

TME

The Military Engineer

Leading the Naval Construction Force

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Building the World's "Greenest" Hospital

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REMARKS

from the President

Measuring Our Success

How do we measure our success? How do we know we are making progress toward our strategic goals and objectives? Will we be where we want to be in 2020?

Some say that success is not the right aim. Instead, *value* is the aim. Perhaps the questions we should be asking are “what difference are we making and what *value* are we adding?” There are many perspectives to consider in answering those questions, especially given the very diverse nature of SAME’s membership; but the one constant is our mission to contribute to America’s national security.

The expectations of the service engineering chiefs, senior government officials, and our industry partners are very clear. They expect SAME to provide top quality professional development opportunities, not just PDHs. They also expect SAME to continue providing an ethical forum for building trust and understanding between government and industry. Government officials need to understand the full range of capabilities and capacity available to meet their requirements. Industry needs to fully understand the government’s requirements. Both sides crave a deeper understanding of trends that will shape the delivery of reliable infrastructure to support national security objectives.



RECOGNIZING EXCELLENCE

The SAME Awards & Medals Program recognizes individuals and organizations for excellence in support of the A/E/C profession, military engineering, national security objectives, and the *SAME Strategic Plan*.

The deadline for most awards and medals nominations is Feb. 1, 2017. Check out page 88 of this issue for the full list of awards and medals that will be presented at the 2017 JETC in Columbus, Ohio, and other upcoming events. For deadlines, and to submit candidates for consideration, visit www.same.org/awards.

SUPPORTING INDUSTRY-GOVERNMENT ENGAGEMENT

We developed an Industry-Government Engagement Plan as part of our *2020 SAME Strategic Plan* to meet the expectations of our members, our stakeholders and our partners. The intent is to improve the *value* we provide by doing more than sharing contract opportunities. We need to bring together people from all corners of the architecture/engineering/construction industry to share lessons

learned, resolve issues, conduct market research, investigate new approaches, track and anticipate trends, and challenge the application of new or emerging technologies. This highly ethical, collaborative forum is the very heart of SAME’s longstanding record of service and a fundamental part of preparing for future operations.

We have the opportunity at both the national, regional and local levels to include others in our efforts to serve. Why not invite members of other societies to join us in mentoring at our camps or participating in the many STEM activities our Posts host? We are interested in producing real results and making a real difference. Our vision “to be the integrator” drives us to think differently about our role; we are striving to become recognized as the “go to” outfit that brings the right folks together to solve challenges. We are already known as “doers”!

Posts are paramount in recruiting military and government members. We will make SAME the “society of choice” for not just military engineers, but all public service engineers. Our professional development plan, underwritten by the new SAME Foundation, is one key part of the value proposition we will emphasize and grow to provide the value that will attract future committed members. We are uniquely positioned to take advantage of our storied history and achieve all of our goals and objectives as we push towards SAME’s Centennial in 2020.

Thank you for your service, teamwork and commitment in strengthening SAME and our nation. See you in Atlanta (Nov. 16-18) for a great SAME Small Business Conference!

Capt. Michael L. Blount, P.E., LEED AP, F.SAME, USN (Ret.)
SAME President 2016-2017



OUR HISTORY

is rooted in our foundation.



OUR FOUNDATION



will help lead us

into the future.



In December 2014, the SAME Board of Direction approved a motion to establish a Foundation that would build upon the success of the Education & Mentoring Fund and enable a broad range of individuals and organizations who desire to leave a legacy in support of military engineering and our nation's future.

The SAME Foundation is now a reality.

The SAME Foundation will serve to give back by paying it forward—to afford opportunities for Society members and for America's youth; to enable professional development and to support personal growth; to provide a means to recognize the passing of members through acts of memorial while helping Posts and partner organizations to inspire, develop and mentor the next generation of STEM professionals and leaders.

America's future is bright. Let's help make it brighter.

Contributions for the SAME Foundation are currently being accepted through the Education & Mentoring Fund.
Visit www.same.org/donate for more information.



USACE LOS ANGELES DISTRICT PHOTO

50 MAIN THEME: DESIGN & CONSTRUCTION

This issue of *The Military Engineer* features a range of projects that exemplify how designers, engineers and constructors are building and sustaining facilities and infrastructure that enable the government and military to achieve their missions.

ON THE COVER:

A whirlybird operator finishes a newly placed concrete slab-on-grade at sunrise during construction of the Weed Army Community Hospital at Fort Irwin, Calif. The LEED Platinum facility is set to open in the summer of 2017. PHOTO BY MAJ. JEFFREY BEEMAN, USA



Story on page 50.

LEADING THE NAVAL CONSTRUCTION FORCE

An interview with Rear Adm. Bret Muilenburg, P.E., CEC, USN, Commander, Naval Facilities Engineering Command, and Chief of Civil Engineers.



Profile on page 47.

THE ENGINEER WHO CAPTURED RICHMOND

It was a civil engineer born in Germany and raised in Cincinnati who captured the Confederate capital and effectively ended the Civil War.



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Unprecedented achievements in sustainable design for medical facilities.
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Performing family housing renovations during an Alaskan winter.
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Creating secure and functional settings that support personal wellness.
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Building a first-of-its kind facility to attract and retain the best and the brightest.
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Preserving the historical characteristics of a post-World War II aircraft hangar.
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Realizing the benefits of coordinating design and construction.



PROFESSIONAL INSIGHTS: TRAINING & DEVELOPMENT

Bridging the Cultural Divide: Understanding in the Joint Environment
An Air Force engineer reflects on his time at the Army Command & General Staff College.
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TME

The Military Engineer

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Featured In Society News

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SAME Launches New Podcast

The new *Real TIME* podcast will feature an inside look at the work of SAME's 30,000 members and 105 Posts and their contributions to the *2020 SAME Strategic Plan*.



SAME President Visits Pensacola Post

SAME National President Capt. Mike Blount, F.SAME, USN (Ret.), discussed the *2020 SAME Strategic Plan*, military membership, and the value of professional societies.



Inside the JETC Table Top Exercise

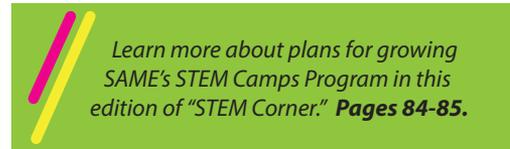
SAME's national Joint Engineer Contingency Operations Committee held the first-ever Table Top Exercise at this year's Joint Engineer Training Conference.

EXCLUSIVELY AT TME ONLINE

November 21, explore the history of airfield matting design and see what the future holds for the technology—*by Capt. Daniel E. Harder, M.SAME, USA*

December 5, discover more about drained/back ventilated rainscreen systems—*by Christopher Kroeter, CSI, CDT, LEED Green Associate, and Daniel Arnold*

www.same.org/TME



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TME
The Military Engineer

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Electronics Technician 1st Class Chidubem Duke conducts maintenance on one of the thousands of circuit boards used at Naval Air Station Fort Worth Joint Reserve Base, Texas. Navy electronics technicians are specially trained in the electrical engineering, computer and aerospace fields.

U.S. NAVY PHOTO BY MASS COMMUNICATION SPECIALIST JASON HOWARD





Senior Airman Kyle Koski, 52nd Civil Engineer Squadron explosive ordnance disposal journeyman, Spangdahlem AB, Germany, detonates removed improvised explosive devices during Exercise Northern Challenge 16 at Icelandic Coast Guard Keflavik Facility, Iceland, Sept. 19, 2016.

U.S. AIR FORCE PHOTO BY STAFF SGT. JONATHAN SNYDER





Soldiers from the 54th Brigade Engineer Battalion and 4th Battalion, 319th Airborne Field Artillery Regiment, 173rd Airborne Brigade, conduct an airborne operation after training by instructors with the 35th Parachute Artillery Regiment, as part of Exercise Colibri in Tarbes, France, Sept. 20, 2016. Exercise Colibri demonstrates and expands upon an allied partnership between the nations and provides paratroopers an opportunity to connect—both personally and tactically, to build stronger, more capable forces.

U.S. ARMY PHOTO BY STAFF SGT. PHILIP STEINER



ASIA-PACIFIC REBALANCE

The rebalance to the Asia-Pacific is a critical national commitment that focuses on regional prosperity and sharpening the U.S. military edge, Secretary of Defense Ash Carter said this fall in San Diego while visiting the aircraft carrier USS *Carl Vinson*. Asia-Pacific remains the "single most consequential region for America's future," Carter said.

The rebalance to the Asia-Pacific, announced five years ago, includes diplomatic, economic and military components. All, Carter said, are to ensure the Asia-Pacific region "remains a place where every nation can rise and prosper," even at a time of dramatic political, economic and security change in the region.

Secretary Carter highlighted ongoing security challenges in the region, including North Korea's "nuclear saber-rattling." Other challenges, he said, include maritime concerns that could hurt the region's prosperous future, as well as terrorism and transnational threats.

The rebalance to the Asia-Pacific has three parts, Carter explained. The first phase began five years ago, when DOD enhanced its military force posture in the region. The second phase launched last year, when the United States made qualitative improvements to its force posture. The third phase will cement the progress made in the first and second phases, the secretary said.

Carter highlighted the strong ties the U.S. military has with its many allies in the region. America's regional partnerships are growing in number and strength, he said. *(Contributed by Lisa Ferdinando, Defense Media Activity)*

BATTLEFIELD OF THE FUTURE

Fighting and winning on a multidomain battlefield must be the focus for the U.S. military moving forward, Deputy Defense Secretary Bob Work said in October at the Association of the U.S. Army's annual meeting in Washington, D.C.

Since the end of the Cold War, the U.S. military has enjoyed unparalleled conventional force dominance, Work said. This was demonstrated by operations in Desert Storm, as well as in Afghanistan and Iraq. "During this period, we had generally unimpeded freedom of action and access



Secretary of Defense Ash Carter discusses the rebalance to the Asia-Pacific region while aboard the USS *Carl Vinson* in September. U.S. NAVY PHOTO BY MASS COMMUNICATION SPECIALIST SEAMAN DANIEL P. JACKSON-NORGART

on land, in the air and on the sea," he said.

But that era is ending, the deputy secretary told the audience. Near-peer competitors such as Russia and China, and smaller foes like Iran and North Korea, are modernizing their forces. They are developing the precision-guided strike power needed to fight a major conventional war, he said, and they are developing capabilities that could erode U.S. military superiority.

Technology plays a part, Work said, "but wars are fought by humans, and not technologies." This means that while new technology is necessary, how it is used tactically and operationally is far more important than the mere possession of it, he explained.

Work said the U.S. military is now facing an inflection point. Today, most U.S. combat power is located in the United States, he said, noting that potential adversaries are establishing rough parity in terms of precision-strike and command-and-control systems. Also, today's U.S. military is facing constrained resources, Work said. Added to this are potential enemy advances in the electromagnetic world and in cyberspace.

