Editor's Note:** Stubbs is a bioenvironmental engineer pursuing his doctoral degree in systems engineering at the Air Force Institute of Technology at Wright-Patterson Air Force Base, Ohio. The author thanks Willie F. Harper Jr., who assisted in the development of this article.



An ultraviolet LED with peak output at a 265 nanometer wavelength operates in the end cap of a research water treatment reactor at the Air Force Institute of Technology on Wright-Patterson Air Force Base, Ohio. (U.S. Air Force photo/Maj. John Stubbs)



# AMPS RIPE FOR INNOVATION

**By Capt. Colby Gregory**  
Air Force Institute of Technology  
Civil Engineer School

It's no secret that in today's Air Force, engineers have to innovate. More than ever, the Air Force's mission depends on our ability to provide and sustain facilities and infrastructure.

For the last 10 years, activity management plans, or AMPs, have been the vehicle to implement asset management across the enterprise. Unfortunately, AMP management isn't as simple as "fix the broken stuff": It is a more organized approach to decision-making and requires a comprehensive understanding of how our organization extracts value from its assets.

In this journey toward AMP management, engineers have learned much about what our inventory and how diverse each mission set is. As such, there is no coloring book, no instructional guide to AMP management. We have sustainment management system, or SMS, tools and other Nex-Gen IT systems designed to inform and assist in populating our AMPs, but on what is an AMP manager really supposed to focus?

Program Action Directive 12-03 is a common reference guide for many, but what does it say specifically about AMP management? Turns out it says a lot; pages and pages of text define the roles and responsibilities of AMP and sub-AMP managers. These roles and responsibilities can be distilled down to four interrelated concepts that rely heavily on innovation to be successful: data, requirements, planning and performance.

Activity management planning is intended to provide the ability to advocate for, and support the allocation of, resources. It is fueled by data. But what data do we need?

Data, similar to the airfields that enable our mission, should be treated as an asset. What data do we need and how do we extract value from it?

The data we need can be boiled down to two categories: inventory and attribute data. Inventory data doesn't change over time; attribute data does. A building will always have a single construction date, a relatively stagnant size (unless we reconfigure it), category code and other important inventory elements. On the other hand, condition and age are two examples of attribute data that changes as a function of time. Once we have a grasp of the kinds of data that will provide us value, we can start to combine data points, which leads us to the second concept of AMP management: requirements.

What is a requirement? It's easy to think of a requirement as simply a project, but requirements are so much more than that. The utilities activity has a requirement to provide potable water to users across the installation. The transportation networks and airfield pavements activity has a requirement to provide pavement to the mission and users of the roads on base. Requirements should aim to provide an acceptable level of service, enabling our organization to realize value from its assets.

We use projects to fulfill requirements, but sometimes we meet them through preventive and corrective maintenance. The more data we have, the more we understand about our portfolios. The more we understand our portfolios, the more requirements appear. This quickly exceeds our capacity, so how do we keep up with requirements over time? That's where the third concept of AMP management comes into play: planning.

extracts value from its assets will allow us to define what constitutes "good" and "bad" performance.

This is where innovation is most crucial. AMP managers must innovate ways that work best for their individual installation to not only measure, but communicate performance to stakeholders and decision-makers alike. For instance, if all we care about is mitigating risk, we can use condition and criticality to communicate it. Both of these attributes can be extrapolated from SMS and we can plot them on a chart to communicate where we are taking our greatest risk. This provides us direction on where resources should be focused to improve risk performance.

Ultimately, AMP management today is equal parts art and science. There is little guidance out there on exactly what an AMP manager should be doing, and that can be frustrating. The silver lining, however, is that the lack of specific guidance provides an opportunity to innovate. We can change the way the rest of the installation and the Air Force looks at how activities support our various mission sets, and how assets support those activities. The more we can tie what we do back to Air Force core functions, the more effective and efficient we will be. To get there, we must innovate!

**Editor's Note:** Gregory is an asset management instructor at the Civil Engineer School at the Air Force Institute of Technology on Wright-Patterson Air Force Base, Ohio.

Remember, the "P" in AMP is "plan" or "planning." Former President Dwight D. Eisenhower once said "Plans are nothing. Planning is everything." In the context of activity management planning, this could not be truer. An AMP does not need to be a spiral-bound product we put on our shelves and consult twice per year. We need to use the tools at our disposal to look into the future and identify the requirements necessary to support the mission.

