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BUILDING
SUSTAINABLE INSTALLATIONS

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Staff Sgt. David Ertwine and Dan Grausso remove a damaged single point nozzle from a fuel fill stand. The fill stand serves R-11 refueling trucks, which are used to refuel the C-17 Globemaster III.
(U.S. Air Force photo/Airman 1st Class Clayton Cupit)

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CEs Always Find a Way

It still amazes me when I have the opportunity to travel, visiting with some of the most incredible Civil Engineer Airmen and civilians taking care of business around our Air Force. Maj. Gen. Theresa Carter and I had the great opportunity to spend 14 days in the Pacific Air Forces area of responsibility at the end of January. We visited 11 squadrons at six installations and spoke with hundreds of military, civilian and host nation personnel. The theme was continuously the same: prideful, dedicated, intuitive, hard-working professionals finding creative ways to get the mission accomplished!

After the recent release of force management initiatives, the visit was timely in terms of us helping to explain why our Air Force has to make such drastic reductions to our force structure. As we expected, there were a lot of questions about the future of our workforce, budgets and deployment requirements. However, in the end, all of the PACAF professionals continue to remain committed to sustaining our installations and providing exceptional firefighting, emergency management and explosive ordnance disposal services.

During one of our first stops we met Senior Airman Shanna Austin, a heating, ventilation and air conditioning journeyman assigned to the 51st Civil Engineer Squadron at Osan Air Base, Korea. With less than five years in our Air Force, she was selected to lead a team winterizing 280 mechanical systems during the "no heat, no cool" season. Through this leadership, she protected $763 million in facilities and saved the Air Force $1.4 million in energy costs. A little further south, at Kunsan Air Base, Korea, we met Senior Airman Walter Carney, Jr., a firefighter with the 8th CES. He was selected to instruct fire tactics and strategy courses to 22 flight personnel from the 8th Wing and 10 Republic of Korean Air Force, ensuring the entire shift was prepared for the joint operational exercise Max Thunder. He accomplished this as well finishing his Community College of the Air Force requirements, completing three college classes with a 4.0 GPA.

As well as meeting some of the outstanding Airmen we have in civil engineering, we were also able to witness firsthand some of the great programs and projects ongoing in PACAF. The Dirt Boyz at Kadena Air Base, Japan, devised a runway maintenance solution to garner $500,000 through an Air Force "good idea" program, purchasing an airfield rubber removal system. They are the first in the Air Force to utilize this system, clearing 300,000 square feet of pavement surface and saving $4 million in equipment and personnel costs. Additionally, at Andersen Air Force Base in Guam, the Civil Engineer and RED HORSE teams continue to build up facilities and infrastructure at Northwest Field and the Pacific Regional Training Center, a consolidated training campus which includes Commando Warrior, Combat Communications, Silver Flag and the PACAF RED HORSE unit.

It is apparent to me that even with the uncertainty of our force structure and budgets within the Air Force, our civil engineers around the world continue to provide first class service and work to our customers. I honestly feel that one of our biggest challenges is "failure is not an option." If you are part of an organization that has engineers, we will always find a way to get the mission done. Team, thanks for your leadership, service and sacrifice to our Air Force!

Jerry W. Lewis
Chief Master Sergeant, USAF
Chief for Enlisted Matters

The Air Force's Sustainability Vision

Dan Kowalczyk
SAF/IEE

The mission of the United States Air Force is "to fly, fight, and win … in air, space, and cyberspace." This mission is energy intensive, and requires considerable access to, and dependence upon, built infrastructure and natural resources. In executing its mission, the Air Force strives to protect, sustain and improve the built and natural infrastructure. It is committed to complying with applicable laws, regulations, executive orders, instructions and policies as well as reducing risk to our Airmen, mission and the environment. The Air Force's sustainability vision is to create a culture where energy, environment and workforce protection considerations serve as central elements for sustainable operations, and are incorporated into everything we do. The Air Force embraces sustainability as a means for achieving its mission and improving its performance.

Through the issuance of Executive Order 13514, "Federal Leadership in Environmental, Energy, and Economic Performance," the president formally established an integrated strategy that links past legislative, regulatory and executive office efforts to move the federal government towards more sustainable operations. The Department of Defense defines sustainability as "the ability to operate in the future without decline, either in the mission or the natural and manmade systems that support it." Building on this definition, the Air Force concept of sustainability involves recognizing the direct and indirect impacts of Air Force operations on resources and understanding of the full measure of resources needed in the present and future to ensure successful operations. It also involves taking action by planning, designing and executing mission requirements in a manner that provides for the long-term sustainability of operations in the face of constrained resources.

In response to unprecedented demands on the critical assets, systems and infrastructure that enable the Air Force mission, sustainability is increasingly of strategic importance. Sustainability is not a stand-alone program, and is not simply an environmental initiative. Rather, it is a management approach that recognizes the wise use of economic, energy, environmental and human resources applied across the enterprise can increase efficiencies and improve mission performance. The Air Force relies on a wide range of resources including skilled, trained and healthy Airmen, as well as energy, water supply and quality, land availability, adequate airspace and material availability (e.g., precious/specialty metals/minerals). Each of these resource assets provides a host of opportunities to sustain and enhance the Air Force mission.

The 2014 Department of Defense Strategic Sustainability Performance Plan, implemented by the Air Force, identifies four key priority areas: 1) ensuring the continued availability of critical resources (energy and water); 2) maintaining readiness in the face of climate change (by reducing greenhouse gas emissions and enhancing resiliency); 3) minimizing waste and pollution (by managing non-hazardous solid waste and minimizing the use of toxic chemicals); and 4) ensuring sustainability practices become the norm (by integrating into management systems, procurement, and building design processes).

"the ability to operate in the future without decline, either in the mission or the natural and manmade systems that support it."
-- DoD definition of Sustainability

The Air Force's 2014 efforts will be balanced with mission requirements, and geared towards meeting current commitments and future challenges. Efforts will include energy conservation and use of renewable energy sources; effective water conservation and resource management; pollution prevention; reduction in hazardous chemical use; procurement of energy-efficient, water efficient, bio-based and environmentally preferable products; and use of innovative sustainable design processes for Air Force facilities.

Air Force heritage exemplifies a willingness to embrace innovation, relentlessly strive for improvement and mission success, serve the warfighter and defend the nation. The resources entrusted to the Air Force are essential to Air Force strategic priorities, and are the foundation for agile response and effective mobilization when facing threats. Moving forward, the Air Force must continue to value and practice stewardship of the precious resources entrusted to it for long-term sustainability.

Mr. Kowalczyk provides contract support to the Office of the Deputy Assistant Secretary of the Air Force for Environment, Safety and Occupational Health, Washington, DC.

Management Tools Help Air Force Reach Environmental Sustainability Goals

Jennifer Schneider
AFCEC/PA

Sustainability is a factor in all aspects of the mission, and the Air Force is committed to integrating environmentally friendly practices into day-to-day processes and policies. Subject matter experts at the Air Force Civil Engineer Center in San Antonio, Texas, are utilizing several innovative technologies to help centralize management of the Air Force's resources, to highlight successes and pinpoint areas where work remains to be done.

One of the overarching tools the Air Force is using to improve sustainability across all environmental aspects is a web-based electronic dashboard technology known as eDASH. The tool provides an environmental management system, or EMS, framework for bases to identify and manage the daily processes and activities responsible for actual or possible impacts to the environment, and to develop and track progress on installation, major command and Air Force-level goals and objectives.

"eDASH allows the Air Force to consistently capture, consolidate and prioritize the significant aspects and impacts of Air Force processes in relation to mission activities," said Teddy James, EMS and eDASH program manager. "Having a one-stop shop to manage this information allows the Air Force to more easily identify efficiencies, reduce where possible and maintain regulatory compliance."

In addition to eDASH, several program-specific tools are helping the force become more efficient and sustainable.

One such tool is in the area of water quality. The Environmental Protection Agency's National Stormwater Calculator was deployed Air Force-wide last year, allowing planners and construction managers to assess how green infrastructure can be used to reduce rainwater runoff at development sites, thereby protecting rivers, lakes, coastal shorelines and other water resources. Managing storm water runoff also improves groundwater supplies, giving rain an opportunity to soak into the soil.

"The calculator allows users to quickly and easily assess the impacts of Energy Independence and Security Act Section 438 on their project, and to estimate the level of low-impact development necessary to mitigate storm water runoff to meet predevelopment conditions," said Larry Isaacs, Air Force water quality subject matter expert at AFCEC.

AFCEC also developed the Water Efficiency Worksheet to enable installation planners to assess water conservation irrigation alternatives versus current practices. Estimated annual water savings and costs can be quickly determined as can the return on investment calculations for the proposed alternative.

Several technologies are also helping the Air Force meet its goals in the area of air quality.

One program, the web-based Employee-vehicle Certification and Reporting System, or ECARS, is being implemented across the force. The system provides the means for tracking employee compliance with vehicle emissions testing, so that employees remain compliant with local inspection and maintenance programs, regardless of where a vehicle is registered. The process takes less than five minutes per employee, saving more than 180,000 man-hours per year when compared to in-person registration It also provides instant access for gathering, tracking and analyzing data to help installations meet their compliance goals and improve and sustain air quality.

The tool is a module in a larger management product known as the Air Program Information Management

System, which is owned and managed by the Air Force and mandated for use by all installations.

APIMS allows air quality managers at all levels to analyze standardized quality and emissions data, and instantly track and report compliance and trends.

"The program eliminated several standalone, installation-level tracking systems and spreadsheets and gave us a centralized location for managing air quality compliance," said Frank Castaneda, Air Force air quality SME and APIMS program manager at AFCEC. "We are able to compare 'apples to apples' to identify reduction targets and pinpoint processes that are not sustainable."

Reducing the use and disposal of toxic chemicals is another area the Air Force is focusing on to enhance sustainability. Similar to how APIMS is revolutionizing air quality management, the technology known as the Enterprise Environmental, Safety and Occupational Health Management Information System, or EESOH-MIS, is expected to help the force reach its reduction goals for hazardous material use and disposal.

Like APIMS, the online system captures data at the installation level, and provides the tracking and reporting necessary for upper-level management to effectively manage hazardous material use, highlighting areas of concern and showcasing success cases.

"The system is mandated for use by all installations by April 1, 2014," said Kevin Gabos, Air Force hazardous material, hazardous waste and pollution prevention SME at AFCEC. "EESOH-MIS provides a detailed look at hazardous material status across all tiers, and helps us identify the mission activities that can best be influenced to achieve additional efficiencies."

With several tools and technologies available across the field, the Air Force is working toward continual improvement.

"Centralizing and standardizing our management tools are a big piece of the sustainability effort," Castaneda said. "We now have a bird's-eye view of our programs and processes, making it easier to fix potential environmental issues before they become problems."

A storm water retention pond on Joint Base Charleston, S.C., also provides a home for one of the base's alligators. (U.S. Air Force photo/Eric Sesit)

The Facility Energy Way Ahead

David J. Bek, P.E.
AFCEC/CN

Energy consumption and conservation affects everything we do. Every installation, every Airman, every gallon of fuel, every kilowatt must make a difference. To maximize conservation and minimize consumption, the Air Force Civil Engineer Center is implementing two key changes in its facility energy program. First, we will use a recently developed asset management tool known as the Air Force Civil Engineer Integrated Priority List, or IPL, to balance mission capability and savings. Second, we will centralize more of the energy management activities and work hand-in-hand with high cost/high consumption installations and major commands to identify energy-saving opportunities.

Integrated Process List

From 2010 through 2013, the AFCEC Energy Directorate at Tyndall Air Force Base, Fla., used a direct investment focus fund to invest $552 million, reaping a cost avoidance of $1.3 billion (over the projected life of the systems). In fiscal 2014, due to budget restrictions and the imperative to apply funds to the greatest mission requirements, we discontinued project funding based upon focus fund principles, which were cost and energy savings. Goals and mandates will remain a consideration on investment decisions as our energy projects now compete in the IPL asset management process based primarily on mission impact, risk management and cost savings. We anticipate making a $130 million investment this year, creating a cost avoidance of $230 million and reducing energy consumption by an amount equivalent to that required for about 30,000 houses annually.