To survive and maintain superiority, the U.S. military must examine all domains and find ways to fight across all of them, using facilities and capabilities to tie them all together, Work said.

"We are going to have to maneuver across all operational domains," he said. This, he added, will allow the joint force the freedom of maneuver that is needed to achieve effects on the battlefield.

(Contributed by Jim Garamone, Defense Media Activity)

COMMITTED TO REGIONAL SECURITY

The United States and its Asian-Pacific allies reaffirmed their commitment to strengthen defense cooperation including in maritime security and counterterrorism, Defense Secretary Ash Carter said in early October in Hawaii.

Defense ministers of the Association of Southeast Asian Nations (ASEAN) met in Kapolei, Hawaii, where they deepened their countries' partnership and renewed pledges to address shared security challenges, Carter told reporters following the talks.

"We all recommitted our militaries to keeping the region's waterways open and secure and to help all our nations see more, share more and do more in Southeast Asia's vital waterways," Carter said.

Carter said the Asian-Pacific nations' cooperation with the United States as well as among themselves will further enhance regional security. "We discussed the path forward for the Asia-Pacific's principled and inclusive security network, which will



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help us all to connect, to cooperate and to contribute to regional security,” he said.

The ministers spent considerable time discussing the threats posed by terrorists affiliated with the Islamic State of Iraq and the Levant, as well as from returning foreign fighters and other extremists in the region.

Carter applauded ASEAN for its commitment to peace and stability, saying it has helped provide the security and uphold the principles that have benefited nations and the entire region. “ASEAN will be just as central to the Asia-Pacific’s principled future as it has been for the last half century,” Carter said. “The United States looks forward to partnering with ASEAN and its member countries for decades to come.”

Carter further said he shared with his counterparts the U.S. plans and commitments of the third phase of the rebalance to the Asia-Pacific, which is meant to cement the progress of the previous phases that enhanced the U.S. military force posture. *(Contributed by Lisa Ferdinando, Defense Media Activity)*

SUPPORTING ENERGY RESILIENCE

Secretary of Energy Ernest Moniz, speaking before the Senate Committee on Energy and Natural Resources in August, called for increased investments in U.S. energy emergency response. He highlighted the Department of Energy’s (DOE) expanded emergency response responsibilities, and the need for comprehensive and coordinated response capabilities in the face of increasingly integrated energy systems and an evolving threat environment.

Secretary Moniz detailed DOE’s increased role in emergency response coordination as it relates to recovery from natural and manmade events such as severe weather, natural disasters, electromagnetic pulses, the impacts of climate change, aging infrastructure and cyber threats.

As part of its efforts to better harden energy systems against attacks, DOE announced up to \$34 million in funding, subject to appropriations, for 12 projects representing energy sector organizations in nine states through the Office of

Electricity Delivery & Energy Reliability’s Cybersecurity of Energy Delivery Systems Program. The projects, which include two awards in Washington State, will include cybersecurity education for energy sector professionals and research and development of tools to strengthen the nation’s energy infrastructure from cyberattacks.

In addition to looking at lessons learned from previous disasters, Secretary Moniz highlighted the importance of emergency preparedness exercises to coordinate responses to future disasters, such as Clear Path IV, held in April 2016 in Portland, Ore., and Washington, D.C.

The Clear Path exercise scenario focused on identifying how DOE and public-private energy stakeholders would coordinate in response to a magnitude 9.0 earthquake and subsequent tsunami stemming from the 700-mi long Cascadia Subduction Zone that stretches along the Washington and Oregon coasts.

As a result of the exercise, DOE is working with the Department of Homeland



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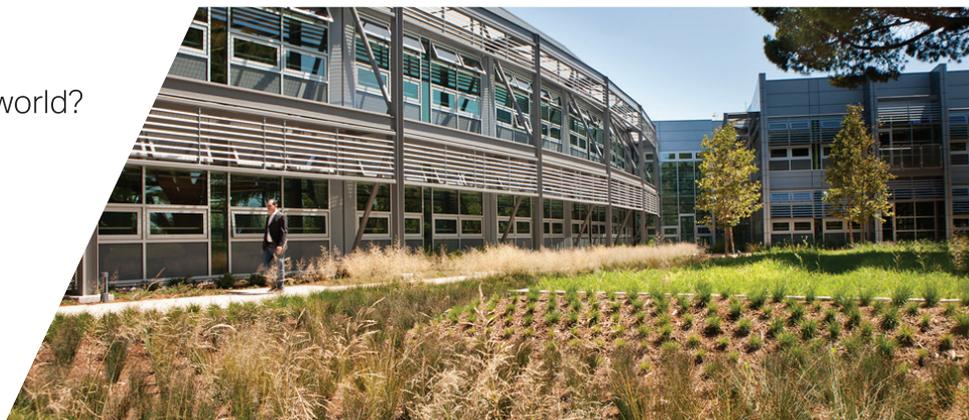
San Antonio Military Medical Center, San Antonio, TX, AECOM role: Construction Manager (image © John W. Davis)

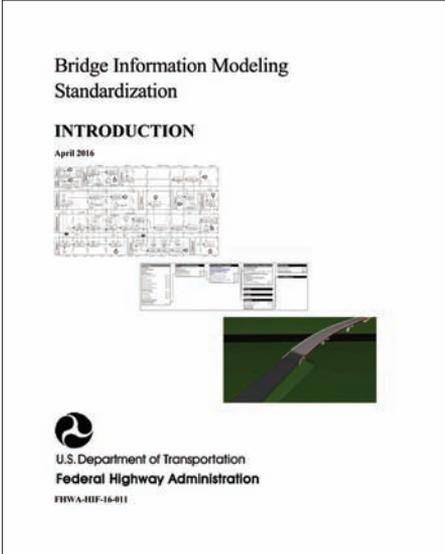
FBI Regional Administration Building, Phoenix, AZ, AECOM role: Master Planning/Architecture/Interiors (image © AECOM)

Shepherd Hall, U.S. ANG Readiness Center, Joint Base Andrews, MD, AECOM role: Master Planning/Architecture/Engineering (image © Maxwell MacKenzie)

NASA Ames Research Center Building N232, Moffett Field, CA, AECOM role: Architect of Record/Master Planning/Engineering (image © AECOM)

NASA Langley Integrated Engineering Services Building, Hampton, VA, AECOM role: Design Architect/Engineering (image © Judy Davis/Hoachlander Davis)





FHWA IMAGE

INFORMATION MODELING OF BRIDGES

Following a two-year effort, the Federal Highway Administration (FHWA) has issued a report, “Bridge Information Modeling Standardization,” that sets a path to implement the use of computer modeling for bridge construction in the United States.

Over the past several decades, many industries have improved efficiencies by moving from document-based information exchanges to integrated data models. The construction industry, including buildings and heavy/highway, has lagged behind manufacturing industries for a number of reasons. FHWA’s goal was to build on the progress that the buildings sector has made in building information modeling standardization to advance the standardization of digital information for bridges—otherwise known as bridge information modeling (BrIM)—in the United States.

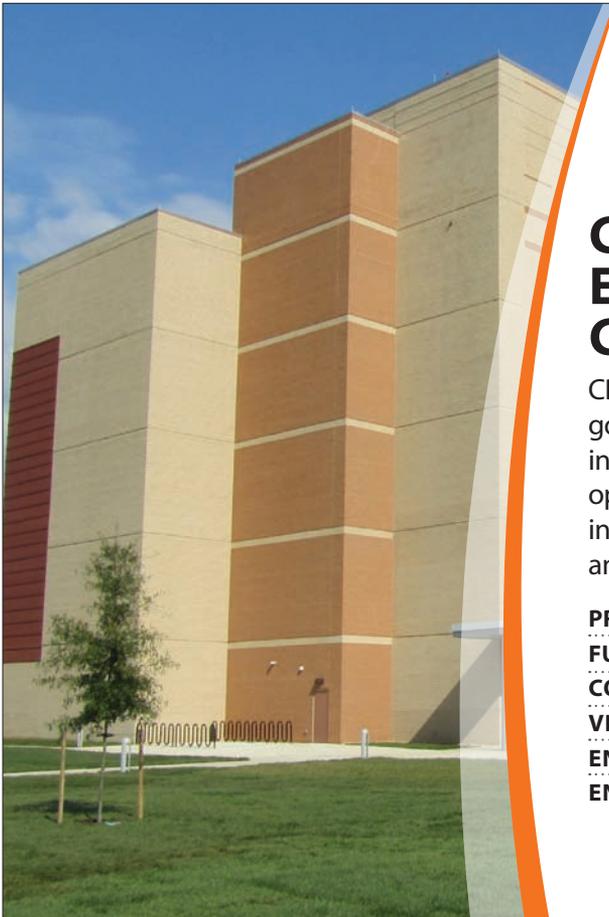
By developing the basis for industry consensus standards for BrIM and related data exchange protocols, FHWA provides a common approach to coordinate the various

phases of bridge design and construction projects, as well as the associated ongoing maintenance operations.

The National Institute of Building Sciences, the project lead, formed a team of experts in open standards-based BIM using the buildingSMART International Industry Foundation Class model, and in bridge design and construction. The team began by researching existing modeling standards and efforts; evaluating planning, design, construction and operations processes; and analyzing the state of practice, to identify a path to BrIM implementation.

The Bridge Information Modeling Standardization report, which is available in four sections, includes example component models of steel girder and reinforced concrete box beam bridges (two typical highway bridge styles) in order to exercise available approaches and determine capabilities and shortcomings. The report is for use by practitioners in transportation agencies, design firms and software companies. *(Contributed by NIBS)*

Security and the Pacific Northwest National Laboratory to provide damage assessments through advanced algorithms that analyze aerial imagery, and further highlight the role of science and technology solutions. *(Contributed by DOE)*



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SAME MEMBER NEWS

Col. Pete Andrysiak, P.E., USA, was named Commander, USACE Pacific Ocean Division.



ANDRYSIAK

Jose “Tony” Buitrago, P.E., PMP, has joined Dewberry as Senior Associate and Senior Project Manager and will be based out of Jacksonville, Fla.



BUITRAGO

Richard Driggs has been appointed President of the Program Management Sector at WSP | Parsons Brinckerhoff.



DRIGGS

Karen Durham-Aguilera, P.E., SES, has been named the American Society of Civil Engineers Government Civil Engineer of the Year.



DURHAM-AGUILERA

Col. Pete Helmlinger, P.E., USA, was named Commander, USACE South Pacific Division.



HELMLINGER

Gregory Kelly, WSP | Parsons Brinckerhoff, was named the 2016 Gallery of Success awardee by Temple University’s College of Engineering.



KELLY

Michael McClafferty, LEED AP, CxA, Senior Project Manager, TLC Engineering for Architecture, has been named an Associate.