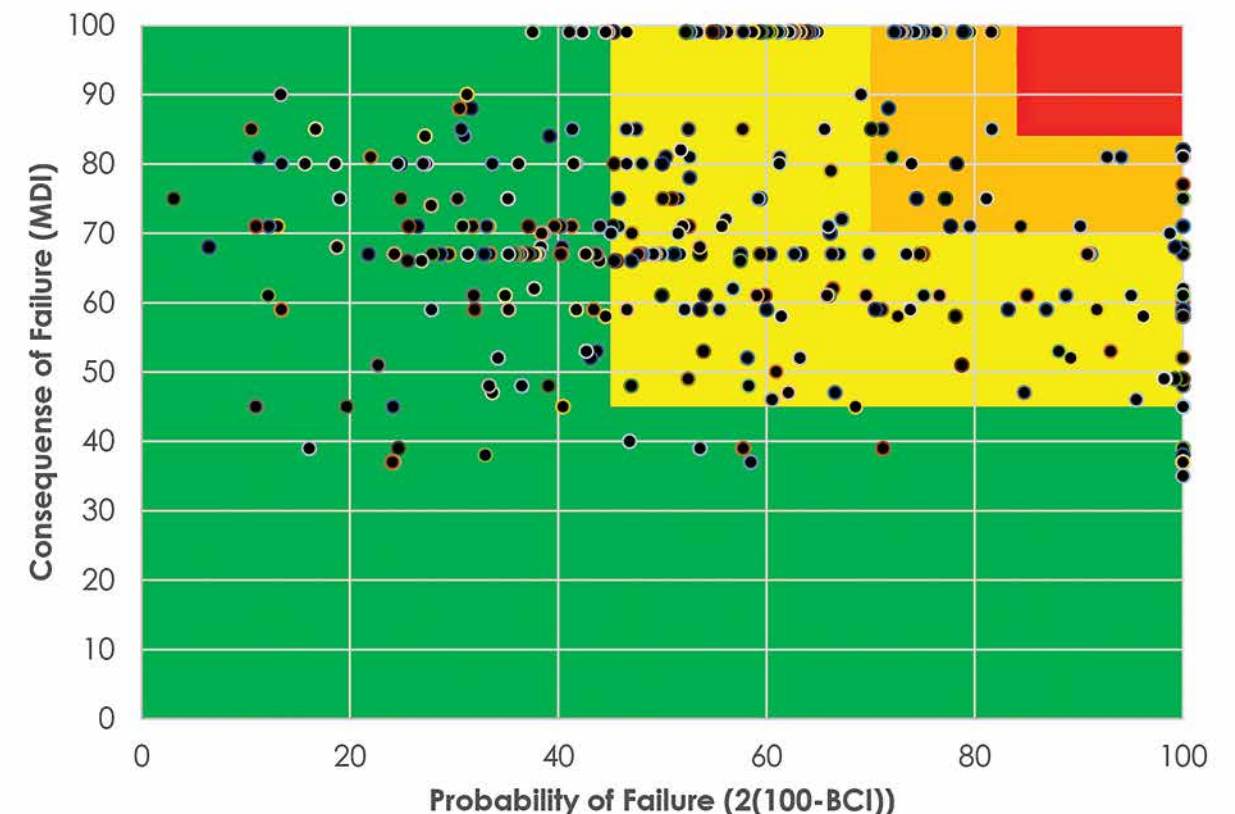
SMS tools can help make this task simple. The data we feed SMS is pivotal in providing us the information we need to plan for requirements. Some of these requirements will be met in the form of a balanced preventive maintenance program, corrective maintenance actions and maybe a project or two. Ultimately, it's on the AMP manager to interpret the data and provide recommendations on how to best meet the requirements. The end result of meeting requirements is both effective and efficient mission support. So how do we measure our effectiveness and efficiency toward this end? That's where the fourth concept becomes crystal clear: performance.

Performance is a tricky subject, because what performs well from one perspective may perform poorly from another. An ice-cold room on a hot day might perform well for its occupants, but consumes a lot more energy than necessary. To date, there are very few well-established key performance indicators published for AMP managers to follow. Having an understanding of how our organization

**Requirement: Provide water**

**Meet requirement:**

- Pay utility bills
- Treat water
- Maintain water system
- Repair water system
- Sustainment/upgrade project



Facility Risk Profile (developed by the author) uses 2 BUILDER SMS attributes to communicate risk across the facilities portfolio.