Centralized Effort

In the past, energy project investments did not compete against other requirements. We used the focus fund to pay for the most competitive projects identified by the installations. The program was not necessarily driven by what the best opportunities were, but by what was submitted in the Automated Civil Engineer System, or ACES. The facility energy way forward will be more directive. We will pull together a cross-functional team that visits an installation, assesses opportunities and leaves the installation with a validated energy execution plan. For years, installations came to AFCEC with opportunities they wanted to pursue. Each installation then created project, legal and contract teams, a time-consuming process susceptible to typical "first-timer" learning curves.

Now, we will leverage centralized capabilities at AFCEC, such as project management, acquisition and contracting, real estate and legal competencies, for third-party financed opportunities such as in Energy Savings Performance Contracts, Utility Energy Service Contracts, Power Purchase Agreements and Enhanced Use Leases. As such, we can avoid starting from ground zero, with a new team at every location.

In the future, AFCEC engineers will visit installations to identify and develop the best energy-saving projects. We will take advantage of these opportunities through a centralized management approach, which is gaining momentum; AFCEC is already awarding projects using its centralized contracting and legal staff. Embedded into some of these projects is a rigorous measurement and verification plan to ensure guaranteed savings are part of the deal.

Tool Box

In past years, the AFCEC Energy Directorate provided its energy-saving tools and resources to all installations regardless of their energy use or utilities costs. In the future, we will provide a more centralized focus on high-consumption, high-cost installations first and foremost. While we will still give attention to every installation, every Airman, and every gallon of fuel, there will be some installations that get priority attention because we believe those locations will have the greatest impact in achieving energy goals. However, regardless of location, all energy savings projects will compete on their own merit in the IPL, and every installation must be aggressive in identifying and submitting their best projects.

Six sustainable technologies installed atop Goodfellow Air Force Base's security forces building in Texas reduces the utility bill, produces energy and captures rainwater for irrigation. (U.S. Air Force photo/Eddie Green)

Energy savings and cost avoidance opportunities will continue to be identified through audits and AFCEC Asset Visibility Team visits as well as calculations and observations by Energy Program Specialists (formerly known as Resource Efficiency Managers). Using decision-making and prioritizing tools commonly associated with the Air Force asset management approach, we will balance project dollars against the CE enterprise needs, risks and priorities.

Third-party investment projects will remain an important tool. As the fiscal environment increasingly strains Air Force capital investments in energy conservation, we anticipate relying more heavily upon ESPCs and UESCs. Engineering Technical Letter 13-13, "Energy Savings Performance Contracts," released August 2013, reduced project development time from 24 months to a target of 12 months and centralized acquisition and legal support at AFCEC with the 772 Enterprise Sourcing Squadron. Centralized ESPC execution is a maturing capability, with several energy conservation opportunities progressing through the new streamlined process. Driven by a new Air Force $416M ESPC/UESC award goal by end of CY2016, CE squadrons should generate requirements and support the efforts while AFCEC staff centrally manages the program and execution process. We believe installations will see some exciting energy conservation efforts come to fruition in the next 12 months!

Renewable energy is another program that will continue to grow with third-party investment. While the renewable energy market is complex and largely driven by such things as site-specific opportunities, technology, tax incentives, transmission access and capacity, purchasers and financing packages, there is ample opportunity and rationale to increase the generation of green power at affordable rates. All renewable projects must deliver energy to the Air Force at or below current "brown" power costs.

AFCEC uses two vehicles — power purchase agreements and enhanced use leases — to bring green power generation into our program. While the Air Force is currently generating 108 megawatts of green power (enough electricity for 108,000 houses), the Air Force has considerable progress to make in renewable energy. The Secretary of the Air Force established a 1 gigawatt renewable energy goal that encourages rapid growth and expansion of solar, wind, geothermal, biomass and waste-to-energy generation where it makes solid business sense. In the end, renewable energy generation helps the Air Force become less reliant on fossil fuel, improves utility system resilience and enables the Air Force to meet mission requirements well into the future.

Relationships

The challenges are many, but so are the successes. The AFCEC Energy Directorate is building strong partnerships to make energy conservation more attainable while meeting mission requirements. Relationships with operational and process energy owners will be vital. As we collaborate at each level, from the Secretariat to the installations, we will be more effective in our conservation and monitoring measures and in the end, consume less as we enable a mission-ready Air Force.

Installations should continue to look for conservation opportunities and embrace enterprise-wide changes in how projects are prioritized using asset management. All of us must collaborate and coordinate efforts to assure the best energy savings projects and initiatives compete for shrinking funds and drive new third party investments.

Mr. Bek leads the Energy Directorate at AFCEC, Det. 1, Tyndall AFB, Fla.

This is one of three central heat plants at Tinker AFB, Okla., scheduled to be decentralized using an Energy Savings Performance Contract. The project could reduce natural gas consumption 40 percent and save up to $7 million. (U.S. Air Force photo)

Installation Sustainability Management System

Christopher Kruzel, P.E.
AFCEC/CFED

In the near future, Air Force civil engineers will be able to use the Installation Sustainability Management System to individually tailor and customize sustainability plans for their base.

ISMS is a web-based tool that utilizes the goals and sub-goals of the Department of Defense Strategic Sustainability Performance Plan to establish Installation Sustainability Plans for any DOD installation. In 2011, the Environmental Security Technology Certification Program, an Office of the Secretary of Defense-level technology demonstration/validation program, funded the Air Force Civil Engineer Center to demonstrate the ISMS methodology. The project is scheduled to be presented to ESTCP as complete the fall of 2014, at which point it will be available for use by any component or installation.

Installations may use ISMS to custom tailor numerical targets within each of the DOD's SSPP sub-goals (e.g., solid waste diversion rate is 80 percent by 2020), identify sub-goals that are non-applicable (e.g., landfill gas capture), and even identify 'innovation' goals that reach beyond the limits of the SSPP (e.g., net zero waste by 2030; virtual desktops by 2020; continuous walking paths by 2025). These capabilities enable installations to take ownership of their ISP, and foster collaboration across the installation by highlighting these sustainability goals as installation priorities.

The tool is developed on an existing OSD platform, the Sustainability Evaluation and Tracking System. This system is already used to report SSPP data, but is limited to "speaking" between the secretariat levels of each component and OSD. ISMS will expand this capability beyond the secretariat, all the way down to the installation. Each command level below the secretariat will have a custom dashboard to view progress towards the SSPP goals. ISMS has the flexibility to create custom dashboards that can show regional performance, command performance, or any other grouping of installations.

Currently, commands and installations respond annually to intermittent data calls for information related to SSPP. ISMS provides them with the capability to encompass installation sustainability within a single dashboard to reduce the reporting burdens, identify the interactions and interconnections between sustainability goals and highlight the holistic nature of sustainability across the entire installation. From a strategic command level, leadership can apportion SSPP goals to select installations based on resource capacity and opportunity (e.g., the renewable energy goal would be apportioned to those installations where the capital investment is supported with a business case analysis).

These capabilities enable installations to take ownership of their ISP, and foster collaboration across the installation by highlighting these sustainability goals as installation priorities and goals.

Benefits of the web-based ISMS and the integrated ISP to the installation include

- Reducing reporting burdens associated with the DOD SSPP metrics
- Raising awareness of holistic sustainability across an entire installation
- Allowing installation commanders to prioritize sustainability goals most appropriate to their mission
- Establishing a repository for best practices and technologies to achieve sustainability goals
- Enabling installations to view best practices and technologies implemented within their geographic region
- Establishing a precedent for funding sustainability projects that target improved performance towards an ISP goal
- Empowering the installation commander to establish the vision for the installation, and the staff to implement their programs to achieve that vision

Mr. Kruzel is a Design and Construction Program Manager for USAFE in the Facility Engineering Directorate, Air Force Civil Engineer Center, Ramstein AB, Germany.

Power in Diversity

Harry Eisenhauer
Michael Redfern
AFPC/DPIBD

Department of Defense and Air Force senior leaders have long recognized the value of people in successfully fulfilling the mission of defending our nation. During the budgetary challenges of the past year, Secretary of Defense Leon E. Panetta emphasized that "our most important asset at the department is our world-class personnel."

General Mark A. Welsh III, the Air Force Chief of Staff agreed, stating that "the greatest strength of our Air Force is our Airmen!" He further identified our Airmen's greatest strength as "their diversity." This diversity sets the stage for mission success, allowing the Air Force to attract, recruit, develop and retain some of America's best talent.

As a source of strength and investment in our future, diversity continues to be a priority. The Air Force Diversity Strategic Roadmap, published March 12, 2013, defines diversity as including, but not limited to, "personal life experiences, geographic background, socioeconomic background, cultural knowledge, educational background, work background, language abilities, physical abilities, philosophical and religious perspectives, age, race, ethnicity, and gender." This roadmap describes the roles and responsibilities needed of every Air Force leader to advance diversity priorities, along with specific goals and action steps to establish a "meritocracy" that ensures a level playing field for all.

Air Force civilian diversity is measured against the National Civilian Labor Force census and tracked at each grade level to determine if there are gaps and underrepresented groups. To help close these gaps, the Department of Defense has established Special Emphasis Programs, or SEPs, that focus on specific demographics. A 2013 Air Force Audit report on Civilian Workforce Diversity identified some areas for improvement, including taking steps to improve visibility and communication at all levels. Several of the corrective actions produced from the audit have key milestones projected for 2014, including formal instructions on establishing SEPs and recruiting strategies.

A focus on diversity presents an exciting period of opportunity for a new group of recruits to the Civil Engineer family as well as another generation of emerging Civil Engineer leaders. The timing to meet a primary goal of the Air Force's Diversity Strategic Roadmap — "attract a broad talent pool reflective of the best of the nation we serve"— is both urgent and applicable for Civil Engineers.

While great emphasis is placed on recruitment and new hires, development of future leaders is only possible if talent is nurtured and retained. Air Force diversity priorities also emphasize "mentoring and professional development programs to provide tools to maximize individual potential and opportunity for leadership across the total force."

Supervisors and employees must work together more effectively on mentoring and career development.

Over the next few years, the CE community will adapt to imminent changes while providing the continued and overwhelmingly successful support demanded to retain our position as the most capable and agile Air Force in the world. We will be required to sustain aging installations in the face of greater competition for less funding, operate and maintain our tempo with less manpower, and adjust to more changes in our operational and organizational construct. The measure of our success will be in our ability to solve complex problems that are drastically different than what we have seen before while redefining who we are and what we are capable of. Solving problems of this nature often requires new ideas, experiences, skills and a varied perspective. We must rely on our shared intellectual capacity and talent for solving problems, abilities that are amplified by having a diverse workforce.

Studies on the benefits of having a diverse workforce frequently demonstrate outcomes that the CE community will need, including an enhanced ability to meet customer demand through problem solving and implementing new ideas. We will also need to relate to customers through diverse background and cultural experiences, improved efficiency and morale as well as the ability to attract and retain talent.

To build the strength and talent of our career field and prepare to meet these challenges, CE will take the following actions to align with Air Force manpower and personnel direction and the actions identified on the Air Force Audit report on Civilian Workforce Diversity:

Visibility and Communication – The CE Career Field Team will continue to address diversity via an annual demographics review at annual Development Team and Functional Advisory Council meetings each summer. We will further emphasize diversity through a series of articles and mass email updates on the subject.

Development – The CECFT will promote professional military education to all eligible employees; the Development Team will review and recommend candidates to the Air Force selection board. Less than seven percent of the CE civilian workforce has completed a qualifier for many developmental opportunities such as Squadron Officer School or higher level PME. Regional and cultural studies courses are part of the Air Force PME syllabus and introduce students to the important role of cultural perspectives on both their outlook and interactions with others. Mr. Mark Correll, then Deputy Civil Engineer and Chair of the CE Development Team reemphasized the importance of PME in the development of our civilian workforce during the 2013 Development Team meeting and as part of an August 2013 Webinar open to all CE personnel.

Recruiting – The Pathways Recent Graduate and PALACE Acquire Intern programs recruit recent college graduates into the CE workforce. In fiscal 2014 the PAQ program will recruit 10 college graduates. Embedded in the CE PAQ recruitment strategy is hiring from the local community or geographic region where PAQ positions will be located. In this way, CE embraces the diverse demographics found in different geographical areas or regions of the nation. This focused recruiting effort will continue to be an integral part of the CE PAQ and Pathways programs.