MICHAELS

Robert Michaels has joined Bryan International as President.

Todd Musterait has been appointed Vice President and Director of Client Development for WSP | Parsons Brinckerhoff’s Environment Sector in the United States.



OWEN

Col. Paul Owen, P.E., has been named Chief of Staff, HQ USACE.

Brig. Gen R. Mark Toy, P.E., USA, was named Commander, USACE Great Lakes & Ohio River Division.



TOY

Lindy Wolner joined Stanley Consultants as a Client Service Manager in the firm’s U.S. Federal and International Programs Market.

Thomas Womeldurf, AIA, AICP, CEM, joined the Institute for Building Technology and Safety as Managing Director of the Federal and State Programs Division, and will be based out of Ashburn, Va.



WOMELDURF

The following SAME members have been named USACE District Commanders:

Lt. Col. James Booth, USA, USACE Albuquerque District

Col. Samuel Calkins, USA, USACE St. Paul District

Col. Michael Clancy, USA, USACE New Orleans District

Col. Jon Chytka, USA, USACE Afghanistan District

Lt. Col. Adam Czekanski, USA, USACE Buffalo District

Col. James DeLapp, USA, USACE Mobile District

Col. Michael Derosier, USA, USACE Vicksburg District

Col. Robert Dixon, USA, USACE Little Rock District

Col. Michael Ellicott, USA, USACE Memphis District

Col. John Hurley, USA, Engineering & Support Center, Huntsville

Col. Christopher Hussin, USA, USACE Tulsa District

Lt. Col. James Hoyman, USA, USACE Honolulu District

Col. John Lloyd, USA, USACE Pittsburgh District

Col. David Ray, USA, USACE Sacramento District

Lt. Col. Dennis Sugrue, USA, USACE Detroit District

Col. Lars Zetterstrom, USA, USACE Galveston District

YOUNG MEMBER SPOTLIGHT

Danielle Barner recently accepted a new position with Atkins as the National Pursuits/Capture Manager based in Dallas.



BARNER

Capt. Kyle Brinks, PMP, LSSGB, USA, has joined Dewberry as part of the Army’s Engineer Regiment Training with Industry program.



BRINKS

Builder Second Class James M. “Matt” Collins III, LEED AP, USNR, a Junior Planner at Cardno, recently



COLLINS

completed a one-year recall to active duty to mobilize in support of Operation Enduring Freedom and while on deployment earned his Seabee Combat Warfare designation.

Lt. Col. Dave Dammeier, USAF, was recently promoted to lieutenant colonel and is currently deployed as Deputy Commander of the 1st Expeditionary Civil Engineer Group.



DAMMEIER

Do you know of an SAME Young Member who should be featured? Email editor@same.org.

ACQUISITIONS & EXPANSIONS

Hanson Professional Services has acquired Corpus Christi, Texas-based Naismith Engineering.

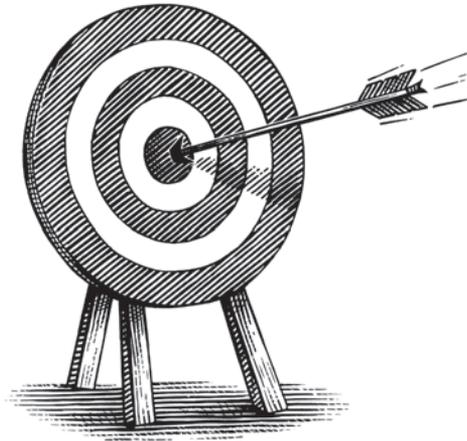
O’Brien & Gere has acquired Charlotte, N.C.-based PENTA Engineering P.A.

Stanley Consultants has opened a new office in Honolulu.

Terracon and **Consultech** have established a mentor-protégé relationship under the Small Business Administration’s Mentor-Protégé Program.

WSP | Parsons Brinckerhoff has acquired CRC Engineering P.C., a firm based in New York City.

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A handwritten signature in black ink, appearing to read 'Gwen Baker'.

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CONTRACTS & AWARDS

AECOM was awarded a maximum \$10 million firm-fixed-price, IDIQ contract for A-E services at seven military installations in Colorado and Wyoming.

AFG Group was selected by the General Services Administration to manage the design and renovation of the Public Ledger Building consolidation in Philadelphia.

Atkins North America was awarded a \$45 million firm-fixed-price contract for A-E services for the Army and Air National Guard in all 50 states, Puerto Rico, Guam, Virgin Islands, and the District of Columbia.

Amec Foster Wheeler was awarded a \$14.6 million firm-fixed-price task order under a previously awarded multiple award contract for cleaning, inspecting, and repairing two fuel tanks at Defense Fuel Support Point Akasaki, Japan.

Basha Services LLC was awarded a \$5 million contract for emergency response and technical facility management for Environmental Protection Agency Region 4 with responsibility for eight southern states.

Bowers and Kubota Consulting was awarded a \$9.9 million firm-fixed-price contract with options for program and project management technical support services for U.S. Army Pacific Region Medical Command.

Burns & McDonnell was awarded a contract by SaskPower for comprehensive engineer/procure/construct services for the new Chinook Power Station, a 350-MW natural gas-fired power facility to be located in Southwestern Saskatchewan, Canada.

The firm also was awarded a \$9.5 million firm-fixed-price contract for A-E commissioning for the National Geospatial-Intelligence Agency campus in St. Louis.

Calibre Systems was awarded a \$9.4 million cost-plus-fixed-fee contract with options for operating and support management information system technical support services at Fort Belvoir, Va.

Cape Environmental Management Inc. was awarded a \$17.1 million firm-fixed-price contract to construct the Hydrant Fuel Facility at Joint Base Andrews, Md.

CB&I Federal Services has been awarded a \$20.8 million firm-fixed-price task order by NAVFAC Southwest for Parcel E remedial action at Hunters Point Naval Shipyard, Calif.

CH2M and Parsons, as part of a joint venture team, have been selected by the District of Columbia Water and Sewer Authority to perform program management for the development and implementation of its \$1.3 billion water and wastewater capital improvement program.

Chugach Federal Solutions was awarded a \$29.9 million modification to a previously awarded contract for installation support services at Eareckson Air Station, King Salmon Air Port, and Wake Island Air Field, Alaska.

Conti Federal Services was awarded a \$17.2 million firm-fixed-price, foreign military sales contract with options to construct an unmanned aerial vehicle facility in Israel.

Continental Mapping Consultants has been awarded a \$12.5 million firm-fixed-price contract by USACE St. Louis District



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for A-E services for photogrammetric surveying and mapping work.

Contract Watts and Garney Federal in a joint venture, CWG JV, were awarded a \$36.1 million firm-fixed-price contract for design and construction of the KC-46A Depot Maintenance Complex support infrastructure at Tinker AFB, Okla.

Crawford Consulting Services, MOCA Systems Inc., and Project Time & Cost LLC, will share in the award of a \$10 million firm-fixed-price contract for architect and engineering, and cost engineering services to support USACE Mobile District.

CTI and Associates Inc. has been awarded an \$8 million firm-fixed-price, construction management services, indefinite-delivery contract by USACE Savannah District with a three-year base period and one two-year option period.

Dewberry has been awarded a five-year, \$49 million IDIQ contract by the National Oceanic and Atmospheric Administration's Office for Coastal Management to provide geospatial services in support of coastal

resource management programs and help build the "Digital Coast," an information repository for coastal management.

The firm also was awarded an \$844,000 grant by the Office for Coastal Management to assist the City of Virginia Beach, Va., with sea level rise planning.

Facility Support Services LLC was awarded a \$9.5 million contract by the General Services Administration for interior renovations on the Internal Revenue Service's Enterprise Computing Center consolidation project in Kearneysville, W.V.

The firm also was awarded a \$3.4 million task order by NAVFAC Mid-Atlantic to Repair Pump 4 on Dry Dock 8 at Norfolk Naval Shipyard, Portsmouth, Va.

Fluor, Atkins and Westinghouse, in a joint venture—Mid-America Conversion Services LLC—were selected by the Department of Energy for a \$318 million contract to operate the depleted uranium hexafluoride conversion facilities at Paducah Gaseous Diffusion Plant, Paducah, Ky., and at the Portsmouth Gaseous

Diffusion Plant, Piketon, Ohio.

HDR Inc. was awarded a \$9.2 million firm-fixed-price task order under a previously awarded A-E IDIQ contract to prepare full plans and specifications, detailed cost estimate, geotechnical investigation, and hazardous materials survey at Marine Corps Air Station Miramar, Calif.

Gilbane Federal was awarded a \$9.9 million firm-fixed-price task order by Naval Facilities Engineering and Expeditionary Warfare Center under a multiple award contract for cleaning, inspecting, and repairing two fuel tanks at Defense Fuel Support Point Hakozaiki, Japan.

Grunley Construction Co. Inc. was awarded a \$26.8 million firm-fixed-price contract for the renovation and repair of Building K at Fort Meade, Md.

Health Facility Solutions Co. has been awarded an \$8 million firm-fixed-price contract by USACE Savannah District for construction management services with a three-year base period and two, one-year option periods.

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Hernandez Consulting was awarded a \$7 million firm-fixed-price contract with options by USACE New Orleans District for Westbank and vicinity, Hurricane & Storm Damage Risk Reduction System mitigation, bottomland habitat protected side restoration, Avondale Gardens, La.

IO Environmental and Infrastructure Inc. was awarded a firm-fixed-price, IDIQ multiple award contract in support of habitat enhancement services at various Navy and Marine Corps installations within the NAVFAC Southwest area of responsibility.

J. Kokolakis Contracting Inc. was awarded a \$52.8 million firm-fixed-price contract for Pershing Barracks renovation and modernization at West Point, N.Y.

KBE Building Corp. was awarded an \$8.4 million firm-fixed-price contract for the expansion and renovation of the main Navy exchange store at Naval Air Station Patuxent River, Md.

KBR was awarded a \$29.1 million modification by NAVFAC Europe Africa and Southwest Asia under a previously awarded

IDIQ contract to exercise option two for base operations support services at Isa AB, Kingdom of Bahrain.

Kemron Environmental Services Inc. was awarded an \$18.2 million firm-fixed-price task order under a multiple award contract for Remedial Action Parcel E-2 installation of soil cover, wetlands and a landfill gas control and containment system at Hunters Point Naval Shipyard, Calif.

Kleinfelder and **AECOM** were awarded a \$12 million firm-fixed-price contract for investigation and design services in support of USACE South Pacific Division dam and levee safety programs.

Koontz Electric Co. Inc. has been awarded an \$8 million contract by USACE Buffalo District for gate automation work in Sault Sainte Marie, Mich.

MAKERS architecture and urban design LLP was awarded a maximum \$30 million IDIQ contract for engineering and design services by NAVFAC Atlantic, with an initial performance period of one year and up to four one-year extensions.