# Embracing opportunities a path to enrichment

By Lt. Col. Joel A. Bolina

451st Expeditionary Support Squadron

*"When opportunity knocks, don't let fear hold you back. Open the door and embrace the opportunity."*

—Anonymous

I left the civil engineer career field from 2012 to 2016 for an opportunity I didn't ask nor plan for. I was selected to begin a journey to become dual-tracked as a regional affairs strategist, which meant I would be leaving the civil engineer community sporadically during the remainder of my Air Force career.

I immediately thought, "This could not possibly be good for my growth as a CE officer." But my family and I embraced the forthcoming changes and challenges, and I learned three very important things from the experience.

## Take advantage of opportunities to learn new things.

My family and I moved to Monterey, California, where I began an intensive six-month course learning Spanish and earned an associates of arts degree from the Defense Language Institute. After a few months, we moved to Fort Benning, Georgia, to attend the Western Hemisphere Institute for Security Cooperation, and I took extra steps to earn a master's in military arts and sciences. I wrote a thesis to highlight how U.S. Northern Command can employ Air Force civil engineer capabilities in support of its defense support to civil authorities mission. I viewed the changes and challenges as an opportunity to open doors for me and my Air Force CE community.

**A positive attitude is an absolute must!** I admit that I faced this new chapter with much fear and trepidation. But I knew having a positive attitude would benefit my family, myself, classmates and co-workers. For example, we moved to Fort Benning to start my studies at WHINSEC — basically the U.S. Army's Command and General Staff Officer's Course — the course was all in Spanish with classmates from sister services and Latin American countries. I wondered, "Am I up to the task of taking CGSOC in a foreign language I just learned? How will I rate next to classmates whose native language is Spanish?"

Though the academics were extremely challenging, it was grueling spending hours translating English to Spanish and vice versa and Army-speak to Air Force-speak and vice versa. I viewed the changes and challenges as an opportunity to succeed and graduated with honors.

## Your CE skills translate well in other situations.

I remembered what Maj. Gen. Tim Green said to me before I embarked on this adventure, "Engineers bring a different perspective and skill set. We do well in challenging and diverse situations."

I reflected on those words many times while I worked in the Security Cooperation Office at the U.S. Embassy in Mexico. I introduced new ways of doing things with our partner nation military counterparts, U.S. Northern Command and various U.S. government agencies in the U.S. Embassy.

And, because my skill sets developed as civil engineers naturally lend themselves to humanitarian assistance and disaster relief, I managed that program and facilitated a multimillion dollar effort that helped develop Mexico's disaster preparedness capabilities. I also deployed to assess airfield damage in Los Cabos, Mexico, as part of a mission to evacuate thousands of American citizens resulting from Hurricane Odile. I viewed the changes and challenges as an opportunity to contribute my skill sets to a greater good.

My family and I grew both personally and professionally during the four years in California, Georgia and Mexico. I have a better appreciation and understanding of the role of the Department of Defense, in concert with the various agencies of the U.S. government, in the prosecution of the U.S. president's national security objectives through a whole-of-government approach.

I was able to contribute to the greater good and gain knowledge and experience to supplement my own "tool box" and my civil engineer community. And on top of that, my spouse was able to work in the U.S. Embassy, gaining experience and skills that will open doors for her. My children were able to receive a first-class education at an international school and learn a new language. And today, after having returned to our CE community, which has evolved with CE Transformation and the Air Force Installation and Mission Support Center, I am still embracing the changes and challenges as opportunities.

**Editor's Note:** Bolina is dual tracked as a civil engineer officer and Latin American Regional Affairs Strategist. He is the commander of the 325th Civil Engineer Squadron at Tyndall Air Force Base, Florida, and is deployed as the commander of the 451st Expeditionary Support Squadron at Kandahar Airfield, Afghanistan. He is a professional engineer licensed in Illinois.

# From civil engineer to basic military trainer

By Master Sgt. Andrew E. Baines Jr.

436th Civil Engineer Squadron

When someone finds out that I used to be a military training instructor, I am always asked the same two questions: "Did you enjoy it?" and "Was it hard?" I always give the same response: "It was the hardest job that I ever loved."

Now that I have returned to the civil engineer career field, I have shared my story countless times, and I am always keenly aware of the skills I acquired as an MTI that provide me with a unique experience and perspective to be an effective leader today.

Reporting into my new squadron on my first day at basic military training was a true eye-opening experience. I wanted to make a great first impression, so I put on a new set of ABUs and brand-new boots. As I walked through the squadron, I could hear the roaring of instructors correcting trainees. After some searching, I located my sponsor, Tech. Sgt. Melissa Holliday, in the dining facility at the notorious "snake pit."