Civilian Career Development Opportunities

Civilian Developmental Education is one talent development tool available. Each year, during the March-May timeframe, the Air Force Leadership Development Office sends out a data call for Civilian Developmental Education and Civilian Strategic Leader Program candidates. All employees who meet basic eligibility may apply. Information on all CDE programs available, eligibility, links to schools, nomination procedures, and CDE forms can be found at https://gum-crm.csd.disa.mil/ by clicking on "Force Development" located on the under the "Learn More About" section on the left of the page.

During her initial town hall meeting in January 2014, the new Secretary of the Air Force, Deborah Lee James was asked a series of questions about what can be done to make civil service a viable alternative for college graduates, to make a career in civil service attractive to young people (in light of the 2013 furlough) and if there is concern that civil service will miss a whole generation of imaginative and talented young people. Her answer? "… I hope we don't lose that whole generation of people because we'll all be the poorer for it if we do .... There's just nothing to compare with the feeling of being involved with something that is so much bigger than yourself and helps so many other people."

Diverse backgrounds foster diverse opinions and diverse methods of solving complex problems. With the Department of Defense, the foreseeable future will present a host of complex engineering and installation support problems CE has not faced before. A diverse workforce is essential to successful examination and resolution of those problems to ensure we remain the most capable and agile Air Force in the world.

Mr. Eisenhauer serves on the CE Career Field Team as the Career Field Administrator for civilian engineers and architects and Mr. Redfern serves as the Chief of the CECFT, both at the Air Force Personnel Center, Joint Base San Antonio-Randolph, Texas.

CEs Hit the Road with 3T

MSgt Alexes A. Abrams
TSgt Ryan J. Cleary
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The 2012 Military Commercial Driver's License Act made it possible for current and former military members to benefit from their vehicle training and experience, by giving states the option to waive the driving portion of the CDL test for government-licensed tractor trailer operators.

Now, the Air Force's new Tractor Trailer Training, or 3T, course makes it possible for Civil Engineering heavy equipment operators to receive the same level of training as civilian commercial drivers. The 3T "train-the-trainer" course is offered at the Expeditionary Combat Support Training Certification Center at Dobbins Air Reserve Base, Ga., and the Regional Equipment Operators Training School, Fort Indiantown Gap, Pa. Students completing the course are issued an Air Force 483 Form certifying them as a tractor-trailer trainer.

Tractor trailer operations are an integral part of CE's mission. In fact, more than 75 percent of airmen at the journeyman or 5-level in the 3E2X1 career field (Pavements and Heavy Equipment) have performed tractor-trailer related activities, according to the latest 3E2X1 occupational analysis. With the current fiscal environment, they may now be called upon for even more tractor trailer duty while in-garrison. Home station training has long been the standard for CEs to receive tractor trailer training, and the 3T program will markedly improve the expertise of the unit-level instructors.

Background

The U.S. Military has always been exempt from the federal law that requires tractor trailer operators to possess a Commercial Driver's License. Despite this, the Air Force has always ensured that its operators received training before issuing them a government driver's license. In 2008, a special task force appointed by the Secretary of Transportation developed 15 recommendations for improving the CDL program. One recommendation was that the Federal Motor Carrier Safety Administration should work with the Department of Defense to establish a driver training and testing program for military personnel that included minimum knowledge and skills requirements comparable to those expected of civilian commercial drivers.

In early 2012, experts in the Air Force Civil Engineer Center's Force Development Division at Tyndall Air Force Base, Fla., began looking at ways to improve tractor trailer training. Leading the effort, Chief Master Sgt. Trevor Shattuck, the Air Force Reserve CE Career Field Manager, determined the logical place to start was looking at the quality of training required for civilians to earn a CDL. Typically, they receive both classroom and over-the-road training in varied operating conditions during courses that last up to four weeks or 160 hours.

In September 2013, AFCEC sent instructors from the ECS-TCC and REOTS to a truck driving school with two objectives in mind: earn their CDL and gain insight into the training and testing used by professional driving schools. After graduating, the instructors began working with AFCEC to build a training program that would improve the quality of tractor trailer home station training.

3T Program

The 3T course is delivered over a two-week period with 16 hours of classroom knowledge-based lessons and 64 hours of practical hands-on driving and tractor-trailer simulator "seat time." There is a prerequisite two-hour computer-based training module that encompasses various general topics on tractor trailer operations. (Now in development, a comprehensive interactive 3-D CBT will replace the current one.) Students must complete the CBT and pass an exam before attending the 3T course.

The classroom portion of the course is delivered through informal lectures and video and slide presentations. The focus is on general knowledge, combination vehicles and air brake systems. Pre- and post-assessments ensure that all knowledge levels are covered and learned.

The hands-on practical portion begins at the maneuvering skills pad. In this controlled environment, instructors teach students how to complete a pre-trip inspection, a process of looking for any potential safety issues that can take up an hour to complete. Instructors then assess students on their ability to use the proper "double clutch" shifting method while operating the tractor. Students are given simulator time as well as individual instruction to increase their proficiency at shifting, an important skill for operating the various 10- and 13-speed-transmission vehicles in the Air Force's inventory.

Students then transition to backing maneuvers and over-the-road, or OTR, driving. Trained on the maneuvering skills pad, backing covers several situations: alley-dock, parallel, offset and straight-line. Each maneuver is trained on the driver's side as well as the blind side. During the OTR training, instructors ride "shotgun" as students get experience in different operating conditions (city, rural and expressway) and in hauling various types of trailers (40-foot flatbed; 53-foot box trailer; 35-foot lowboy; and 28-foot back trailer). The two training schools are located near the major metropolitan areas of Atlanta, Ga., and Harrisburg, Pa., so students encounter heavy traffic conditions during OTR driving. The increased need to upshift and downshift helps build shifting proficiency, as well as the ability to safely react to hazards as they occur. On the final day of training, students must pass a department of motor vehicles CDL-style practical assessment.

Master Sgt. Alexes Abrams instructs students during the 16-hour classroom portion of the 3T course at Dobbins ARB, Ga. (U.S. Air Force photo/Eddie Green)

The 3T train-the-trainer program ensures CE heavy equipment operators will receive a level of instruction equivalent to their civilian counterparts.

"When we put our Airman outside the in-garrison gate they will be safe operators," said Shattuck. "Our drivers and those on the streets around them can have confidence in their abilities."

Master Sgt. Abrams and Tech. Sgt. Cleary are instructors at the Expeditionary Combat Support Training Certification Center at Dobbins Air Reserve Base, Ga.

Facing page and left: 3T students learn to complete a pre-trip inspection of their tractor trailers during the 64-hour practical, hands-on portion of the class. (U.S. Air Force photo/Eddie Green)

RED HORSE TTP Program:
The Right Tool for the Job

Maj Ross Dotzlaf
ACC/A7XO
Capt Lindsey Maddox
ACEC/CPAD

The RED HORSE Troop Training Project Program provides RED HORSE squadrons with important wartime heavy construction training through cost-efficient execution of real world construction projects. Prior to fiscal 2014, the TTP program was managed and funded primarily by the Headquarters Air Combat Command Installations and Mission Support Directorate. Candidate projects were solicited from bases across the Air Force through an annual call letter and selected based on the training needs of the respective RED HORSE units. The projects' priority and position on the Air Force Integrated Priority List, or IPL, were not considerations for TTP selection. However, that changed last year with the centralization of sustainment, restoration, and modernization funds at the Air Force Civil Engineer Center, Joint Base San Antonio, Texas.

In early 2013, the ACC RED HORSE program office and AFCEC Planning and Integration Directorate worked together to determine how to integrate the TTP program into the AFCAMP — the Air Force Comprehensive Asset Management Plan. The ideal solution was to have RED HORSE select TTPs from projects above the notional funding line on the IPL. This would mean RED HORSE could satisfy annual training requirements by completing high priority projects already selected to receive funds. While this was a good idea in theory, it turned out to be more challenging to execute.

On the initial draft of the fiscal 2014 IPL, many of the projects above the fund line were life, health, safety; fire suppression; or facility renovation projects with little training value for RED HORSE. Many of the types of projects RED HORSE requires for training (e.g., pre-engineered buildings, K-spans, well drilling, etc.) were not on the IPL or were below the anticipated fund line.The team quickly realized modifications to the process were needed to meet RED HORSE requirements.

To ensure RED HORSE could still meet its fiscal 2014 training requirements, the units expanded their search for potential TTPs to projects above and below the fund line. Once the RED HORSE units identified a potential TTP, they reached out to the respective base to learn more about the project and get buy-in to allow RED HORSE to add the project to their TTP program. The RED HORSE squadrons even-

tually identified all of the projects needed to fulfill their training requirements. Although some of these projects scored below the anticipated IPL fund line, the proposed TTP program was approved for execution by the CE Governance Structure.

Since fiscal 2014 was a transition year, concessions were made for RED HORSE and a few other programs whose requirements were not supported by the 2014 centralized scoring models. When planning began for fiscal 2015, the team knew RED HORSE would not get the same concessions. The AFCAMP business rules needed to specifically address selection and funding of TTPs, as well as the potential cost savings from RED HORSE project execution. Fortunately, the team learned many valuable lessons to improve the process.

Since the TTP selection process is now formally integrated into the AFCAMP, all guidance for the selection, approval, and funding of RED HORSE TTPs is included in the Business Rules for the Execution of CAMP and FY17-21 Activity Management Plan Processes (Para 1.C.7), approved on Jan. 7, 2014. Key changes from the previous year's business rules include:

1. Project Solicitation. A list of required TTP types/scope is provided in the Business Rules. Examples include projects for K-spans, PEBs, asphalt and concrete pavement, electrical and utility distribution, well drilling and heavy earthwork. If a base has a project that fits TTP requirements and would like to submit it for consideration, the base must send the pertinent project information (number, title, description, programmed amount, and POC information) to AFCEC/CPAD (afcec.cpad.workflow@us.af.mil). AFCEC/CPAD will log the data and forward the submittal to ACC RED HORSE for final validation as a TTP candidate. If the project is a valid TTP candidate, AFCEC's Comprehensive Program Development Branch will send an e-mail to the base POC for documentation purposes.

2. Scoring Incentive. Typically, RED HORSE is able to execute a project for roughly 80 percent of the programmed amount. To encourage bases to submit projects for consideration, the Business Rules allow base programmers to claim the anticipated savings from the use of troop labor when calculating the project's savings to investment ratio, or SIR. This will increase the project's total score and increase the likelihood of it being above the fund line. Note: Before doing this, the project must be validated by RED HORSE as a TTP candidate (referenced above).

3. Project Selection. When selecting projects for the annual TTP list, each RED HORSE unit will match projects from the IPL to their baseline training requirements starting with those projects identified as valid TTP candidates above the expected funding line. If/when the TTP candidates are exhausted, RED HORSE will review all projects above the anticipated fund line to find projects meeting their training needs. If training requirements cannot be met through projects above the fund line because of the size of the projects, nature of the work, base/MAJCOM preference or other limitations, projects from below the fund line will be considered in priority order until all training requirements are met.

4. Project Funding. Despite the new opportunities for project solicitation and scoring incentives, it is possible RED HORSE will still need to select projects below the funding line. As outlined in the AFCAMP business rules, all projects selected and approved as a TTP on the IPL will be funded; however, projects will retain their IPL original score. If RED HORSE needs to drop a project for any reason (e.g., unexpected deployment, change in site conditions, etc.), the project will be funded according to its place on the IPL. Projects above the funding line will receive funds for non-RED HORSE execution; projects below the fund line will not.

5. Two Year Outlook. The AFCAMP transitioned to a two-year planning cycle starting with the fiscal 2015-2016 IPL. This change will allow for better planning and design of all requirements, including those executed by RED HORSE. By forecasting projects two years in advance, RED HORSE will have a full year for design, and they will execute the project in the second year (although it is important to note RED HORSE is equally interested in projects with and without completed designs). Since TTP requirements may fluctuate due to unexpected deployments, each year's IPL build will provide an opportunity for RED HORSE to validate the execution list forecasted the prior year.

This article was originally prepared before the start of the fiscal 2015-2016 AFCAMP process. RED HORSE finalized their TTP list in mid-June and submitted it through AFCEC/CP for approval by the CE governance structure. The IPL was approved by the CE Council on 25 June. The revised TTP selection process worked as planned, and general feedback was positive. RED HORSE did reach below the funding line to meet all training requirements. However adherence to the established Business Rules enabled full transparency, and senior leaders were supportive of funding the projects as vital training requirements. Next year's TTP selection process will follow the same approach. Refer to the AFCAMP Business Rules for the most up to-date instructions regarding the TTP selection process.