McKim & Creed Inc. was given notice to proceed on beach profiles and coastline surveys along the New York shoreline for USACE New York District.

Merrick & Company was awarded a \$15 million firm-fixed-price contract by USACE Fort Worth District for A-E services for military projects.

Michels Corp. was awarded a \$10.9 million firm-fixed-price contract by USACE Buffalo District for an ecosystem restoration project at Underwood Creek along the western edge of Milwaukee County, Wisc.

Mortenson Construction was awarded a \$25.4 million firm-fixed-price contract to design and construct an unmanned aircraft system facilities expansion at Marine Corps Air Station Cherry Point, N.C.

Nova Group Inc. was awarded a \$17.4 million firm-fixed-price contract for repair of a dry dock saltwater distribution system at Naval Base Kitsap, Bremerton, Wash.

Ocean Construction Services was awarded an \$8.1 million firm-fixed-price task order under a previously awarded

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multiple award contract for Pier Cheatham Annex Depot A structural repairs at Naval Weapons Station, Cheatham Annex, Va.

Parsons has been awarded a five-year Technical, Engineering, Advisory, and Management Support Weapons and Missiles Systems Engineering contract by the Missile Defense Agency, as well as a five-year Technical, Engineering, Advisory, and Management Support Command, Control, Communications and Battle Management contract.

Perini Management Services was awarded a \$9.9 million firm-fixed-price contract to construct an explosives research and development laboratory at Picatinny Arsenal, N.J.

Pernix Guam LLC was awarded a \$26.4 million firm-fixed-price contract by NAVFAC Pacific to construct a low observable/corrosion control/composite repair shop to provide environmentally controlled areas for on-aircraft low observable restoration and repair in support of the Guam strike mission at Andersen AFB, Guam.

Purcell Construction Corp. was awarded a \$58.9 million firm-fixed-price contract with options for Advanced Individual Training Barracks Complex, Phase III, at Fort Lee, Va.

San Diego Project Management PSC in a joint venture with JFM Construcciones won a task order from the Department of Veterans Affairs to install a 38-KV Power Line at the VA Caribbean Healthcare System, San Juan, P.R., to improve the hospital's readiness for emergency situations.

Sealaska Constructors LLC was awarded a \$10.1 million firm-fixed-price contract by the Army National Guard Bureau for construction of a civil support team ready building, as well as supporting site, roadway, parking, and utility improvements in Windsor Locks, Conn.

Sevenson-USA Environmental JV was awarded an \$11.9 million cost-plus-fixed-fee contract for removal and decontamination of potentially explosive sewers and underground structures at the former Sunflower Army Ammunition Plant, Kan.

Southwind Construction Services was awarded a \$48 million firm-fixed-price contract for construction services within the boundaries of USACE Tulsa District.

Suulutaaq Inc. has been awarded an \$18.3 million firm-fixed-price contract with options by USACE San Francisco District for a flood control channel improvement project in Milpitas, Calif.

Tetra Tech Inc. was awarded a \$9 million firm-fixed-price contract by USACE Louisville District for design, studies, surveys, sampling, testing, permit procurement, cost estimates, sustainable and innovative technologies, and other activities related to environmental matters.

Wolff & Müller Government Services GmbH & Co. KG was awarded a \$49.9 million IDIQ contract for Germany and Belgium by USACE Europe District for real property repair and minor construction.



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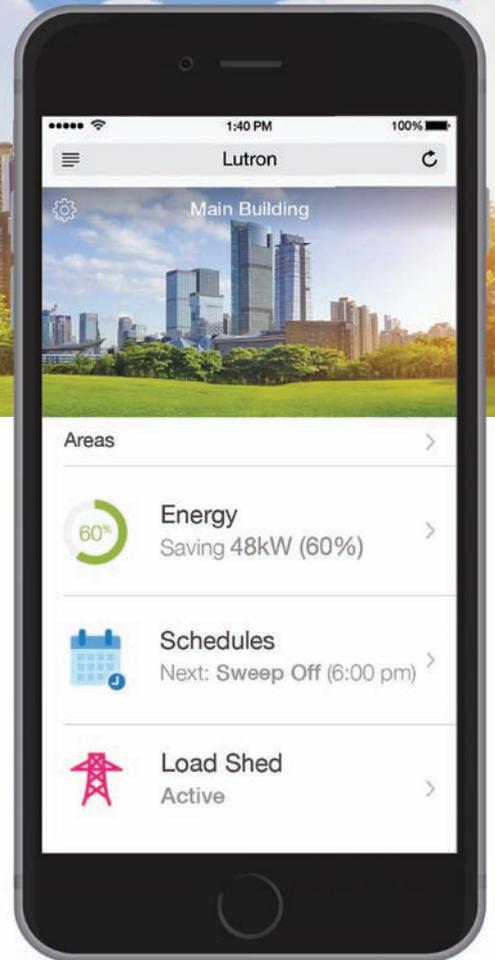
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RESPONDING TO OUR CHANGING WORLD

I have written about change before in this column. Perhaps it is the frequent reassignments in the military or my role as a father that I am reminded daily (and often nightly) about the prevalence of change in the world. I recently listened to a podcast about our perception of time—the companion of change. One of the speakers, a physicist, asserted that the increasing entropy of the universe provides our perception of time as a unidirectional concept.

The idea of increasing chaotic change is certainly a hot topic nowadays, with technological evolutions, climate change, and globalization. This change permeates societal and natural domains. Military engineers are about change, perhaps another reason I am so distracted by it. Our job is to help shape the environment either against our adversaries or for our allies and

ourselves. Through activities like building partner capacity or humanitarian assistance, our allies can increase their resiliency and be better prepared for the next unforeseen change. Military engineers can provide the stability and, dare I say it, a decrease in entropy when confronted by those unforeseen changes, be it a natural disaster or attack. Engineers can bring back the essential services demanded by today's standard of living through effective planning, exercising, and executing those response capabilities.

We, as military engineers, constantly change how we prepare, change how we do the same old things, and change our environment. In a way, since military engineers drive change and change is part of the future...I suppose military engineers are the future, or at least, will play an essential part in it.—T.S.

MULTINATIONAL TRAINING IN ICELAND

Airmen from the 52nd Civil Engineer Squadron Explosive Ordnance Disposal Flight, Spangdahlem AB, Germany, in September participated in Exercise Northern Challenge 2016, an Icelandic-hosted, multinational, explosive ordnance disposal (EOD), counter-improvised explosive device training.

The exercise focused on disabling improvised explosive devices in support of counter-terrorism tactics to prepare countries enrolled in NATO's Partnership for Peace program for international deployments and defense against terrorism.

This year's participating nations included Iceland, Germany, Denmark, Poland, Norway, Belgium, Great Britain, Canada, Sweden, Finland, Italy, the Netherlands and the United States.

"With all these partner nations working together to defeat a common network, you really get the advantage of different points of view, which will help each other improve tactics, techniques, and procedures," said Capt. Kyle Fuller, Commander of the 31st Civil Engineer Squadron Explosive Ordnance Disposal Flight, Aviano AB, Italy.

Although the training is not associated with, or a reaction to, any real world events, it is designed to subject its multicultural participants to realistic EOD-related challenges that they must face together. "The benefit of participating in this exercise is the exchange of tactics, techniques and procedures with partner nations," said Staff Sgt. Cole Carroll, 52nd Civil Engineer Squadron explosive ordnance disposal craftsman.



U.S. Air Force Tech. Sgt. Jason Umlauf, 52nd Civil Engineer Squadron explosive ordnance disposal craftsman, sweeps an area with a mine detector during Northern Challenge 16 at Icelandic Coast Guard Keflavik Facility. U.S. AIR FORCE PHOTO BY STAFF SGT. JONATHAN SNYDER

The goal of the exercise is for participating program members to become familiar with each other's military procedures, which will improve interoperability and combined counter-terrorism efforts.

(Contributed by Staff Sgt. Jonathan Snyder, 52nd Fighter Wing Public Affairs)

MARINES IMPROVISE TRAINING

Marines with Explosive Ordnance Disposal Company, 8th Engineer Support Battalion, participated in counter improvised explosive device (IED) skills demonstration training at Camp Lejeune, N.C.

The Marines learned information from eye-witness reporters about simulated threat situations in a training village. Sometimes the threat would include additional IEDs and even weapon caches.

All of the simulated scenarios that technicians conducted were based off real-world situations, explained Staff Sgt. Jake Locquiao, an explosive ordnance disposal technician with the unit. "We are training our Marines to prepare them for the Special-Purpose Marine Air-Ground Task Force Crisis Response-Africa. The scenarios replicate some of the situations they may



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encounter if they are called in for an IED.”

Marines used an IED detector to sweep the area and assess the situations, identifying possible threats. After the area was clear, Marines reported back to their team leaders for an assessment on their performance.

(Contributed by Lance Cpl. Aaron Fiala, II Marine Expeditionary Force)

NEW TRICKS FOR AN OLD TRADE

Civil Engineer squadrons from three air bases located in Japan—Kadena, Yokota and Misawa—teamed with the Air Force Civil Engineer Center to conduct training for the new rapid airfield damage repair technique.

Operations in Iraq, Afghanistan and other locations have highlighted a need for better methods to quickly and effectively establish or improve airfields. Craters, spalls, and other conditions that limit airfield use can create costly delays that are not adequately resolved by old techniques.

“This is a significant step forward that provides new capabilities in addition to traditional rapid runway repair,” said

Master Sgt. Matthew Novack, Section Chief of Requirements & Optimization, 18th Civil Engineer Squadron. “This is the first time we have been able to conduct operations like this on an active runway in more than a decade.”

During the training, airmen clear the debris from the surface of the flightline using heavy equipment. Next, they cut a square around the damaged areas or craters with specialized saws. Then the remaining concrete is removed.

After the concrete is removed, the engineers fill the hole in with a low-strength concrete and cap it with a rapid-set hard concrete. This can be done quickly in combat situations so airfield operations can resume. It is estimated 3,000 aircraft of any size or weight can pass over the restored area without causing degradation to the runway. This means that airmen will not have to return later to conduct maintenance on the same areas.

(Contributed by Senior Airman Stephen Eigel, 18th Wing Public Affairs)



A Marine with Explosive Ordnance Disposal Company, 8th Engineer Support Battalion, searches for signs of improvised explosive devices during a training exercise at Camp Lejeune, N.C.
U.S. MARINE CORPS PHOTO BY LANCE CPL. AARON K. FIALA

A FENCE UNITES A COMMUNITY

U.S. Army Reserve soldiers from the 412th Theater Engineer Command, 7th Mission Support Command, worked along with Lithuanian soldiers and airmen and local national contractors to construct a new fence, gate and sign for Kudikiu Namai, an orphanage in Sauliai, Lithuania.