I introduced myself, causing Holliday to look up from her plate with a fleeting glance, after which she immediately looked back down and calmly asked, "Technical Sergeant Baines, what do we do on Mondays?" Not knowing what she meant, I said I wasn't sure. "We wear blues on Monday ... goodbye!" Just like that, I was sent home on my first day as an instructor for not maintaining standards. That moment set the tone for the next four years.

Working in an environment filled with "Type A" personalities, not a day passed where I was not challenged to be better than I was the day prior. The meticulous honor of transforming civilians into Airmen perpetuated an incredible sense of pride in me that reinvigorated my passion to serve.

Before leaving the CE career field, I had fallen into a stagnant routine getting my work assignment for the day, completing it and going home; no more, no less. It wasn't until I was thrust into an environment that was filled with the

"top 10 percent" of each career field that I began to want to improve. That atmosphere was infectious and instilled in me a drive to want to be better. This same drive enables me to humbly reach out to my fellow engineers for assistance in acquiring the experiences that I missed during my four-year hiatus.

Have you ever felt like you weren't living up to your potential but didn't know quite how to achieve it? Being an engineer, I had the mindset that all I had to do was work; I never considered seeking out any self-improvement opportunities my leadership "suggested" for me, primarily due to a lack of self-confidence. But as a MTI, I realized quickly that there is no room for mediocrity.

Stepping outside my comfort zone forced me into situations that evolved my sense of self-worth and taught me the true meaning of responsibility. Today, I see challenges as opportunities to succeed; a mindset that likely never would have taken root had I not taken the leap as an MTI.

With the creation of the developmental special duty platform, completing a tour outside of one's career field has many engineers concerned. However, for those who are selected, all I would tell them is to embrace it. The experiences they gain can't be quantified, nor overlooked.

Serving in a developmental position will test you every single day; there is no doubt about that. But, as it did for me, it will show you what you are truly capable of and that will resonate not only throughout your career but throughout your life as well.

Remember, no matter what the task ... Engineers lead the way!

**Editor's Note:** Baines is the NCO in charge of the 436th Civil Engineer Squadron heating, ventilation, air conditioning and refrigeration shop on Dover Air Force Base, Delaware.



# LEAN IN CIRCLE

By Karen Winnie  
Air Force Civil Engineer Center

Karen Winnie | Renae Fischer | Erica Becvar | Lisa Schmidt | Ivette O'Brien | Sylvia Crowell | Laura McWhirter

## making a big impact for female leaders

In January 2016, a small group of female Air Force civil engineers chartered the first Lean In Circle at Joint Base San Antonio, Texas. The group is made up of women across the Air Force, including the Air Force Civil Engineer Center, the Air Force Personnel Center, the Air Force Installation and Mission Support Center and the San Antonio River Authority. All are associated with the Air Force civil engineer community — but that's not the only thing they have in common. They all are interested in their growth as Air Force leaders and in helping others achieve personal and leadership goals.

The concept of Lean In arose from Sheryl Sanberg, chief operating officer of Facebook. Her book, "Lean In: Women, Work, and the Will to Lead," forms the premise of Lean In Circles. In her book, Sandberg explains that women in the workplace often hold themselves back by lacking self-confidence, not sitting at the table and pulling back when they should be leaning in. She encourages women to "lean in" to their career — if this is the path they choose — and support other women in the workplace to lean in as well.

Lean In is supported by the Department of Defense. In fact, the DOD has embraced Lean In practices to encourage women to empower themselves and help them achieve their ambitions. The goal is to foster a sense of community and promote peer mentoring through the formation of small groups that meet regularly. Through the use of guided discussion and sharing sessions, group members grow, learn, cross-feed to inspire each other and share each group member's successes and challenges.

This is exactly what the AFCEC Lean In Circle is doing! The circle meets monthly to celebrate personal and professional successes, discuss challenges in the workplace, mentor each other, sharpen leadership skills and build their network. The group is predicated on a set of shared values and goals that were established when the circle formed in 2016. The circle agreed that confidentiality, communica-

tion and commitment are key to growing together and meeting established goals:

- Strengthen our circle through monthly meetings that include open discussions, team-building exercises, cross-feeding of ideas/experiences and social events.
- Create a positive impact on the civil engineering workforce by developing paths for mentorship. Host one "open" meeting per year where members can connect with local civil engineering civilians interested in mentorship.
- Create networking opportunities by inviting guest speakers (senior leaders) to at least two meetings for informal discussions on mentoring, networking, etc.