Maj. Dotzlaf was previously the RED HORSE Program Manager and currently serves on the Commander's Action Group, HQ Air Combat Command, Joint Base Langley-Eustis, Va. Capt. Maddox is Chief, Installation Investment Programs with the AFCEC Planning and Integration Directorate.

Facing page: A team from the 823rd RED HORSE Squadron, Hurlburt Field, Fla., works on a road pavement project at Shaw Air Force Base, S.C., in 2012. (U.S. Air Force photo by Senior Airman Kenny Holston)

Kadena CEs Lead Crash Recovery Operations

Capt Jonathan Needham
18 CEG/CCE

On August 5, 2013, an Air Force HH-60 helicopter crashed in a dense jungle while conducting a training mission over a central training range on the island of Okinawa, Japan. Emergency responders from both the U.S. Marine Corps and the Air Force rushed to the scene to administer first aid and contain the resulting fires.

Airmen from the 18th Civil Engineer Group at Kadena Air Base, Japan, led both the firefighting and recovery efforts. Master Sgt. Jerry Reynolds, assistant chief of operations for the 18th Civil Engineer Squadron's Fire and Emergency Services Flight, directed the firefighting. Once all the fires were extinguished, I took over, with responsibility to lead the recovery efforts.

Firefighters battled multiple wildfires over the four days following the crash. With training as wildland firefighter, Reynolds immediately put his knowledge to work, overseeing both land-based and air-based operations. The extreme terrain made the wild fires difficult to contain and extinguish, as did the near drought conditions brought on by an abnormally dry Okinawan summer.

Reynolds directed the Marine Corps to drop 34,688 gallons of water via helicopter over a four-day period to eventually contain the fires. Once the fires were contained, he sent personnel into the jungle, stretching nearly a quarter mile of hose to the crash site to fully extinguish the fire.

On August 8, after the last fire had been contained, the crash site was handed over to me and my team from the 18th Civil Engineer Group to direct the collection and removal of the aircraft wreckage. Under normal conditions, heavy equipment would have been used to remove the wreckage. However, the crash site was located approximately 200 meters into a dense, rugged jungle that prevented equipment from reaching the wreckage. I began coordination with the Marine Corps to airlift the wreckage out of the jungle.

While coordinating airlift recovery options, we were simultaneously responsible for maintaining the base camp that was used for daily operations. For this monumental task, Tech. Sgt. Mark Fitzgerald from the 18th Civil Engineer Squadron was appointed NCO in charge and assisted in leading Airmen from seven squadrons to ensure daily operations stayed on track. Due to the nature and location of the crash site, numerous challenges arose along the way, each met with the ingenuity and tenacity Air Force CEs are known for.

First, the intense heat from the aircraft fire caused inhalation and contact hazards. Personnel entering the hot zone near the aircraft donned personal protective equipment that included full Tyvek suits and full face respirators. Personnel from Readiness and Emergency Management and Bioenvironmental Engineering worked hand-in-hand with those making entry to ensure Airmen were properly outfit-

ted and decontaminated upon entering and exiting the hot zone. Airmen not only suffered a loss of dexterity, they had to endure temperatures in the high 90s and humidity greater than 80 percent that forced restricting work and rest cycles. Over 50 individual entries were required to safe the scene and allow for a reduced PPE posture.

Next, the team faced the arduous task of locating, identifying and surveying every piece of helicopter debris scattered throughout the jungle. This was no easy task, considering the crash site location. After four days, the recovery team had collected enough data points to create a map for the accident investigation team.

The next task required was the creation of a 26,000-square-foot clear zone around the crash site to enable airlift. A team of dirt boyz, led by Fitzgerald, spearheaded this effort. With a few chainsaws, hatchets and a lot of CE sweat, the team cut down and moved more than 300 trees to create the required clear zone in four days.

While the dirt boyz were creating the clear zone, the 18th Equipment Maintenance Squadron's Crash Recovery team was busy wrapping and packing the helicopter debris for transport. This team worked tirelessly for three weeks to ensure every piece of debris was either placed in a plastic tub or thoroughly wrapped in plastic. In total, 107 plastic tubs were filled and several large pieces were wrapped and readied for transport.

Despite the challenges, the team remained flexible and found ways to work around every obstacle. While work continued at the site, the 18th Communications Squadron, Logistics Readiness Squadron, Security Forces Squadron and Force Support Squadron worked tirelessly behind the scenes to support the personnel on site; the Medical Group stood watch ready to respond at a moment's notice. The operation was a true sampling of the wing's best and brightest Airmen working together to complete the mission.

Forty-five days after the accident, the clear zone was approved and the wreckage was prepped for transport. Following three planning visits to the site, on day 66, the Marines began executing the airlift. The Marines and Airmen joined together at the staging area and readied empty shipping containers for airlift into the jungle. The aircrew gently and precisely lowered each box onto the landing zone where an eager ground crew sprang into action to pack it full. Once loaded, the HH-53 flew each box back out of the jungle to the staging area. The removal of over 12,000 pounds of debris took four hours and seven separate airlifts. The full shipping containers were loaded on two flatbeds, taken to Kadena and turned over the investigation team.

From start to finish, this operation flowed smoothly and was a testament to the state of readiness of all personnel involved. Both Airmen and Marines stepped up to the complex challenge following the unfortunate event, and all performed at a very high level. As a result, each service walked away with a greater appreciation of the other's dedication, work ethic and capabilities.

Capt. Needham is the executive officer for the 18 Civil Engineer Group, Kadena AB, Japan.

Airmen from Kadena Air Base and Marines stationed at Okinawa, Japan work together to fill Conex boxes with wreckage debris for airlift following the crash of an Air Force helicopter on Okinawa. (photo above by author; photo at left courtesy U.S. Marine Corps)

Guidance Unit Cost Models for MILCON Programming Estimates

Thomas A. Adams, P.E., C.C.E
AFCEC/COSC

Accurate military construction programming estimates are necessary so that Congress may allocate the right amount of funds for an approved project. Overestimate the requirement, and funds are lost for other mission needs. Underestimate and an approved project may be cancelled or delayed until additional funds are procured.

From fiscal 2003 to 2013, only 57 percent of Air Force MILCON programming estimates fell within the desired accuracy range of 100 to 125 percent of actual costs (0-25 percent error). Seven percent fell below actual costs and 36 percent were above 125 percent of actual costs.

According to UFC 3-730-01, "Programming Cost Estimates for Military Construction," two methods — parametric and guidance unit cost — are available for calculating programming estimates. The parametric estimate can be quite accurate, if a programmer has access to detailed project definition and scope. Otherwise, GUC estimating procedures should be used. Considering that few MILCON projects begin with an accurate and detailed project and scope, this report focuses on improving GUC estimating methods through modeling.

The GUC Method

The GUC method uses pre-calculated unit costs (per square foot) of new construction for the most common types of military facilities (i.e., aircraft hangars, child care centers, headquarters buildings, warehouses, etc.). GUCs for individual facility analysis category codes are published in UFC 3-701-01, "DoD Pricing Guide." GUC costs are normalized for square footage, location, cost escalation and technological advancement. The programmer then readjusts the programming estimate to the actual design parameters using the appropriate adjustment data tables in UFC 3-730-01, Section 4.

In most cases, GUC values are updated annually to reflect the latest average DOD unit price. However, if an adequate sample size (as defined by GUC rules) is not available for a particular Office of the Secretary of Defense FAC code, that GUC is not updated. The DOD budget continues to shrink, and with it, the number of MILCON projects from which to develop GUC values. Based on official Air Force data, the Air Force MILCON budget declined an average of 50 percent annually for the past three fiscal years, from $3.3B in 2010 to $0.4B in 2013, and with it the number of projects, from 229 in 2010 to 30 in 2013.

In addition, to increase the amount of data points used to develop annual GUC updates, the OSD FAC codes attempt to consolidate similar, homogeneous facilities across all services into a single reference code. This results in some odd pairings from an Air Force perspective. For example, FAC 1711 "General Purpose Instruction Building" places a runway control structure and an academic lecture hall in the same category.

Improving GUC Estimates through Modeling

To compensate for GUC method deficiencies, the Office of the Secretary of Defense commissioned a study in June 2011 to refine the existing methods of calculating GUC indices. Four of the six recommendations (more accurate data entry; granular breakout of analogous projects; use of facility-unique size adjustment curves, and normalization for design differences) are significant and can be validated using statistical analysis.

At a Tri-Services Cost Engineering Meeting held in Atlanta, June 2013, cost engineering experts from the Army, Navy, Air Force and Defense Health Agency discussed the project sample size issue and proposed a modeling alternative to the existing GUC method. Using a GUC model built on data spanning more than 10 years rather than using the existing GUC method (average of a small sample of at least 3 data points no more than three years old) reduces the requirement for recent MILCON project data.

Modeling has several distinct advantages over the existing GUC methodology. First, a model can use "time" as a variable and thereby mix old with new data to increase the sample size. The age of the data is no longer a limiting factor.

Second, the increased sample size generates conditions for accurately estimating cost distribution variance. This model variance can be used to create confidence intervals and provide programmers with an objective measure of how well their estimate compares with similar, historical projects.

A third advantage is the ability to use a single-factor analysis of variance to test various "cost" assumptions. For instance, a single-factor ANOVA can be used to filter out dissimilar category codes from the model; estimate area cost factors and escalation curves; and test the significance of other process variables (e.g., number of bids, small business/8A contract impacts, construction method, sustainability rating, etc.) on facility cost.

Model Type

To begin the modeling process, we first need to determine the function type that best fits the data. Figure 1 would be a good place to start since it is a model recognized and endorsed by DOD senior cost engineering experts. Extrapolating to the left, we note that the function gets very large as the facility square footage (variable x) approaches zero. Extrapolating to the right, we note that the slope of the function increases slowly toward zero. Alternatively, we may say that the function appears to converge to a constant. Mathematically, we may write:

Condition 1: $\lim_{x\to 0} \frac{f_b(x)}{x} = \infty$

Condition 2: $\lim_{x\to \infty} \frac{f_b(x)}{x} = C$

If $f_b(x) \equiv a \cdot x + b$, (where "$a$" is a constant) both conditions above are met. However, our cost function, $f_b(x)$, now tells us that if we choose not to build a facility (i.e., $x = 0$), then we still have a cost: $f_b(x) = a \cdot 0 + b = b$

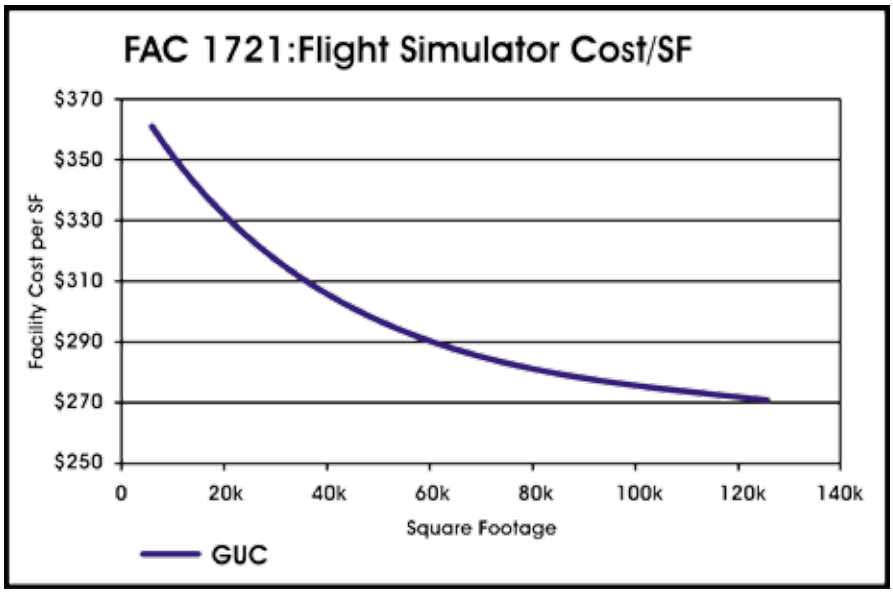


Figure 1: GUC Example Adjusted for SF

From this condition, we see that b cannot be a constant but rather must be a function of x. So $f_b(x) \equiv a \cdot x + b(x)$ and