“I am impressed they did their job professionally with no impact on the

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neighbors,” said Orphanage Director Audrone Kardasiene. “The old fence was built almost 50 years ago. It had broken pieces and it was heavy, and the new one is beautiful. I am amazed with the work they did and how they communicated with the Lithuanian soldiers.”

The ribbon-cutting ceremony for the new fence was held on Aug. 25, 2016, and was attended by more than 40 people, including the Mayor of Siauliai, and Christopher Volciak, the Acting Deputy Chief of Mission for the U.S. Embassy in Lithuania. The orphanage had worked for seven years to get the fence project completed. The orphanage runs on donations only, relying on the community for support.

(Contributed by Sgt. 1st Class Matthew Chlosta, 7th Mission Support Command)

JOINT TRAINING IN CANADA

The Maine Army National Guard’s 185th Engineer Support Company conducted its annual training in August at Canadian Forces Base Gagetown, New Brunswick,

Canada, during Exercise Strident Tracer in order to improve its capabilities, proficiency, and relations with Canadian forces.

Exercise Strident Tracer is the culminating training event for the 5th Canadian Division. This year, American units were invited to join the training event to mutually benefit both militaries.

Soldiers repaired roads, constructed a foundation pad for a future structure, and removed debris from old buildings using various construction vehicles. The engineers grated more than 3-mi of range roads and moved more than 3,000-yd³ of dirt over two days at the Hersey Breaching site in efforts to construct the foundation pad.

Once the building site is completed, Canadian forces are slated to build a shoot house to further enhance soldiers’ tactical skills. The project not only gave Canadian Forces a new training site, it gave new engineers in the 185th an opportunity to see a project from start to finish.

(Contributed by Spc. Jarod Dye, 121st Public Affairs Detachment)



U.S. Army Reserve soldiers with the 412th Theater Engineer Command supported a Humanitarian Civic Assistance project this summer in Lithuania. U.S. ARMY PHOTO BY PFC. EMILY HOUDERSHIELDT, TRAINING SUPPORT ACTIVITY EUROPE

Beefing up the border

Since 2004, the U.S. Border Patrol (USBP) has nearly doubled the number of agents it employs to fulfill its mission of ensuring and maintaining border security. To help accommodate the growth of the USBP agent force, we were selected to provide full architecture-engineering design services for a new \$37 million, 250-agent USBP station and collocated checkpoint facility in Comstock, Texas.

The project incorporates an integrated, collaborative delivery process with ITS! Gilbane—that leverages our experience using AutoDesk’s Revit building information modeling (BIM) software to provide closely coordinated, quality construction documents.

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The Comstock station is a key component in the border-protection strategy of the Department of Homeland Security. It significantly expands the USBP’s capabilities in the Del Rio sector, and the facility itself is vital to accommodating the growth of the USBP agent force, which has doubled since 2004.



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BUILDING A “TENT CITY”

A temporary town called the logistics support area, or “LSA” was erected to house the influx of around 500 U.S. and Canadian soldiers to Yongin, South Korea to participate in a two-week training exercise. Each tent had plywood floors, power supply, lights, and air conditioning. Each soldier’s cot was only steps away from a bathroom, showers and four tents, where they could get two hot meals a day.

Everything had been arranged—places for male soldiers to shave, electric outlets to charge devices, laundry services, church services—and, in a nod to the modern day that some of older veterans might find baffling, even Wi-Fi.

“Creating a temporary city like this requires a lot of coordination between us, our Korean partners, and the subordinate units of the 8th Army. It’s a very challenging and complicated effort,” said U.S. Army Capt. Robert Arkell, I Corps Headquarters Support Company Commander and “mayor” of the temporary city.

“Our Korean partners have been really providing an extensive amount of support for establishing the LSA. We facilitated the contracts for establishing the PX support, the barber and for all the other basic amenities but really the overall architecture and infrastructure was built by the Koreans.”

In a typical day, the temporary village would go through about 8,000-gal of water, 1,200 meals, and 30-gal of coffee (excluding the grounds given away for those office coffee pots). Once the two-week exercise concludes, the LSA will be broken down into containers and shipped away. The entire process will take less than two days, leaving an empty field in the middle of the South Korean mountains until I Corps decides to pay a visit again.

(Contributed by Staff Sgt. Ken Scar, 108th Training Command–Initial Entry Training)

PARTICIPATING IN PACIFIC EXERCISE

Seabees assigned to Naval Mobile Construction Battalion (NMCB) 4 participated in joint construction operations in



U.S. Army Pvt. 1st Class Andrew Skalecki, from Kansasville, Wisc., and Spc. Jose Rodriguez of San Juan, P.R., both water treatment specialists with the 339th Quartermaster Company, resupply the water for over 500 U.S. and Canadian soldiers staying in a tent village at Yongin, South Korea. U.S. ARMY PHOTO BY STAFF SGT. KEN SCAR

support of the 22nd Annual Cooperation Afloat Readiness and Training (CARAT) Indonesia 2016. CARAT is a series of annual multilateral military exercises conducted by the U.S. Pacific Fleet with several member nations of the Association of Southeast Asian Nations. The exercise focuses on increasing interoperability and advancing regional stability within Southeast Asia.

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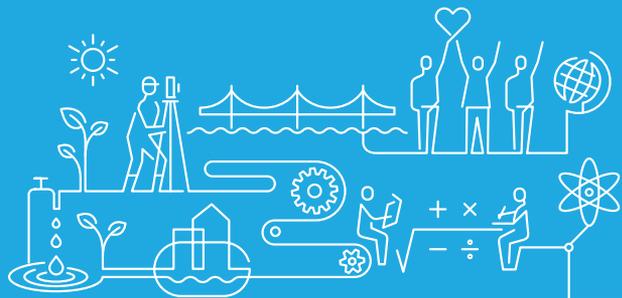
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Engineering activities support maritime security, contingency and humanitarian assistance/disaster recovery response through the targeted demonstration and practical application of innovative design and construction. This year's naval exercise series was between the United States and Bangladesh, Brunei, Cambodia, Indonesia, Thailand, Malaysia, the Philippines, Singapore and Timor-Leste.

NMCB 4 Seabees and the Indonesian TNI-AL ZENI Battalion were tasked with planning, estimating, budgeting and constructing a two-room schoolhouse in a 44-day timeframe. *(Contributed by Construction Electrician 3rd Class Santiago Guzman Jr., Naval Mobile Construction Battalion 4)*

BRIDGING UNITS TEST NEW BOAT

The Ohio River between Indiana and Kentucky recently saw operational testing of the Army Engineer Regiment's new Bridge Erection Boat (BEB).

The 2061st Multi-Role Bridge Company,

a National Guard unit out of Elizabethtown, Ky., joined with active duty engineers of the 502nd Multi-Role Bridge Company from Fort Knox to do wave after wave of bridging operations, running the BEB through its paces under a Limited User Test. The new BEB will replace the current Legacy MK II BEB, which has been in service since 1984, and is used to deploy the Improved Ribbon Bridge during wet gap crossings.

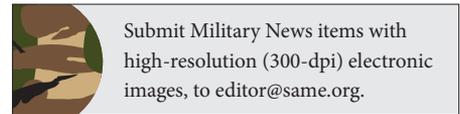
Maj. Mattii Minor, BEB Test Officer with the U.S. Army Operational Test Command's Maneuver Support and Sustainment Test Directorate, said the Limited User Test is in support of full rate production of the system and fielding to units, as part of the Army's modernization efforts. Over five test days, crewmembers provided input to data collectors on whether or not the boat meets mission needs.

Being involved in an operational test gave the engineers the chance to polish their bridging skills. "We were on the water at least 10 times, whether we were doing training or testing," said 1st Lt. Aleksandr



Engineers from the 502nd Multi-Role Bridge Company work with the Kentucky National Guard's 2061st Multi-Role Bridge Company to prepare a bay using the Bridge Erection Boat while assembling a full raft on the Ohio River during operational testing. PHOTO BY LARRY FURNACE, OPERATIONAL TEST COMMAND TEST & DOCUMENTATION TEAM

Schuler. "The speed and the pace at which we built the raft was in close approximation to what we would do in a conflict scenario." *(Contributed by Michael Novogradac, U.S. Army Operational Test Command)*




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INCREASING OUR RESILIENCE

When torrential rainfalls dumped over 30-in of water on portions of Louisiana this summer, impacts were disastrous, especially because communities were not adequately informed or prepared. Indeed, nothing quite like these storms had occurred previously, and despite Louisiana's flood-prone reputation, this type of flooding was not expected. How could the area be unprepared? No hurricane drove coastal storm surge into low-lying land, so the recently completed Hurricane & Storm Damage Risk Reduction System did not apply. The Mississippi River did not overflow, so the nation's first and largest levee system was not relevant. The region around Baton Rouge simply drowned in rain that could not escape as fast as it fell.

The term "pluvial flooding" applies to overland flow generated by rainfall, typically creating shallow or deep pooling before it may enter a natural channel or drainage pipe. When high-intensity rains meet flat terrain, or when stormwater sewers are too small, pluvial flooding happens. Notably, national flood maps are not intended to predict pluvial flooding, and roughly half of U.S. flood damage appears to occur outside of mapped flood zones,

depending on the study method used. What can engineers and allied professionals do about this?

I suggest we need to arm ourselves with broader tools to analyze and design for better solutions, and looking to time-worn maps or data sets of the past is simply not enough. A shift in culture is required to adequately consider future systemic conditions that may affect disaster risk.

We must put modern modeling tools to better use. The newly developing science of climate change attribution allows researchers to evaluate whether extreme weather events are statistical outliers, or part of a new, more threatening pattern of weather indicating worsening trends. Findings from a National Oceanic and Atmospheric Administration study show that Louisiana is once again the canary in a coalmine, indicating the type of damage and loss of life possible as rainfall intensity patterns change in ways that our built environment was never designed to accommodate. We should now be taking all of this available information into consideration as we develop viable designs for future resilience.—W.G.

RECORD RAINS IN LOUISIANA

Researchers who conducted a rapid assessment of the role of climate on the historic heavy rains in south Louisiana in mid-August have found that human-caused climate warming increased the chances of the torrential rains that unleashed devastating floods by at least 40 percent.

"We found human-caused, heat-trapping greenhouse gases can play a measurable role in events such as the August rains that resulted in such devastating floods, affecting so many people," said Karin van der Wiel, a research associate at the National Oceanic and Atmospheric Administration's (NOAA) Geophysical Fluid Dynamics Laboratory. "While we concluded that 40 percent is the minimum increase in the chances of such rains, we found that the mostly likely impact of climate change is a near doubling of the odds of such a storm."