Circle meetings are held both on and off duty, and members rotate the facilitation role. Sometimes meetings are conducted in conjunction with a potluck lunch, utilizing office conference space; other times, the meeting may include dinner at a convivial new restaurant. Always, the discussions have a stated purpose and a degree of structured activity, as each member is responsible for leaning in, participating and sharing her experiences and knowledge.

Over the past year, the AFCEC Lean In Circle has grown together and accomplished a lot! Circle members have hosted discussions on verbal and nonverbal communications, networking and career development. Air Force civil engineering senior leaders have been invited to share their experiences on career development and leadership.

But perhaps the biggest impact the circle has had is to raise awareness about the need for peer mentorship within the Air Force civil engineer community. The circle recently hosted an open meeting to invite others to learn about Lean In. Over 30 women and men participated in the meeting and at least one new AFCEC Lean In Circle was formed!

If you are interested in learning more about Lean In or want to start a circle, visit <https://leanin.org/?r=44431996>.

**Editor's Note:** Renae Fischer, Erica Becvar, Lisa Schmidt, Ivette O'Brien, Sylvia Crowell and Laura McWhirter contributed to this article.



## Get outside your comfort zone

# and *grow!*

By Senior Master Sgt. Joseph Y. Bogdan  
51st Civil Engineer Squadron

Growing up in my family's home offered good experiences as well as challenges. As a first-generation American, my family ingrained in me an immense amount of pressure to succeed, which resulted in some unintended consequences. Fear of failure led to underachieving in both my academic and professional careers.

In school I never dared to try an advanced-placement course because bringing home a grade less than an A was simply unacceptable. This bled into my professional life after I joined the Air Force in early 2001. Although my young career was prospering, I feared stepping out of my comfort zone.

This all changed in 2011, when I received a call from a former first sergeant of mine, Master Sgt. Lowell Olson. He was working at the Travis Air Force Base Airman & Family Readiness Center in California, and asked if I would apply to be a readiness NCO, a position I wasn't even aware existed. My immediate thought was to turn him down because I loved being an electrical power production craftsman, but instead, I asked if I could think about it. After a much needed push from a mentor, Chief Master Sgt. Patricia English, I took a leap of faith and accepted the offer.



Then-Master Sgt. Joseph Bogdan assists a customer with potential professional development opportunities offered at the Airman & Family Readiness Center on Travis Air Force Base, California. (U.S. Air Force photo/Kenneth D. Wright)

Working at the A&FRC was definitely a step outside of my comfort zone. Prior to working as a readiness NCO, I lacked vital leadership skills such as empathy and the ability to speak in public — to name just a few. At the A&FRC, I oversaw 10 diverse service programs and was blessed to work with some extraordinary professionals.

The position also enabled me to earn several certifications to facilitate and instruct courses and expanded my sphere of influence across Air Mobility Command. In my time at the A&FRC, I earned promotions to both master sergeant and senior master sergeant and in 2015 was selected as one of the Air Force's 12 Outstanding Airmen of the Year. Even more important, the perspectives and experiences I gained from stepping outside of my career field truly made me not only a better Airman, but a better person, which translated to continued success upon my return.

In December 2015, I returned as a facility systems superintendent at Osan Air Base, Republic of Korea. Leaving the career field a technical sergeant and returning as a senior master sergeant made me a bit apprehensive, but the resiliency skills and leadership tools I developed while in my special duty made my transition relatively smooth. Although I missed a lot while away, leveraging my newly found skills helped me mold my element into an effective team that I am extremely proud to lead. Dealing with a failing infrastructure in one of the most challenging locations, my 62 Airmen have excelled, and I truly believe my experience in a special duty has helped me become the leader I am today.

Stepping outside of one's comfort zone truly can be daunting; however, that is where the greatest amount of growth occurs. I feel truly blessed that I had mentors who pushed me to stretch my limits and challenge the limitations I put on myself. If I could leave anyone with a single piece of advice it would be to take every opportunity, not just the ones that look shiny or those in which you feel you can excel. I left my career field feeling like there were so many things I couldn't do and returned with the confidence to know there isn't much I can't.

**Editor's Note:** Bogdan is facility systems section chief with the 51st Civil Engineer Squadron at Osan Air Base, Republic of Korea.