Condition 3: $\lim_{x\to 0^+} b(0^+) = 0$

Revisiting conditions 1 and 2, we find that the following sub-conditions must hold true in addition to condition 3:

Condition 1a: $\lim_{x\to 0^+} \frac{b(x)}{x} = \infty$

Condition 2a: $\lim_{x\to \infty} \frac{b(x)}{x} = 0$

One function that fits the above requirements (but there could be others) is $b(x) = -c \cdot \sqrt{x} \cdot \ln x$ where c is a constant. We see that condition 1 is met:

$$\lim_{x\to 0^+} \frac{b(x)}{x} = \lim_{x\to 0^+} \frac{-c \cdot \sqrt{x} \cdot \ln x}{x} = \lim_{x\to 0^+} \frac{-c}{\sqrt{x}} \cdot \ln x$$

$$\lim_{x\to 0^+} \frac{b(x)}{x} = \frac{-c}{0} \cdot \ln 0^+ = (-\infty) \cdot (-\infty) = \infty$$

Condition 2 is also met:

$$\lim_{x\to \infty} \frac{b(x)}{x} = \lim_{x\to \infty} \frac{-c \cdot \sqrt{x} \cdot \ln x}{x} = -c \cdot \left(\lim_{x\to \infty} \frac{\ln x}{\sqrt{x}}\right) = \frac{\infty}{\infty}$$

Since this is an indeterminate form, L'Hospital's rule must be invoked:

$$-c \cdot \lim_{x\to \infty} \frac{\frac{d}{dx}[\ln(x)]}{\frac{d}{dx}[\sqrt{x}]} = -c \cdot \lim_{x\to \infty} \frac{2}{\sqrt{x}} = -c \cdot 0 = 0$$

So now we have found a usable form of a baseline GUC model: $f_b(x) = a \cdot x - c \cdot \sqrt{x} \cdot \ln x$

This function may be used to model the normalized (for time-value of money and area cost variances) cost of any category of facility. It will reflect the cost of an average facility and is not corrected for technology enhancements or other unique facility characteristics since these additional variable inputs are not collected. But, the model could be modified to accept these variables if they became available in the future.

Escalation

Since our cost data is influenced by time, an appropriate correction factor must be included. One appropriate form of the escalation function is simply the continuous compounding rate formula, $g(t) = e^r$, where *r* is the interest (or escalation) rate and *t* is the time variable. Since the escalation rate changes through time, we may modify the formula to a more applicable form:

$$g(t) = e^{r(t)}$$

Where *r(t)* is a polynomial function in the time domain that captures the escalation rate through time. To dampen wild fluctuations between data points, the function is arbitrarily limited to a cubic polynomial,

$$r(t) = \sum_{i=1}^{3} \beta_i \cdot t^i$$

where β is the coefficient vector to the cubic equation.

So the overall modeling function becomes:

$$f(x,t) = g(t) \cdot f_b(x)$$

$$f(x,t) = e^{(\beta_1 t + \beta_2 t^2 + \beta_3 t^3)} \cdot [ax - c(\sqrt{x}) \ln x]$$

Area Cost Factors

Once all models are completed, an ANOVA procedure can be run against the error variances by the state in which the project was constructed. If the error variance is significant, then a table of ACF adjustments can be created to improve model accuracy. So the final form of the model becomes:

$$F(x,t,S) = ACF(S) \cdot f(x,t)$$

Equation 1:

$$F(x,t,S) = ACF(S) \cdot e^{(\beta_1 t + \beta_2 t^2 + \beta_3 t^3)} \cdot [ax - c(\sqrt{x}) \ln x]$$

Where *x* is square footage; *t* is time; *S* is U.S. state (e.g., Arizona, Arkansas, etc.); and *a*, *β*, and *c* are model coefficients.

Method

The models were built using non-linear modeling techniques. Specifically, the conjugate gradient method was used to find coefficients that minimized the sum of squared errors.

Testing the Model

From the entire Historical Analysis Generator II database of Air Force MILCON projects from fiscal 2003-2013 (588 projects), 10 FAC codes under "CONUS, New Construction" were found that contained a set of at least 10 new facilities. These 10 FAC codes were used to test the model. An example of one is presented here.

FAC 1721: Flight Simulator Facility

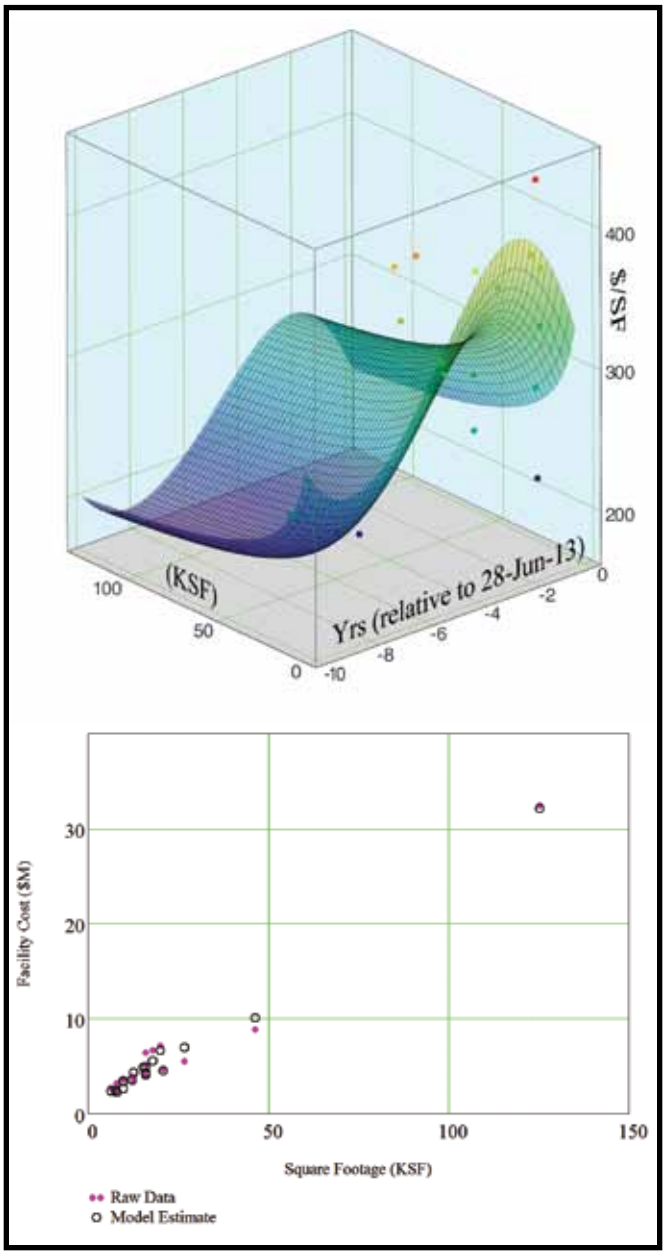
The Air Force built 21 Flight Simulator Facilities over the 10-year analysis period and all were used to build the model.

Model Parameters. The coefficients for the FAC 1444 model are

$$\begin{bmatrix} a \\ c \\ \beta_1 \\ \beta_2 \\ \beta_3 \end{bmatrix} = \begin{bmatrix} 1284.31728 \\ 181.3977083 \\ -0.2095887 \\ -0.05920616 \\ -0.003716746 \end{bmatrix}$$

The coefficient of determination, or r^2 value, provides a measure of how much error variance is explained by the model. The desired target for a "satisfactory" model is an r^2 value above 0.80. For the FAC 1721 model, $r^2 = 0.981$ (i.e., 98.1 percent of the error is explained by the model).

Figure 2: FAC 1721 SF & Total Cost Models

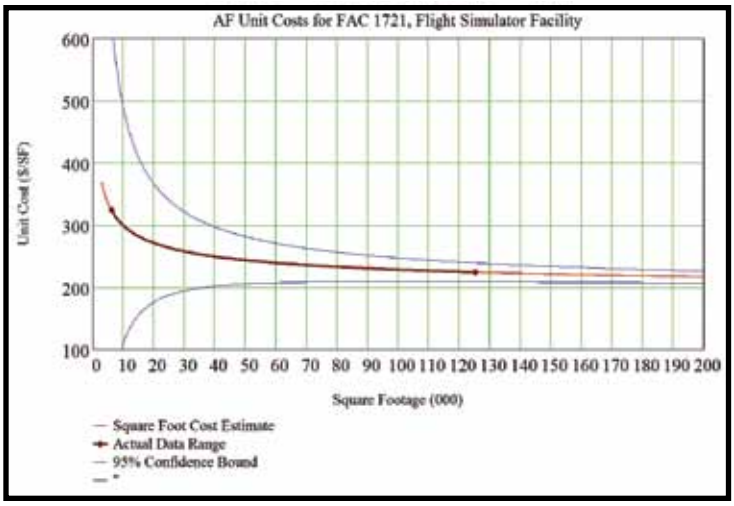


Comparative Performance

The FAC Model provides a more accurate estimate than the Facility Government Estimate and GUC but the FGE has less variability (i.e., FAC Model has less bias but bigger data spread).

The FGE is the estimated cost of the primary facility in the construction projects (i.e., the functioning facility minus site-specific requirements such as demolition, site work, paving, etc.) The FGE is developed specifically for each project and is a direct, "apples-to-apples" comparison. Comparison with the GUC, however, poses a few difficulties. First, GUC values are updated every year and there is no

Figure 3: FAC 1721 Baseline Model



easy access to prior values. Therefore, they were adjusted using inflation rates published by the National Institute of Standards and Technology in their annual energy rate supplement. Published 2012 Area Cost Factor values from UFC 3-701-01 were used for spatial correction. The results are listed in Table 1.

Summary

The FAC models exceeded the accuracy of the Facility Government Estimates and the Guidance Unit Cost estimates (calculated per UFC 3-701-1; see Table 2). The model bias is significantly lower than either the FGE or the GUC models and the standard deviation is almost 50 percent of the FGE and 60 percent less than the GUC. The results indicate that non-linear models should be explored further as a substitute for traditional GUC annual updates. The Tri-Service Cost Engineering Community would benefit by improved accuracy for MILCON programming estimates and less stringent data requirements for annual updates.

Author's note: The full research report is available at http://www.afcec.af.mil/shared/media/document/AFD-140424-057.pdf

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Table 1: FAC 1721, Comparative Accuracy

	FAC Model	FGE	GUC
Average error, or bias:	-1.0%	4.5%	6.0%
Data Spread (avg std dev, σ):	16.6%	15.2%	19.1%

Table 2: Model Performance Summary

FAC Code	FAC Model		FGE Model		GUC Model	
	Bias (%)	Avg. Std. Dev. (%)	Bias (%)	Avg. Std. Dev. (%)	Bias (%)	Avg. Std. Dev. (%)
1412	-0.14	15.7	9.50	24.5	-5.85	22.7
1444	0.71	24.3	15.22	30.4	10.20	34.6
1711	-0.40	8.7 12.5	-7.90	22.7	-4.42	27.1
1721	-0.95	16.6	4.45	15.2	5.98	19.1
2111	0.06	15.3	-0.67	34.8	-8.16	25.3
4221	-0.06	9.4	-12.84	31.4	44.80	94.1
4421	0.82	7.8	10.16	28.3	-21.68	34.9
6100	-0.48	9.7 24.5	5.31	21.1	-10.66	27.4
7210	-0.61	18.7	12.35	28.5	-21.34	27.7
7371	-0.35	9.0	15.60	24.8	-1.51	17.6
Total[a]	-1.40	53.4	51.18	84.5	-12.64	123.9

[a]The "Total" can be interpreted in the following way: If the Air Force were to build a facility from each FAC in one year, the combined bias of all facilities would be the sum of the individual biases, and the standard deviation (σ), of this probability distribution would be the square root of the sum of the individual squared standard deviations (σ^2), or $bias_{tot} = \sum_i bias_i$, and $\sigma_{tot} = \sqrt{\sum_i (\sigma_i)^2}$

A Letter to Senior NCOs on Building Leaders

"The man who complains
about the way the ball bounces
is likely to be the one who dropped it."

Lou Holtz

To my fellow SNCOs,

I recently had an up-and-coming senior airman with a line number approach me looking for the opportunity to excel. He was particularly asking about leadership opportunities and courses, something he could do on his own time. How refreshing!