Models indicate that the return period for extreme rain events of the magnitude of the mid-August downpour in Louisiana has decreased from an average of 50 years to 30 years. A typical 30-year event in 1900 would have had 10 percent less rain than a similar event today, for example, 23-in instead of 25-in. For the assessment, scientists conducted a statistical analysis of rainfall observations and used two of NOAA's high-resolution climate models



(Left) Aerial photo, collected by the National Geodetic Survey, of Denham Springs, La., at the height of flooding on Aug. 15, 2016. The photo at right was taken three days later when flood waters had receded. NOAA IMAGES

to understand how the odds have changed for such three-day events between the early 20th century and the early 21st century. The results were consistent using observational data and climate models.

The research focused on the central U.S. Gulf Coast, and investigated events as strong as that observed at the height of the storm (August 12-14) to provide a regional context and a broader assessment of risk. The climate model experiments involved altering the climate based on levels of greenhouse gases in the atmosphere, aerosols such as soot and dust, ozone and

natural changes in the sun's radiation and from volcanic eruptions for various periods of time to assess how extreme rainfall events respond to climate changes.

The storm began when a low-pressure system carried massive levels of moisture from an unusually warm Gulf of Mexico over south Louisiana where the system stalled, leading to record-breaking precipitation in the region around Baton Rouge. The rains were followed by inland flash flooding and river flooding that was slow to recede due to flooding downstream. (Contributed by NOAA)



NEW OFFSHORE WIND STRATEGY

U.S. Secretary of Energy Ernest Moniz and Secretary of the Interior Sally Jewell announced the publication of a collaborative strategic plan to continue accelerating the development of offshore wind energy in the United States.

The “National Offshore Wind Strategy: Facilitating the Development of the Offshore Wind Industry in the United States” details the current state of offshore wind in the United States, presents the actions and innovations needed to reduce deployment costs and timelines, and provides a roadmap to support the growth and success of the industry. The Department of Energy (DOE) has found that developing 86,000-MW of these offshore wind energy resources by 2050 would support 160,000 jobs, reduce power sector water consumption by 5 percent, and reduce greenhouse gas emissions by 1.8 percent.

The strategy identifies key challenges facing the industry and more than 30 specific actions DOE and the Department

of Interior (DOI) can take over the next five years to address those challenges. These actions fall into three strategic areas.

- **Reducing technical costs and risks.** DOI proposes the joint development of standard data collection guidelines to foster predictability and inform safe project development while DOE will work to increase annual energy production and reliability of offshore wind plants.
- **Supporting effective stewardship.** DOI commits to numerous actions to ensure that the regulatory process is predictable, transparent, efficient and informed by lessons learned from regulators in other countries. Additionally, as the first generation of installed projects come online, DOI and DOE will collect field data on parts of offshore development including impacts on marine life and turbine radar interference in order to support future offshore wind siting and plan reviews.
- **Improving the market conditions for investment in offshore wind energy.** Studies are needed help quantify the



The Department of Energy and Department of the Interior have published a strategic plan to accelerate the development of offshore wind energy in the United States. NREL PHOTO BY SENU SIRNIVAS

broad grid integration impacts of adding significant amounts of offshore wind energy to the power system. Such information could significantly benefit the offshore wind community by informing state policies critical to development.

The new strategy builds on DOE and DOI’s first offshore wind strategy, which was published in 2011. Since then, DOE has allocated nearly \$200 million to support demonstration projects.

(Contributed by DOE)

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LOWERING ENERGY INTENSITY

About 14 percent of commercial buildings in the United States are owned by a federal, state or local government agency.

Recent data from the Energy Information Administration's Commercial Building Energy Consumption Survey (CBECS) show these buildings have significantly reduced their energy intensity in recent years. From 2003 to 2012, the average energy intensity, or energy consumption per square foot, of government buildings decreased by 23 percent, from 105,300-Btu/ft² to 81,200-ft². Over the same period, the average energy intensity across all commercial buildings decreased by 12 percent, from 91,000-Btu/ft² to 80,000-Btu/ft².

Governments at all levels have passed legislation or adopted goals and targets regarding energy use in both new and existing buildings. CBECS data highlight some of the specific actions owners can take to help meet energy reduction goals or requirements, such as monitoring energy use and upgrading key equipment. Building

automation systems that control lighting and HVAC are present in about one in three government buildings, more than twice the rate as in nongovernment buildings. Formal energy management plans, which involve setting and regularly monitoring specific energy targets, are also more common in government than nongovernment buildings (27 percent to 8 percent).

About 4 percent of government-owned buildings are federal, 24 percent are state, and the remaining 72 percent are local. While most federal buildings are office buildings or post offices (categorized by CBECS as service), the most prevalent type of state or local government building is schools. More than half of government buildings are located on multi-building campuses, where energy management and purchasing are often centralized. Campuses may also have a central physical plant, with boilers, chillers, and generators serving multiple buildings, which is often a more efficient and cost-effective arrangement.

(Contributed by EIA)

HARNESSING WAVE ENERGY

Naval Facilities Engineering and Expeditionary Warfare Center recently hosted a Wave Energy Test Site (WETS) blessing ceremony at Marine Corps Base Hawaii to mark a renewable ocean energy milestone. The event signified the opening of deep water berths at the WETS, which, in addition to a shallow-water berth, comprise the grid-connected infrastructure.

WETS is a research and development endeavor with the objective of accelerating the evolution of wave energy conversion (WEC) technologies. The opportunity to test WEC devices will accelerate the evolution of this technology and allow the Navy and Marine Corps to evaluate the technical and economic feasibility of various wave energy conversion configurations.

As part of the WETS infrastructure, data gathering and research devices such as wave measuring buoys, electromagnetic field recorders, and hydrophones, are being deployed in the vicinity of the WEC devices to gather baseline oceanographic



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and environmental data, and to verify that the existence and operation of the system and devices and other related ocean infrastructure does not harm the environment.

Located on the windward side of Oahu, offshore Marine Corps Base Hawaii, the WETS grid-connected, open ocean site is available for testing and demonstrating full-scale WEC systems that have potential for Navy energy applications. The capability was originally established in 2001 with one berth at the 30-m water depth to support point absorber-type WEC tests. Today, with the addition of two deep-water berths that support both point absorber and oscillating water column WEC testing at 60-m and 80-m water depths, a total of three WETS berths are operational as the first U.S. grid-connected facility of its kind.

(Contributed by NAVFAC EXWC)

SUMMER FIFTH WARMEST ON RECORD

An oppressively hot summer for many across the continental United States tied 2016 with 2006 as the fifth warmest in 122 years of record keeping.

The average summer U.S. temperature was 73.5°F, 2.1° above average, according to scientists from NOAA's National Centers for Environmental Information. Every state in the continental United States and Alaska were warmer than average this summer. Precipitation totaled 0.60-in above average, making summer the 24th wettest on record.

The month of August was the 17th warmest on record, with an average temperature across the Lower 48 of 73.6°F, 1.5° above average. A total of 24 states were much warmer than average. The precipitation total for the month was 0.85-in above average, making this August the second wettest.

The year to date (January-August) for the continental United States was the third warmest on record with an average temperature of 56.7°F, 2.8° above average. All Lower 48 states and Alaska observed above-average temperatures during this period.

- In the Northeast/Mid-Atlantic, eight states, including Connecticut, Delaware, Maryland, Massachusetts, New Jersey, New York, Pennsylvania and Rhode Island, had a record warm August. Connecticut and Rhode Island had their warmest summer on record.
- California had its warmest summer on

record, which contributed to an active wildfire season.

- Alaska experienced its third warmest August, second warmest summer and was record warm for the year to date at 7.6°F above average.
- In Louisiana, a storm system dropped more than 30-in of rain on parts of the state in August, causing record flooding and at least 13 deaths.

For more information, visit www.ncdc.noaa.gov/sotc.

(Contributed by NOAA)

INSIDE CLEAN ENERGY TECHNOLOGIES

DOE has released its annual "Revolution...Now" report, which highlights the accelerated deployment of five clean energy technologies: wind turbines; solar technologies for both utility-scale and distributed photovoltaic (PV); electric vehicles (EVs); and light-emitting diodes (LEDs). The report looks at the decreasing cost and increasing deployment of clean-energy technologies in the United States.

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ENERGY & SUSTAINABILITY NEWS



A new Department of Energy report highlights the deployment of five clean energy technologies.
DOE IMAGE

DOE's investments in the research and advancement of the technologies highlighted in Revolution...Now have contributed to price reductions from 40 percent to as high as 94 percent since 2008.

Highlights from the report include:

- Land-based wind accounted for 41 percent of all new capacity brought online in 2015. Overall, wind generated enough electricity to power more than 17 million households.
- Utility-scale solar PV represented 15 percent of all newly installed electricity generation capacity in 2015. Overall utility-scale PV generated enough electricity to power over 2 million homes.
- Distributed solar PV has reached 1 million rooftop installations on homes and businesses after experiencing a 54 percent reduction in costs since 2008.
- Wind and solar account for two-thirds of all new installed electricity capacity.
- Installation of LED A-type bulbs exceeded 200 million through 2015—growing 160 percent over 2014.
- Total sales of electric vehicles reached 490,000 on the road as of August 2016.

In addition to these clean energy technologies, the report discusses four emerging technologies—fuel cells, grid-connected batteries, energy management systems, and 3D printing—that are on the cusp of wider deployment in the coming years.

(Contributed by DOE)

ADDITIONS TO SUPERFUND PROGRAM

The Environmental Protection Agency (EPA) announced it is adding 10 hazardous waste sites and proposing to add another eight to the Superfund Program's National Priorities List (NPL). These sites have contamination from a variety of sources, including manufacturing, mining, battery recycling, and dry cleaning.

EPA adds sites to the NPL when mismanagement of contamination threatens public health and the environment. Superfund involvement is typically because states, tribes or citizens ask for the agency's help. The agency may also find contamination during its own investigations.

The Superfund Program does not just address legacy sites; nine of the 18 sites EPA is adding or proposing were in operation within the last two decades.

Sites added to the NPL in September:

- Anaconda Aluminum Co. - Columbia Falls Reduction Plant, Mont.
- Argonaut Mine, Jackson, Calif.
- Bonita Peak Mining District, San Juan County, Colo.
- Dorado Ground Water Contamination, Dorado, P.R.
- Eldorado Chemical Co. Inc., Live Oak, Texas
- North 25th Street Glass and Zinc, Clarksburg, W.Va.
- SBA Shipyard, Jennings, La.
- Valley Pike VOCs, Riverside, Ohio
- Wappinger Creek, Dutchess County, N.Y.
- West Vermont Drinking Water Contamination, Indianapolis, Ind.

Sites proposed for addition to the NPL:

- Anaconda Copper Mine, Yerington, Nev.
- The Battery Recycling Company, Bo Cambalache, P.R.
- Custom Cleaners, Memphis, Tenn.
- Highway 18 Ground Water, Kermit, Texas
- Microfab Inc., Amesbury, Mass.
- Old Highway 275 and North 288th Street, Valley, Neb.
- Post and Lumber Preserving Co. Inc., Quincy, Fla.
- Sant-Gobain Performance Plastics, Village of Hoosick Falls, N.Y.