CE officers enhance

# LEADERSHIP SKILLS

with Academy experience

## Office of the Directorate of Civil Engineers

Headquarters Air Force

Two U.S. Air Force officers have returned to their civil engineering roots after serving as air officers commanding, or AOCs, at the U.S. Air Force Academy, Colorado.

AOCs support the Academy's mission of developing leaders of character by training cadets to be officers, and Maj. Charles Hansen and Brian Low were among that select group. Both said they were apprehensive about becoming AOCs. Hansen even compared his initial feelings on AOC duty to those he experienced in a combat zone.

"I've got to admit, my first day driving onto the Academy toward the cadet area was gut-wrenching," he said. "It was only comparable to my first convoy in Baghdad, or leading the 820th RED HORSE Squadron's Advance Echelon team into Afghanistan."

RED HORSE units are the Air Force's rapid engineer deployable heavy operational repair squadrons, or heavy-construction units..

Hansen commanded the Academy's Cadet Squadron 14 from 2014-2016. Low commanded Cadet Squadron 13 from 2015-2017.

"When I found out I was to be assigned as an AOC, I wasn't even sure what an AOC was or what the job entailed," Low said. "I asked an Academy graduate, who said it would be a demanding job with leadership challenges. This proved true."

Hansen said his duties as a civil engineer are vastly different from the day-to-day responsibilities of an AOC.

"It was a challenge to step away from the rigid and tangible science of engineering and construction and 'trust the system' as a lightly tuned counselor," he said. "I found being an AOC added a few more tools to our toolbox, and even sharpened some I'd forgotten or had not used as often."

Low said his AOC duties were challenging but directly related to the Air Force's mission to fly, fight and win in air, space and cyberspace.

"There was a great divide between leading a senior master sergeant and leading an 18-year-old freshmen cadet, but it was pretty clear the experience we had as civil engineers positioned us to adapt to a new leadership environment

and command our Academy military trainers and 100-plus cadets," he said. "It was just a different mission."

AOCs are aided by Academy military trainers, NCOs charged with the military training of each cadet squadron. Hansen said his time as an AOC reminded him of how important it is for all commanders to get to know their staff and for AOCs to get to know their cadets.

"Learning what makes cadets tick and helping them push past their limits while making sense of all that's happening around them and to them, was strangely familiar," he said. "I recall the outgoing group commander (at the Academy) smiling at my CE badge and urging me to help cadets develop their warrior ethos, the idea that we are warfighters in the profession of arms."

Hansen and Low said leadership at the Academy is a year-round responsibility.

"While the academic calendar revolved around traditional classroom challenges, the troop leadership during the summer programs and occasional field leadership events set the learning curve for our future officers and leaders," Hansen said.

Low led the Academy's operations support squadron during two academic summer periods while Hansen led the school's Expedition, Survival and Evasion Training program.

Low said he enjoyed watching cadets grow into greater leadership roles and learn the value of teamwork.

"It was rewarding to see a cadet in a leadership role step back and look at the situation while soliciting input from his team to make the best decision," he said.

Hansen agreed, adding that watching cadets take on greater leadership responsibilities and make decisions was inspiring.

"Some cadets get to a level where you could ask them, 'OK, LT, what do you want to do now?' and you could see it click," he said. "That's when they knew the leadership role they were in was real. Hearing lieutenants tell AOCs or AMTs 'thank you for trusting us to lead and make mistakes at the Academy' was very rewarding."

Their selection as AOCs permitted Hansen and Low to earn masters' degrees in leadership and counseling from the University of Colorado at Colorado Springs before reporting for AOC duty.

**Editor's Note:** Hansen is assigned to the Civil Engineering Directorate at Headquarters Air Force. Low will report to the directorate this summer.

**Facing page:** Cadet Squadron 13 classes of 2017 and 2020 rest after their "Run to the Rock" on the last day of the Four Degree Recognition.

**Below:** Cadets from CS 13 carry a log during Recognition, a rigorous annual event freshmen, or 'four degrees' must overcome before earning the status of recognized cadet. (U.S. Air Force photos/Cadet 1st Class Julie Fleming)





# Celebrating 70 Years of Engineers *Leading the Way*



Civil engineers have been repairing damaged airfields since the 1940s, when members of the 831st Engineer Aviation Battalion (top) traded food for lumber to build concrete pouring forms! Today's airfield damage repair involves high-tech heavy machinery and sophisticated methods. This year, the Air Force turns 70. As we celebrate civil engineers providing support and leading the way for those 70 years, look for coverage on [www.afcec.af.mil](http://www.afcec.af.mil)



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