It started me thinking. We have all heard complaints that the caliber of airmen joining the Air Force today just isn't what it once was. I am sure I will upset some folks by saying this, but on the contrary, in my opinion the caliber of SNCOs isn't what it once was. I say we have amazing Airmen and young NCOs hungry for success and destined to do great things, looking for that right path and mentor who can lead them and give them the chance.

A wise chief once told me that my greatest and most rewarding challenge as a SNCO would be "to build leaders." He was right. One constant throughout the CE Transformation culture change has been the need to build effective leaders, to "do more with less" and "think out of the box." Hearing this, we have always risen to the occasion.

Now more than ever, in this time of uncertainty, we need to do so again. I can't think of a better opportunity than right here, right now. Look around, we have a captive audience. We have a chance to truly make a difference in Airmen's careers. That's huge and it's a win-win situation. As a Dallas Cowboy fan, trust me, I can always use a win. As Tom Landry once said, "Leadership is a matter of having people look at you and gain confidence, seeing how you react. If you are in control, they are in control."

Other than leading by example, there are some things we can do in the little amount of time we have this captive audience. If we give them the tools, most will surprise us. I think a great place for a young staff sergeant or staff sergeant-select to start is through Advanced Distributed Learning Service, or ADLS (https://golearn.csd.disa.mil/kc/login/login.asp), and look at the courses found under the "Defense Equal Opportunity Management Institute" heading.

These are good basic leadership topics that will help develop interpersonal skillsets. Although the course overview will tell you that they are for Guard and Reserve, we are a total force and these courses will benefit all, regardless of status.

The Air University Web site (www.au.af.mil/au) is another great tool. I recommend going to the "Publications" section to peruse the electronic journals. You can also find up-to-date speeches from our senior leaders. There is some great stuff here and the best part is, the information is free!

We must become selfless when building leaders. Our junior military members do not know an Air Force where we have not been at war. Stop and give them a pat on the back. Tell them you are proud of them. Be firm, but be kind. It is imperative that we talk about how great the Air Force is regardless of the job title they hold. Instill pride in them and in wearing the uniform. Show them where they fit in.

We must lead them by setting the example. The reward will be more than worth it. When we begin to see our troops outperform us and make us step up our personal game, isn't that what it is all about? Isn't it our responsibility to train our replacements and know we can retire and still feel confident we have left our mark, our legacy?

Vince Lombardi said, "Leaders are not born, they are made. And they are made just like anything else, through hard work. And that's the price we'll have to pay to achieve that goal or any goal." I happen to believe that they are also mentored, educated and developed over time. We must challenge ourselves to be the great role models and mentors needed to build CE's great leaders.

Very respectfully,

Michelle Y. Lafferty, SMSgt, USAF
Water and Fuels Systems Maintenance Force Development Manager

WEAR IT PROUDLY!

MSgt Alfredo Perez, Jr.
ACC/A7XO

"It's not mandatory."

This is the most common response we hear when we ask our Airmen why they don't wear their Air Force specialty code badge. And, they are correct. According to AFI 36-2903, "Dress and Personal Appearance of Air Force Personnel," Airmen aren't required to wear their occupational badge.

But if we're always asking for our Airmen to go above and beyond, as Air Force leaders, we should encourage them to wear it. The Air Force occupational badge denotes and recognizes training, education and qualifications received in a particular career field, providing recognition in an outwardly displayed fashion.

Most of us have or will earn our badge upon completion of our technical training. That was the case for me. I remember observing my instructors at basic training and tech school proudly wearing their badge. I wanted to be a part of that. For me, it meant I was no longer in training status and my fellow Airmen could see me as another member of the operational Air Force.

My current observation is that those in our NCO tier seem to be the ones that lack the motivation or commitment of wearing their AFSC badge. As an NCO, I was always told by SNCOs that it's frowned upon if you don't wear your badge with your ABUs. And, as my story will relate, it can have a positive impact.

I had just recently sewed on master sergeant and was wearing a new uniform with my new stripes, but no occupational badge. Chief Master Sgt. Brian Mosier, now retired but at the time the CE Chief of Enlisted Masters at Headquarters Air Combat Command, was on a troop/moral visit to my unit, the 820th RED HORSE Squadron. I was selected to brief him and explain what we bring to the fight.

Chief Mosier had been my flight superintendent when I arrived at my first duty station at McGuire Air Force Base, N.J., 15 years ago, and we started talking about the "old days." During our conversation, he told me that my standards had diminished. He pointed at my chest and said "I thought you were proud of being an Engineer. Why aren't you representing and showing the young Airmen that you wear your uniform with pride and dignity?" As anyone, I hated being called out and was upset because I knew better. When I reluctantly explained to him that it was a new uniform, he simply looked at me and smiled.

He asked me how long I'd been with my current unit (I had been in RED HORSE almost 10 years) and told me that I should consider broadening my career and move elsewhere. He let me know there was an upcoming opening on the ACC/A7 staff, but said he could not recommend me for the job because without my badge, he wasn't sure if I was an engineer.

He said it as a joke, but I took it personally. As soon as I left work, I headed first to clothing sales and following that, alterations. I had it sewed on in less than two minutes, then texted him a photo. He replied, "Thank you for making it happen." A week later he called and asked me what I thought of Virginia and if I was willing to move there in less than three months. I will never know if putting the CE badge on my uniform did it, but I would like to think it made the difference.

It's important for all Airmen to maintain a high standard of dress and personal appearance, as an important part of military image as well as military history. Enlisted occupational badges reflect not only the career field but also the skill level attained: 3-level Apprentice, 5-level Journeyman, 7-level Craftsman and 9-level Superintendent. Many of you may believe that an AFSC badge is given to you, but if you think about it, it's something that you've worked hard to earn. More importantly, it represents your career field.

As a community, let's do our part and encourage our fellow CEs to wear their occupational badge with pride. It does make a difference.

Master Sgt. Perez is Superintendent, Civil Engineer Global Force Management, Headquarters Air Combat Command, Joint Base Langley-Eustis, Va.

Editor's Note: The CE occupational badge was approved in 1994, to represent "the accumulated experience of thousands of men and women who have performed engineer duties for more than 50 years." The Civil Engineer at the time, Maj. Gen. James E. McCarthy, charged Air Force CEs to "wear it proudly!"

3E1X1
HVAC

CEs in the 3E1X1, Heating, Ventilation and Air Conditioning career field are responsible for creating the optimal inside climate for Airmen to be successful in their mission, whether deployed or at home installations. They install, maintain and repair the mechanical systems that cool, heat and ventilate the facilities — buildings and tents — where Airmen live, work, recreate and eat. Charged with the operation and care of refrigeration systems, HVAC CEs also ensure food availability and safety by managing cold storage equipment.

3E1X1 Airmen are trained at the Schoolhouse at Sheppard Air Force Base, Texas, and in their home station flights with the range of skills and knowledge they'll need for their job. The size and type of systems they're responsible for varies greatly in size, fuel source and type of operation — mechanical, electrical, electronic, pneumatic and hydraulic. They work on systems that range from 60,000-BTU environmental control units used for deployed shelter systems to multimillion-BTU boiler systems used to provide hot water and steam production for multiple facilities.

HVAC CEs are the go-to experts for the operation and calibration of the control systems. They also install and maintain sensing and switching devices that control the flow and temperature of air, steam, gases and liquids. They must always be ready to do expedient repairs to maintain mission readiness. For example, climate control in the Air Force Space Command facilities that house vital electronic systems is a necessity, not a nicety.

A1C Paul Register

HVAC Technician
18 CES, Kadena AB, Japan

A1C Paul Register, 3E4X1, 3-level
(U.S. Air Force photo/ Airman First Class Stephen G. Eigel)

3-level Apprentice

When Register joined the Air Force in November 2012, HVAC was his first choice for a career field, and, it still is.

"Every time I go out on the job I learn something new," he said. " I've also seen how important the field is to the Air Force, with all the equipment involved."

His first duty station, Kadena AB, is far from home for the Warner Robins, Ga., native but of all Register's initial uncertainty about being so far away was quickly gone.

"The fact is that we are like a big family," he said. "From what I've heard we're one of the biggest shops in the Air Force. People are also always telling me that this is the best shop they've been to and I believe it; leadership constantly motivates us to do our best."

"One of the biggest things we do here is work on air conditioning because it is rarely cold here," said Register. "Because we are so close to the ocean, we have a problem with corrosion and things breaking faster. It makes the maintenance program even more important."

In the near future, Register is looking forward to a scheduled deployment with RED HORSE. He has plans for the not-so-near future as well.

"I want to retire from the Air Force as a chief."

SrA Robert Segler

5-level Journeyman

HVAC Technician
319 CES, Grand Forks AFB, N.D.

Segler has been stationed at Grand Forks since joining the Air Force in 2010. He recently returned from a six-month deployment with the 1st Expeditionary Civil Engineer Group in Southwest Asia, where he worked outside of his career field. *(see photo)*

"I got to do a lot of structures work, a lot of renovations," said Segler. "It was enjoyable to learn different things and work with other CEs, people who know what they're doing. And, it was really great to know the quality of work we all do in our jobs."

This first deployment taught him other things as well, Segler said. "I realized my family and I are pretty strong and we'll be able to make it through any others that come along."

At Grand Forks, the HVAC shop has about eight civilians and 15 military personnel, he said.

"We work with boilers and hot water systems, with chillers and big package AC units. I've done AC work for the chow halls. I've also worked on residential-type equipment assigned to our unit. A little bit of everything."

SrA Robert Segler, 3E1X1, 5-level
(courtesy photo)

He's well suited to being an Air Force CE, said Segler.

"I like to work hard and get the job done. I want to stay in and do more than my 20 years."

TSgt Joshua Malone

7-level Craftsman

HVAC Technician
60 CES, Travis AFB, Calif.

Malone just hit the 15-year mark in his Air Force Career. When he joined in 1998, HVAC was his first choice for an occupational field.

"I'm glad I chose HVAC," said Malone. "It's a good fit. I really enjoy the job. The best benefit is the people I get to work with."

The HVAC shop at Travis is a great place to get hands-on experience, said Malone.

"We do a lot of installs, taking out certain units and putting in newer, more energy efficient, equipment. We also do recovery maintenance on our equipment throughout the base. There's a computer side to HVAC as well, setting up control systems."

Malone has deployed four times to Southwest Asia and understands the importance of readiness.

"You really need to stay on your toes because you are relied on heavily. You need to train and learn as much as you can when you can. There can be times when you may not have someone to come help you out."

With a care for those coming behind him, Malone is conscientious in passing on his "lessons learned."

TSgt Joshua Malone 3E1X1, 7-level
(U.S. Air Force photo/Heide Couch)

"It's a great feeling when younger troops come to me to learn and I know I'm mentoring in the right way, leading in the right way."

3E4X1
Water & Fuels Systems Maintenance

In 2009, two Civil Engineer career fields – Utilities and Liquid Fuels – merged into one Air Force specialty code under CE: 3E4X1, Water and Fuels System Maintenance.
The merger also joined together two important CE responsibilities that ensure the mission — maintaining a safe, adequate supply of water to sustain installations and Airmen and a safe, ready supply of fuel for aircraft and vehicles.

3E4X1 technicians install, inspect, maintain, repair and manage plumbing, water distribution, water and wastewater treatment systems, fire suppression, backflow prevention systems, and natural gas distribution systems. They install, maintain and repair aircraft hydrant refueling, bulk storage and group product dispensing systems. Fuel system components that these technicians inspect and maintain include pumps, valves, motors, switches, filters, and piping. They often work in confined spaces.

They monitor all systems operations to ensure efficiency and compliance with local state, federal and DOD safety and environmental regulations. In contingency locations, they are responsible for locating and determining the quality and quantity of water sources and for operating and maintaining water collection and storage systems and ensuring that water purity standards are met. They set up and maintain field water and waste systems (e.g., BEAR assets) as well as water purification equipment, such as the Reverse Osmosis Water Purification Unit, or ROWPU.

The mission-essential components — installations, weapons systems and Airmen — all rely heavily on 3E4X1 Airmen and how well they do their jobs.

A1C Taylor Dunlap
3-level Apprentice

Water & Fuels Technician
341 CES, Malmstrom AFB, Mont.