(Contributed by EPA)



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TRANSFORMING DESIGN & CONSTRUCTION

Building Information Modeling (BIM) is one example of new approaches that are transforming the design and construction industry. Focused initially in design, BIM is expanding into construction site management activities to include aspects of site safety and efficiency.

This Technology News column looks at several emerging technologies that have a great potential to join BIM as agents of transformation. These technologies provide the capability to rapidly acquire high density precision geometric data using remotely piloted aircraft; to incorporate virtual reality that

enhances visualization of components, systems and structures; to rapidly create components and whole structures through additive manufacturing (3D printing); and to significantly accelerate construction using robotics.

It would be easy to conclude that these capabilities may not mature for a long time. Yet, following their successful first flight in December 1903, Wilbur Wright said "I confess that in 1901, I said to my brother Orville that man would not fly for 50 years."

In fact, all of these new design and construction capabilities are already "flying" as well.—E.L.

UTILIZING DRONES TO ASSESS INFRASTRUCTURE CONDITIONS

Small Remote-Piloted Aircraft, more commonly referred to as drones, offer significant new engineering-related capabilities. In the military sector, recent studies have examined the application of drones in scenarios as diverse as chemical agent detection, pavement condition assessment, and reality capture for the U.S. Air Force Academy's chapel. Another particularly interesting application involves the use of low-cost lightweight cameras to build 3D as-is infrastructure models.

Recent advances in both image sensor technology and computer vision techniques have made it possible to produce dense georeferenced point cloud data with sub-centimeter accuracy from such platforms. The potential for combining and comparing this data with 3D design models could present a viable solution for monitoring projects in remote and dangerous locations to support project management functions like progress assessment, quality assurance, and contractor invoice review/approval.

Case Study Comparison. A case study for this approach is being conducted on the construction of a small residential road at a Greenfield site in Cambridge, United Kingdom. As-built data was collected at various stages of the construction process from December 2015 to May 2016.

To facilitate comparison of various technologies, data was collected using both aerial imagery and terrestrial laser scans. Scans were collected with a FARO Focus X 3D laser scanner equipped with onboard GPS, compass, altimeter, and inclinometer (retail value approximately \$30,000).

For the aerial imagery, two different



Small Remote-Piloted Aircraft, more commonly referred to as drones, offer significant new engineering-related capabilities, including pavement condition assessment. U.S. AIR FORCE PHOTO

platforms were used. Trimble's UX5 is a fixed-wing drone utilizing a 16.1-megapixel Sony camera and onboard GPS, compass, and inertial measurement unit (retail value approximately \$50,000). DJI's F550 is a six-motor rotary drone (hexacopter) that can be configured to accommodate a wide variety of sensors. A GoPro Hero4 Black edition camera was used, mounted on a three-axis gimbal for in-flight stabilization. On-board GPS, compass, and inertial measurement unit sensors were used solely in support of autonomous flight operation. The cost of the DJI drone as configured was just over \$5,000. All aerial imagery was collected from a top-down, perspective.

Post-processing is required to convert the data into a complete 3D representation. Scans were taken at 20-m intervals

along the centerline of the road, meaning 26 individual point clouds needed to be registered with one another and stitched together to form a contiguous representation. This was accomplished using FARO's Scene application.

Photogrammetric reconstruction of the UX5 imagery was completed using Trimble's Business Center software package. It is important to note that this software will only work for data collected from Trimble drones, but other commercially-available programs can produce similar results using imagery from any platform. Photogrammetric reconstruction of the F550 imagery was done using a combination of open-source software and C++ language coding libraries to include OpenCV, vSFM, SF3M, and CloudCompare.



Georeferencing of the point cloud data in all cases was achieved using eight ground control targets visible in the data, the locations of which were measured by GNSS prior to data collection. Once the as-built point clouds are registered in the project coordinate system, comparison with the 3D design surface can begin.

Qualitatively, the terrestrial laser scan data produced the most dense, accurate and precise reconstruction of the as-built scene. The average 3D point accuracy was well below 1-cm as measured at multiple control points, and surfaces are accurately represented (curbs meet at nice 90° angles for instance). The reconstruction of the UX5 data produced an average accuracy of 2- to 3-cm, while that of the F550 was in the 4- 5-cm range.

This difference in accuracy is likely due to the higher-quality image sensor used in the UX5's on-board camera. For both sets of photogrammetric data, the point clouds were noisier and produced rounded corners in some locations where the top-down

perspective did not afford the camera a good look at the vertical face of the curbs.

Evaluation Factors. Other factors such as cost and time should be evaluated when considering the appropriate data collection technology to support model-based project monitoring. Ground scanning the entire length of the road took three to four hours, while the data collection flights were completed in far less time (11 minutes for one UX5 flight; 45 minutes for four flights of the F550). Post-processing the data was in the two- to four-hour range for all methods, with the UX5 processing in Trimble Business Center being the fastest at just over two hours. The F550 produced reasonably-accurate results that could support project monitoring functions at a fraction of the cost of the other two technologies. Mounting a higher quality camera to the drone could drastically improve these results without significant cost increases.

For more information, contact Maj. Steven Vick, USAF, University of Cambridge. at steven.vick@us.af.mil or sv364@cam.ac.uk.

AUTOMATING MASONRY TASKS

The construction industry has lagged the manufacturing industry in adapting automation to improve productivity. High quality, durable and low-maintenance materials such as masonry can potentially be displaced by lower cost or higher lifecycle materials to meet budget or schedule needs.

Victor, N.Y.-based Construction Robotics is revolutionizing automation advancement with the Semi-Automated Mason 100 (SAM 100) system. SAM 100 incorporates a commercial robotic arm designed to work with the mason, assisting with the repetitive task of lifting and placing each brick. The mason operating SAM owns the site setup and final wall quality, but through the technology is able to amplify productivity and better leverage their own unique skills.

Construction Robotics developed several core components under grants from the National Science Foundation and performed its first government site demonstration in late 2014 on a new five-story barracks at Fort Lee, Va.



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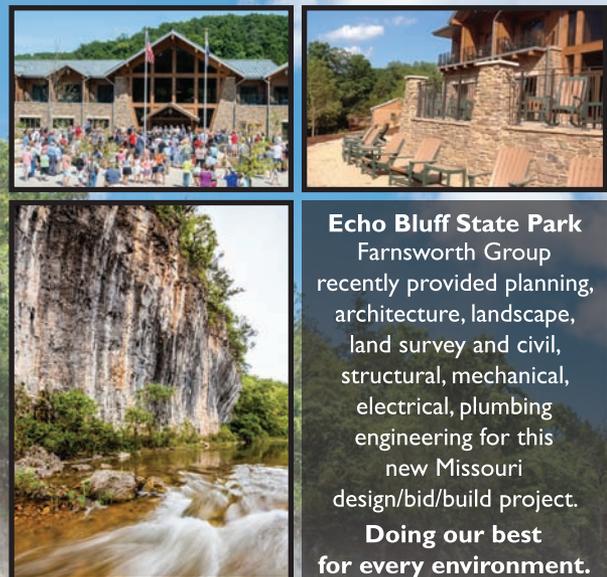
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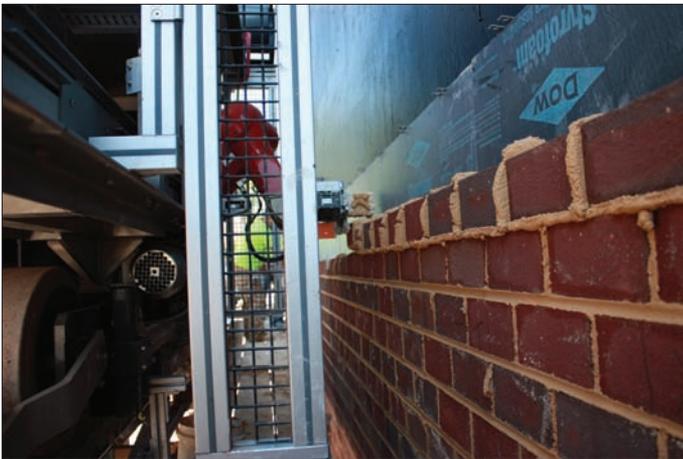
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SAM 100 incorporates a commercial robotic arm designed to work with the mason, assisting with lifting and placing each brick. CONSTRUCTION ROBOTICS PHOTOS

SAM helped install bricks at machine speeds up to 230 bricks per hour working on a Mast Climbing Work Platform. SAM utilizes a laser control system that compensates for movement and accurately place each brick. Since the Fort Lee demonstration, software and hardware improvements developed additional testing have SAM laying up to 300 to 400 modular through utility-sized bricks per hour. By comparison, a mason typically places 400 to 600 bricks in a day. The commercial version of SAM was rolled out in late 2015.

Using a telehandler, SAM is placed on a track that is pre-mounted on a Mast Climbing Work Platform. The mason then sets up a target story pole on one end of the work area and SAM's laser story pole on the other end, similar to how masons set string lines. Masons then load a map file into SAM that teaches the robot the pattern of the wall it will construct. The mason next takes a few measurements, enters them into the system, aligns SAM with the wall, and loads bricks and mortar.

SAM Map Tool software allows the rapid development of wall maps providing details (BIM 300 and 400 level) for each brick. Once the wall map is completed, it is immediately loaded to the tablet used to control SAM, translating the map into the commands to have SAM place each brick.

For more information, contact Chris Raddell, Construction Robotics, at craddell@robotics.build.

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3D-printed guard house structure. ERDC-CERL PHOTO

BUILDING STRUCTURES ON DEMAND

ERDC, together with Caterpillar Inc., and the National Aeronautics and Space Administration (NASA), are developing an additive 3D printing technology capable

of printing expeditionary structures on demand, in the field, using concrete sourced from locally available materials. The project, called “Automated Construction of Expeditionary Structures (ACES)” by the Army, and “Additive Cementitious Material Emplacement (ACME)” by NASA, is a three-year program to prototype an automated construction system that can fabricate a 500-ft² structure in under 24 hours.

The intent of this effort is to develop a capability that will decrease construction from five days to one day per structure, and reduce the personnel required from eight to three. Another goal is to reduce logistics associated with material shipment, and the resources required to sustain the structures. For instance, it would decrease the amount of material shipped from out of theater from 5-T to less than 2.5-T. ACES-built structures should also have improved energy performance.

The ACES printer was the first to utilize concrete made with 3/8-in aggregate, rather than paste or mortar. The printer also can

create other types of structures such as Jersey Barriers, vaults, culverts, and beams with the capability to print structures on-demand, with parts printed from computer-aided design models, which are pre-loaded or uplinked from different locations. To date, the team has successfully printed several wall segments, beams, and a 6-ft x 6-ft guard shelter. A 16-ft x 32-ft proof of concept structure is scheduled to be printed this fall at ERDC’s Forward Operating Base Laboratory in Champaign, Ill.