Dunlap joined the Air Force in May of 2012 and although Water and Fuels System Maintenance wasn't his first choice, he says he's glad to be in the career field, and in the Air Force.

"I grew up doing work like this and enjoy it," said Dunlap. "I get to have hands on new things every day. I joined the Air Force to provide for myself, go the route I wanted to go and be self-sufficient."

At Malmstrom, the hands-on work involves primarily the "water" part of his job description and not so much the "liquid fuels," said Dunlap. "Our primary mission here is missiles and security, so we don't have an active flight line."

Dunlap is hard at work on the training and testing that will move him to a 3E4X1 journeyman level. He also takes advantage of any opportunity to improve his skills.

"I am now nationally backflow certified, which means I can — and do — check each building's backflow preventer that prevents used or dirty water from moving back into the building and mixing in with clean water."

A1C Taylor Dunlap, 3E4X1 3-level
(U.S. Air Force photo/Christy Mason)

Through the day-to-day tasks and training, Dunlap's focus is steady on his primary reason for becoming an Airman.

"I came in wanting to get physically, mentally, emotionally and spiritually as strong as possible and that's still the goal."

SSgt David Ertwine

5-level Journeyman

Water & Fuels Technician
628 CES, JB Charleston, S.C.

Although Ertwine entered the Air Force in 2006 as a Liquid Fuels CE, on his first deployment in Southwest Asia, in 2009, he trained and worked as a plumber.

"It just made sense," he said. "At that point we knew the merger was coming and there were no fuel pumps where I was stationed. On my second deployment in 2009, I was with RED HORSE, primarily working in structures, and by my third, in 2012, I was in a merged shop at a location with a fuel system."

His deployments have given him a greater perspective of civil engineers as a whole, said Ertwine.

"At home bases, you don't interact with the other CE career fields that much, but when you deploy as a squadron you see all the work of the all the fields. It's cool to see how the squadron and all the shops work together."

As a CE at Charleston, Ertwine enjoys working in both areas of his career field, but if choosing, would still rather work in his first Air Force job — fuels.

SSgt David Ertwine, 3E4X1 5-level
(U.S. Air Force photo/Airman 1st Class Clayton Cupit)

"I enjoy the technical aspects of fuel, and it's also become sort of pride thing because there are so few of us original fuel guys left — a lot got out after the merger.

"But, I love CE and this program. I'm really glad when the liquid fuels field got merged, it was still with CE. I love the troubleshooting side of what we do."

TSgt Steven Javinar

7-level Craftsman

Water & Fuels Technician
18 CES, Kadena AB, Japan

As the fuel section lead for his shop, Javinar oversees the work of two Airmen and eight Japanese civilians.

"This has been a great opportunity for me in terms of hands-on work on fuel systems, "Javinar said. "I have a water background, but I really enjoy working with fuels."

When Javinar joined in 2003, the Air Force chose the utilities career field for him.

"It's been a blessing ever since," he said. "I love the Air Force and civil engineering. I plan on making this a career."

Javinar has deployed twice to Southwest Asia, experience he says was invaluable to him as a CE.

"It gives you many opportunities to learn different aspects of your own job as well as other CE crafts, like electrical or being a dirt boy. I got to focus on my job and see how it directly affected people, but also to see the big picture."

Javinar's current goals are to finish his bachelor's degree and to continue learning all the aspects of his job.

"The learning never stops, especially as a tech sergeant," he said. "That is when you should be the hungriest to learn more and more about your job, to be able to help out your troops."

He would give that advice and more to all the Airmen new to the 3E4X1 career field.

"Be a sponge and learn your job to the best of your ability," said Javinar. "Most of all, bring a good attitude and take pride in what you do."

TSgt Steven Javinar, 3E4X1 7-level
(U.S. Air Force photo/Airman 1st Class Stephen G. Eigel)

2013 Air Force Civil Engineer awards

Outstanding Civil Engineer Unit
and the
Society of American Military Engineer Maj Gen Robert H. Curtin Award
Large Unit
87 CES, JB McGuire-Dix-Lakehurst, N.J.
35 CES, Misawa AB, Japan
Small Unit
355 CES, Davis-Monthan AFB, Ariz.
8 CES, Kunsan AB, Republic of Korea
Air Reserve Component
439 CES, Westover ARB, Mass.
158 CES, Burlington ANGB, Vt.

Brig Gen Michael A. McAuliffe Award
(Housing Excellence)
86 CES/CEH, Ramstein AB, Germany
502 CES/CEH, JB San Antonio, Texas

Maj Gen Robert C. Thompson Award
(Resources)
18 CEG, Kadena AB, Japan
99 CES, Nellis AFB, Nev.

Brig Gen Archie S. Mayes Award
(Engineering)
88 ABW/CE, Wright-Patterson AFB, Ohio
35 CES, Misawa AB, Japan

Maj Gen Clifton D. Wright Award
(Operations)
27 SOCES, Cannon AFB, N.M.
355 CES, Davis-Monthan AFB, Ariz.

Maj Gen Del R. Eulberg Award
(Asset Management)
27 SOCES, Cannon AFB, N.M.
718 CES, Kadena AB, Japan

SMSgt Gerald J. Stryzak Award
(Explosive Ordnance Disposal)
90 CES, F.E. Warren AFB, Wyo.
96 CES, Eglin AFB, Fla.

Col Frederick J. Riemer Award
(Readiness & Emergency Management)
52 CES, Spangdahlem AB, German
36 CES, Andersen AFB, Guam

Maj Gen Joseph A. Ahearn Enlisted Leadership Award
CMSgt Freddie Davis,
509 CES, Whiteman AFB, Mo.
CMSgt Patrick D. Jones,
51 CES, Osan AB, Republic of Korea

Maj Gen William D. Gilbert Award
(Outstanding Staff Action Officer)
Officer
Lt Col Shawn Larcher,
AFDW, JB Andrews, Md.
Lt Col Kevin Williams,
USTRANSCOM, Scott AFB, Ill.
Enlisted
SMSgt Edward Lockhart,
AFCEC Det. 1, Tyndall AFB, Fla.
SMSgt Lamar Heard,
PACAF/A7, JB Pearl Harbor-Hickam, Hawauu
Civilian
Rodney W. Wise,
HQ AFGSC/A7, Barksdale AFB, La.
Nathan Rowland,
HQ USAFE/A7, Ramstein AB, Germany

Harry P. Rietman Award
(Senior Civilian Manager)
Wayne Williams,
439 MSG/CE, Westover ARB, Mass.
Kyle Hicks,
35 CES, Misawa AB, Japan

Maj Gen L. Dean Fox Award
(Senior Military Manager)
Major Elizabeth Harwood,
786 CES, Ramstein AB, Germany
Lt Col Aaron Altwies,
628 CES, JB Charleston, S.C.

Maj Gen Eugene A. Lupia Award
(Military Manager)
Company Grade Officer
1Lt Matthew Fecke,
27 SOCES, Cannon AFB, N.M.
1Lt Ryan Hill,
60 CES, Travis AFB, Calif.

NCO
TSgt Andrew Krueger,
90 CES, F.E. Warren AFB, Wyo.
SSgt Nicole Nellist,
502 CES, JB San Antonio, Texas
Airman
SrA Stephen Beasley,
100 CES, RAF Mildenhall, United Kingdom
SrA Bruce Green,
773 CES, JB Elmendorf-Richardson, Alaska

The Chief Master Sergeant Larry R. Daniels Award
(Military Superintendent)
SMSgt Daniel Clark,
51 CES, Osan AB, Republic of Korea
SMSgt Brian Ginter,
50 CES, Shriever AFB, Colo.

Outstanding Civil Engineer Manager
Civilian Manager
Jamie Visinoni,
9 CES, Beale AFB, Calif.
Andrea Goodson,
509 CES, Whiteman AFB, Mo.
Civilian Supervisor
Sean Grady,
673 CES, JB Elmendorf-Richardson, Alaska
Elsa Feliciano,
45 CES, Patrick AFB, Fla.
Civilian Technician
Greg Nelson,
9 CES, Beale AFB, Calif.
Keith Pellerin,
673 CES, JB Elmendorf-Richardson, Alaska

Society of American Military Engineers Newman Medal
Col David DeMartino,
HQ AFCEC, JB San Antonio- Lackland, Texas
Col John Baker,
HQ ACC, JB Langley-Eustis, Va.

Society of American Military Engineers Goddard Medal
MSgt Tommy Childers, Jr., 56 CES, Luke AFB, Ariz.
SMSgt David DeLoney III, 820 RHS, Nellis AFB, Nev.

National Society of Professional Engineers Federal Engineer of the Year
Military
Capt Timothy Callahan,
Air Force Institute of Technology,
Wright-Patterson AFB, Ohio

Civilian
Dr. Donald Malloy,
Arnold Engineering Development Complex,
Arnold AFB, Tenn.

Maj Gen Augustus M. Minton Award
(Outstanding Air Force Civil Engineer Article)
James Martin,
HQ AFMC/A7, Wright-Patterson AFB, Ohio
Capt Kate Miles and Capt Jeff Klein,
633 ABW, JB Langley-Eustis, Va.

The Balchen/Post Award
(Snow and Ice Removal)
773 CES, JB Elemendorf-Richardson, Alaska
92 CES, Fairchild AFB, Wash.

Gen Thomas D. White Environmental Awards

Environmental Quality Award
Installation Excellence
96 CEG, Eglin AFB, Fla.
Individual/Team Excellence
718 CES, Kadena, Japan

Cultural Resources Management Award
Installation Excellence
2 CES, Barksdale AFB, La.

Natural Resources Conservation Program Award
Installation Excellence
177 FW, Warren Grove Range, N.J.
Individual/Team Excellence
96 CEG, Eglin AFB, Fla.

Environmental Restoration Program Award
Installation Excellence
9 CES, Beale AFB, Calif.
Individual/Team Excellence
92 CES, Fairchild AFB, Wash.

Environmental Excellence in Weapon System Acquisition
Individual/Team Excellence
F-35 ESOH Team,
AFLCMC/WNVV, Wright-Patterson AFB, Ohio

*Winners are listed in bold, runners-up in plain text

Pacific Angel 13:
Humanitarian Mission Success

SMSgt Timothy Wieser
773 CES/CEOE

Growing up, hearing stories from American Vietnam veterans and watching movies about the conflict in Vietnam, I never thought in a million years I would ever have a chance to visit Vietnam. However, after 14 years in the military and numerous assignments, I was given the opportunity to go to Dong Hoi, Vietnam, for Pacific Angel 2013. Dong Hoi is on the South China Sea, approximately 1,300 kilometers north of the city of Saigon (Ho Chi Min City) in the northern territory of Vietnam.

A civil engineering team consisting of 18 U.S. Air Force, Army and Marine military engineers and 10 Vietnamese Army Engineers worked together in a two-week humanitarian mission to upgrade a medical clinic and two schools. The welcome we received from the Vietnamese people was wonderful.

After completion of the medical clinic, the people of this small village now have an upgraded water well, running water, bathroom, waste disposal tank, air conditioning, ceiling fans, and new roof. Most importantly, they now have a medical waste incinerator to minimize the chances of disease and contamination. The clinic can now perform full medical operations.

The eight-building grade school provides education to children from four to eight years of age from numerous villages. Our team revamped a well system to provide more gallons per minute of potable water. We also rebuilt two bathrooms, providing running water to both urinals and latrines. This is the first time the school has had running water in the bathrooms. Finally, the team fixed 15 electrical hazards and installed two ceiling fans — important for comfort during the hot summer, spring and fall seasons.

The middle school has 10 buildings and is attended by students aged between 10 to 14 years. Our team installed 200 feet of potable water pipe to supply water to the school's only chemistry lab. There was no access to heavy equipment, so even with temperatures of 95 degrees and humidity close to 100 percent, the joint team dug the trench with shovels and pickaxes. The team also installed a 350-liter potable water tank on the second floor of one of the main buildings. This not only created enough pressure to adequately supply the classrooms, but it also gave the school a fire suppression backup. Finally, our team installed a new water well pump and piping system that doubled the supply capacity of the previous one.

The members of our joint team did an unbelievable job; with just 10 days to perform the mission, they made an important and memorable difference. The joy and gratitude by the school leaders was evident after each school was finished. I just hope I get the chance to be part of another Pacific Angel — the memories and the sense of accomplishment will never be forgotten.

Senior Master Sgt. Wieser is the Operations Engineering Superintendent, 773 CES, JB Elmendorf-Richardson, Alaska.

Before and after photos of the medical clinic at Dong Hoi, Vietnam, following renovation by an 18-person U.S. military engineering team that included Air Force CEs. (courtesy photos)

IRT deployment benefits, Airmen, Marines, Soldiers, Scouts

TSgt Dan Heaton
127 AW/PA

Generations to come will benefit from a recent innovative training project led by the Air National Guard at Camp Hinds Boy Scout Camp in Raymond, Maine.

ANG Airmen joined by Marine Corps and Army reservists have begun a series of major upgrades to the camp through a program known as Innovative Readiness Training. An IRT project allows military construction units to partner with nonprofit organizations for training purposes. Under the program, the nonprofit organization, in this case the Boy Scouts, provides the materials needed for the various construction projects and the military provides the manpower.

"These projects will benefit not only today's Boy Scouts, but will last for generations," said Eric Tarbox, Scout Executive with the Pine Tree Council of Boys Scouts of America, which oversees the camp and Scouting programs in southern Maine.

The IRT program at Camp Hinds is scheduled to take place over five consecutive summers, as military funding allows, beginning in 2014. In this first year, approximately 450 Airmen, Marines and Soldiers from about a dozen different states will be working on the project. Some of their tasks will be cutting a new road, constructing a new parking lot and cabins for staffers and preparing the site for the camp's new dining facility.

During the second of the six two-week work rotations at the camp, the 127th Civil Engineer Squadron, Michigan Air National Guard, from Selfridge Air National Guard Base contributed about three dozen Airmen to the project. They were joined by about two dozen Marines Reservists from multiple units around the country and a half-dozen Rhode Island ANG Airmen who will be on site the entire summer as part of the "duration team."

Marine Corps Capt. Cory Bruce, a member of the 6th Engineer Support Battalion and the assistant officer in charge of the Camp Hinds project, said one of the benefits to the Marine detachment is that the current rotation features a number of very junior Marines and a larger percentage of more experienced Airmen.

"We are working to integrate the two teams, so those with the greater experience are able to work with the more junior personnel, maximizing the training in a joint environment," he said.

The work on the Scout camp is also of great benefit to the Civil Engineer Airmen, said Chief Master Sgt. Jeff Talaga, superintendent of the group from Selfridge.

"Often on our drill weekends, it is hard for our guys to get much time on the equipment, given the many requirements on their time," he said. "On a deployment for training like this one, the Airmen are out, working in their Air Force Specialty Code, seeing progress on their assigned tasks. This is why our Airmen joined CE in the first place.

For Senior Airmen Bradley Ziegler, 127th CES, the two weeks at the Boy Scout camp has been a positive experience.

"We've been able to hone our skills and work with projects we don't normally work on at home station," Ziegler said. "As far as the Boy Scouts, we are able to come out here, support their needs and get their facility up to par where the Scouts can utilize and enjoy their facilities."

Senior Airman Jason Armstrong pounds in a stake while constructing an erosion control fence at Camp Hinds Boy Scout Camp, Raymond, Maine, May 21, 2014. (U.S. Air National Guard photo/Tech. Sgt. Dan Heaton)

EOD Technician Awarded Silver Star

Master Sgt. Michael F. Sears, 177th Fighter Wing, was presented the Silver Star, the third highest military award, June 28, during a ceremony at the 177th at Egg Harbor Township, N.J., for actions while deployed to Afghanistan on Sept. 29, 2013. Sears joins a group of 58 Airmen who have been awarded the Silver Star since Sept. 11, 2001. (U.S. Air National Guard photo/Master Sgt. Mark C. Olsen)

Teresa Hood
AFCEC PA

An Air National Guard Explosive Ordnance Disposal technician with the 177 Civil Engineer Squadron, Atlantic City IAP, N.J. was awarded the Silver Star on June 28 for valor in combat while deployed to Afghanistan in 2012.

Master Sgt. Michael F. Sears was the leader of a three - person EOD team credited with saving the life of a fellow International Security Assistance Force soldier in the midst of an ambush by enemy forces on Sept. 29, 2012, in Ghazni province, Afghanistan.

While on a mounted eight-vehicle combat patrol supporting a Polish battle group, Sears successfully defeated a victim-operated IED with an 80-pound main charge buried on the route. He then located and defeated a second device placed several yards away.

Once he deemed the scene safe, MSgt Sears, his EOD team — Tech. Sgt. Jay Hurley and Staff Sgt. Josh Jerden — and the Polish soldiers began the return trip to their forward operating base. During the trip home, after all but the last three vehicles had passed a choke point, the convoy came under heavy enemy machine gun and accurate sniper fire. With rounds impacting three feet from the EOD vehicle, Sears dismounted, and as the turret gunner returned fire, he moved to a point to directly engage the enemy. When an RPG struck one of the Polish MRAPs, Sears sprinted across 50 feet of open terrain through a wall of enemy gunfire to catch the badly wounded soldier attempting to escape the vehicle. Despite suffering injury to his arm during the rescue, Sears was able to assess the solder's injuries, and slow the life-threatening blood loss.

Sears then crossed a 100-foot-wide open area under intense small arms fire to bring the medic to the wounded soldier, and then provided cover fire for both. He then helped move the wounded soldier onto a litter and relocate him to cover behind a building 150 feet away, while still under enemy fire. To alert and escort the medical vehicle to the soldier, he then sprinted 150 feet across an open field while still heavily engaged with the enemy from two different directions.

Rather than remain under cover, Sears maneuvered back to his EOD vehicle and continued in the fight until attack helicopters arrived and dispersed the enemy. Throughout the two-hour firefight, Sears expended over 190 rounds from his M4 in direct engagement with the enemy.

Sears' award citation states that "His incredible battle space awareness, combat leadership, intense courage, and selfless dedication to the mission enabled the successful return of the eight vehicle convoy and 33 passengers."

Sears praised both of his teammates, Sergeants Hurley and Jerden, with courage under fire.

"Hurley, on that day, without hesitation, used his vehicle to cover me," said Sears. "Josh Jerden dismounted his vehicle on the side of enemy fire and engaged the enemy on foot. Their actions showed what kind of team I had."

CEs Help "Sister State" in Croatia

Airmen from and Minnesota Air National Guard's 133rd and 148th Civil Engineering Squadrons and the Guard's 219th RED HORSE Squadron, Malmstrom AFB, Mont., partnered with the Croatian army June 27, to renovate bathrooms at an elementary school in Ogulin, Croatia.

The elementary school renovation was part of a Humanitarian Civic Assistance program supported by U.S. Army, United States European Command and 409th Contracting Support Brigade.

Croatia is Minnesota's "sister state," which is part of the National Guard's State Partnership Program. The program has built global relationships for more than 20 years based on international civil-military affairs projects such as the bathroom renovation. The combined efforts cultivate diverse working conditions and enhance global operations.

Airmen from Montana Air National Guard's 219th RED HORSE Squadron also assisted in the construction efforts.

While the Airmen provided their unique set of skills, the Croatian army provided lodging, food, transportation, translators, and augmented labor and some larger pieces of equipment, such as jackhammers and cement mixers.

The partnership and project served to build a long lasting relationship for years to come.

(Minnesota Air National Guard news service)

Master Sgt. Steven Virnig, 133 CES, removes tile from an elementary school bathroom in Ogulin, Croatia, being renovated by Airmen from the 133rd and 148th Civil Engineering Squadrons; and 219 Red Horse Squadron. (U.S. Air National Guard photo/Staff Sgt. Austen Adriaens)

Key Personnel Update:

Maj. Gen. Leonard A. Patrick is the Vice Commander, Headquarters Air Education and Training Command, Joint Base San Antonio-Randolph, Texas. He was formerly the Commander, Second Air Force, Air Education and Training Command, Keesler AFB, Miss.

Maj. Gen. Theresa C. Carter is the Special Assistant to the Commander, Air Force Materiel Command, Joint Base Andrews, Md. She was the Air Force Civil Engineer, Deputy Chief of Staff, Logistics, Installations and Mission Support, Headquarters United States Air Force, Washington, D.C.

Mr. Mark A. Correll is the Deputy Assistant Secretary, Environment, Safety and Infrastructure, Office of the Assistant Secretary of the Air Force, Installations, Environment and Energy, Washington, D.C. He was previously the Deputy Director of Civil Engineers, Deputy Chief of Staff, Logistics, Installations and Mission Support, Headquarters United States Air Force, Washington, D.C.

Brig. Gen. Timothy S. Green is the Director of Civil Engineers, Deputy Chief of Staff, Logistics, Installations and Mission Support, Headquarters United States Air Force, Pentagon, Washington, D.C. He was previously the Director, Installations and Mission Support, Headquarters Air Combat Command, Joint Base Langley-Eustis, Va.

Mr. Robert Moriarty was selected as a member of the Senior Executive Service as the Director, Installations Directorate, Air Force Civil Engineer Center, Joint Base San Antonio-Lackland, Texas.

Col. Roy-Alan Agustin has been selected for promotion to the rank of brigadier general and is the Director, Installations and Mission Support, Headquarters Air Combat Command, Joint Base Langley-Eustis, Va. He was formerly Deputy, Installations and Mission Support and the Command Civil Engineer, Headquarters Air Force Reserve Command, Robins AFB, Ga.

Col. Darren Gibbs, the former Chief, Readiness and Emergency Management Division, Office of the Director of Civil Engineering, Headquarters United States Air Force, Washington, D.C., has retired.

Col. David Martinson, the former Deputy Director of Logistics, Installations and Mission Support and the Command Civil Engineer, Headquarters Air Education and Training Command, Joint Base San Antonio-Randolph, Texas, has retired.

Col. Dwayne Thomas, the former Chief, Environment and Energy Division, Office of the Directory of Civil Engineering, Headquarters United States Air Force, Washington, D.C., has retired.

"Auf Wiedersehen"

The 786th Civil Engineer Squadron, Ramstein AB Germany, said goodbye to one of their most dedicated local national employees, Herr Franz Pfaffenrath, when he retired on Jan. 18, 2014. With 47 years of service to the Air Force mission, Pfaffenrath is a living piece of U.S., NATO, and European history, not to mention an expert on the 1,324 facilities and 4,615 acres comprising the Kaiserslautern Military Community.

Pfaffenrath began working at Kleber Kaserne as an electronics mechanic for Army/Air Force Exchange Services on Jan. 23 1967. In 1976, he earned a Master's in electromechanical engineering and became the first German supervisor of the Einsiedlerhof Appliance Shop, which maintained more than 32,000 electric appliances. In 1989, he became the Facility Manager for Sembach Air Base and in 1995, a member of Team Ramstein, under what was then the 86 CES. During his time Ramstein, Pfaffenrath saw the squadron change from the 86th to the 786th, then 735th, back to 86th, and finally the 786 CES, and the base transform from a Cold War fighter base to what is now one of DOD's largest air transportation, logistics, and command and control hubs.

Through the years, Franz has worked with thousands of Air Force military, civilians and local national employees, and more than 30 CE squadron commanders and chiefs, including the former Air Force Civil Engineer, retired Maj. Gen. L. Dean Fox, Sembach's 66 CES commander from 1986-1989.

Despite participating in projects as large as the construction of the $151M Kaiserslautern Military Community Center, Pfaffenrath said his greatest career accomplishment was the oversight of the construction and installation of Ramstein's centralized distribution heating system in 1996. His biggest advice to his successors: "Don't over-react, and don't forget that you were young once!"

Contributed by 1st Lt. Timothy S. (Scott) Lorson, 786 CES/CEOOLA

Maj. Mark Fogle and Chief Master Sgt. Neil Jones salute the EOD Memorial Wall after the names of fallen Air Force explosive ordnance disposal technicians were read during the 45th Annual EOD Memorial Ceremony May 3, at Eglin Air Force Base, Fla. Eight new names of Army and Marine EOD technicians, who lost their lives, were added to the wall this year. The all-service total now stands at 306. (U.S. Air Force photo/Tech. Sgt. Sam King)

Building Ready CEs

A member of the 5th Civil Engineer Squadron runs to take advantage of the cover provided by a smoke grenade during a pre-deployment training exercise at Minot Air Force Base, N.D., May 21, 2014. (U.S. Air Force photo/Airman 1st Class Lauren Pitts)

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