The third generation ACES machine, capable of being transported on the Army’s Palletized Load System and C-130 aircraft, will be fabricated in 2017 and demonstrated in late summer 2017. NASA’s ACME version will be used to demonstrate a proof of concept for planetary surface infrastructure construction, also in 2017.

For more information, contact Michael Case, ERDC-CERL, at michael.p.case@usace.army.mil; John Fikes, NASA, at john.fikes@nasa.gov; or Eric Reiners, Caterpillar, at reiners_eric_a@cat.com.

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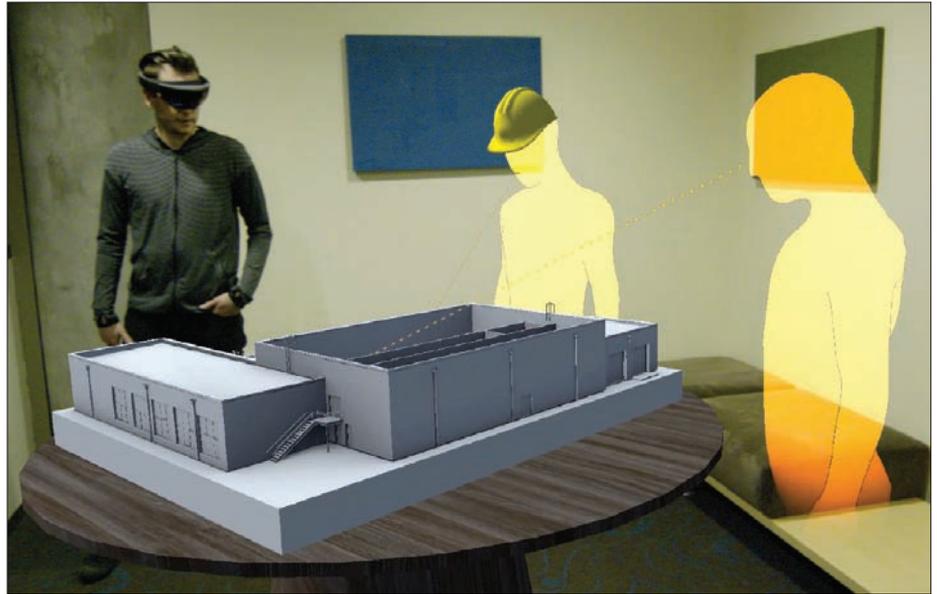
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VIRTUAL REALITY IS REAL

New technologies, such as the recently-released Microsoft HoloLens, combine real world and virtual models to create a unique mixed reality environment where owners, designers, constructors and operators can collaborate to create and deliver more efficient and inspiring infrastructure projects. This new capability—overlaying 3D models onto existing, physical spaces—has implications across the project lifecycle, from planning through operations.

In the early stages of a project, these new technologies help the team experience different infrastructure configuration scenarios in a way never before possible. 3D modeling and BIM are powerful tools, but they are still being presented through a 2D screen. Applying these models with mixed reality lets owners and team members experience them as 3D objects at scale. This drives collaboration and improves early decision-making by enabling everyone to experience “what if” scenarios in the context of a physical environment.



Infrastructure owners and operators should consider the benefits of applying mixed reality technology to drive collaboration throughout a project’s lifecycle. CDM SMITH IMAGE

During the design stage, the tools continue to deliver previously unavailable perspective. Imagine being able to walk through your completed facility, seeing all

the walls and equipment in place, at full scale, before a single shovel is put in the ground. By projecting holographic layers on top of the physical world, this can be

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USACE applied BIM and 3D printing to visualize the Folsom Dam Auxiliary Spillway before components of the project were constructed.

done with mixed reality today. Applying this technology enables owners to experience the final product, make suggestions for improvements, and understand how a structure or upgrade will look in its environment. It also enables the construction team, safety inspectors and operators to weigh in with improvements at the design stage, reducing the need for change orders.

Being able to collect, manage and analyze digital assets will empower owners to make operational decisions quicker and with more accuracy. The models created during the planning, design and construction phases of a project can be translated into working models for operations. Using mixed reality technology will enhance asset management and operations and maintenance tasks, allow control of physical assets remotely and safely from the virtual world, and accelerate learning and training even before physical assets are built.

For more information, contact Dave Neitz, CDM Smith, at neitzdm@cdmsmith.com; or Scott Aldridge, CDM Smith, at aldridgehs@cdmsmith.com.

3D PRINTING FOR CIVIL WORKS

3D printing has fully emerged as a viable alternative for designing and rapid prototyping of structures. When combined with High-Performance Computing and finite element analysis, designs can be vetted virtually prior to bench-scale manufacturing.

BIM technology allows designers to build a 3D model of a structure before construction is initiated. Coupled with prototyping technologies, the 3D virtual model can be fabricated into a small-scaled physical model using 3D printing technology. The physical model can then be reviewed to assess the need for changes in the engineering design. Recently, the U.S. Army Corps of Engineers (USACE) has begun to use both BIM and 3D printing technology to bring the virtual design into reality for one of its ongoing Civil Works projects.

USACE applied BIM and 3D printing to visualize the Folsom Dam Auxiliary Spillway before components of the project were constructed. The spillway is a \$900 million effort between USACE and the Bureau of Reclamation. BIM was used to develop a virtual model of the dam. 3D printing then creates components of the virtual model to create a physical model.

The Inland Navigation Design Center at USACE Rock Island District also used 3D printing technology to create a model of the Emsworth Locks and Dam in Pennsylvania. The 3D printed model was created to show how temporary walls (bulkheads) should be installed to prevent water from entering the chamber. Rock Island District delivered the model to USACE Pittsburgh District, which will use it as an instructional tool to teach new engineers about bulkhead design, construction, and installation.

Additionally, USACE is using 3D printing combined with finite element modeling to rapidly down select prototypes for manufacturing composite systems for use in transportation applications. Often, transportation routes are not suitable to sustain excessive loads from heavy traffic. As a result, composites are placed on the roadway or airfield surface to increase the strength. However, the composite systems in use today are manually assembled and can be heavy to lift. USACE has been tasked with developing enhanced composite designs that are lighter but maintain comparable engineering performance.

As applications based on virtual design/prototyping increase, USACE will need to begin implementing new acceptable-use policies. Similarly, repositories, certification protocols, and standards for the 3D printable drawings will need to be developed and made available to users.

For more information, contact Edward Huell Jr., USACE CAD/BIM Technology Center, Information Technology Laboratory, ERDC, at edward.l.huell@erdc.dren.mil; or Wayne Hodo, Ph.D., Geotechnical Structures Laboratory, ERDC, at wayne.d.hodo@erdc.dren.mil.



Submit Technology News items with high-resolution (300-dpi) electronic images, to editor@same.org.

Leading the Naval Construction Force

Rear Adm. Bret Muilenburg, P.E., CEC, USN, Commander, Naval Facilities Engineering Command, and Chief of Civil Engineers

TME: What are your top priorities as Chief of Civil Engineers and Commander of Naval Facilities Engineering Command (NAVFAC)?

MUILENBURG: A major concern right now is maintaining base infrastructure in a condition that, over the long term, will continue to meet the mission needs of the U.S. Navy and Marine Corps.

We have been operating under reduced top-line budgets, leading us to prioritize resourcing for warfighting readiness and capabilities, which we all agree must come first. Our current and future budgets continue to carefully accept risk in certain shore readiness areas, to include military construction, and facilities sustainment, restoration and modernization.

Our overarching strategy to deal with this is to thoroughly understand our facility inventory, its current condition, and its connection to the mission of our fleets. We then bias our resources to the most mission-critical facilities, including shipyards, piers and runways, communication facilities, and utility systems. We delay maintenance and upgrades to important, but less mission-critical facilities, like administrative buildings. Our strategy also includes improving energy resilience and reducing the cost of energy through usage reductions and alternative energy incorporation at our installations.

I would love to see more resources for facilities maintenance and recapitalization. But I do not foresee it coming anytime in the near future. Therefore, NAVFAC, and our primary shore infrastructure partners at Commander, Navy Installations Command, and Marine Corps Installations Command



Rear Adm. Bret Muilenburg, CEC, USN, (far right) is briefed on a reversible solid oxide fuel cell system that stores energy from renewable resources, producing clean, zero-emissions electricity, during a visit to the Naval Facilities Engineering and Expeditionary Warfare Center, Port Hueneme, Calif.

have to work hard to learn, improve, and be creative in our base infrastructure maintenance to reverse the rate of facility condition decline using the resources we have.

TME: How have the recent force structure reductions affected the Naval Construction Force?

MUILENBURG: Naval Construction Force reductions are always a concern, but they also correspond with the overall decrease in numbers that all our military services experience after every war or conflict. With our current active and reserve force structure, I feel that we have adequate numbers to meet our current operational requirements. We are used to this up-and-down cycling, because we have implemented it time and again throughout the history of the Naval Construction Force.

Even though the wartime demand signal for Seabees has decreased since the spike during Operations Iraqi and Enduring Freedom, the desire by Combatant Commanders to have available the unique

skills and forward deployment element that Seabees possess remains strong. During World War II, Gen. Douglas MacArthur said, "The only trouble with your Seabees is that you don't have enough of them." This sentiment still holds true today.

When the next conflict comes, when our Seabees are called upon to provide expeditionary construction support, we need to be able to flex and quickly increase the number of highly skilled and technically trained personnel ready to meet the challenge. The Reserve Force is a key component for making this happen. We like it when our reservists are already working in the construction industry and have the technical skills we can lean on. Putting a plan together to continuing attracting and hiring already highly-skilled construction tradesmen is a focus of mine.

TME: Discuss the NAVFAC Strategic Design you released earlier this year?

MUILENBURG: I took command of NAVFAC in November 2015 and we



Rear Adm. Bret Muilenburg, CEC, USN, pins the Navy and Marine Corps Commendation Medal to the pocket of Engineering Aide 1st Class Sean Barezi during the NAVFAC Sailor of the Year award presentation in April 2016. U.S. NAVY PHOTO BY DON ROCHON, NAVAL FACILITIES ENGINEERING COMMAND

immediately set out to implement a strategic guidance, a five- to seven-year “sight picture” that would set the vision for our enterprise. In March 2016, we released the NAVFAC Strategic Design—deliberately named so to signify a deliberate change in our approach. It acknowledges the inherent uncertainty of the dynamic global environment we operate in, which requires us to anticipate, manage that uncertainty, and continuously assess direction.

Our Strategic Design is aligned with the Secretary of the Navy’s priorities and the Chief of Naval Operations’ Design for Maritime Superiority, which was released in January 2016. Our guidance is organized around two Lines of Effort: one, “Enhancing Naval Shore Readiness” and two, “Strengthening our NAVFAC Team.” They are inter-reliant on one another for success and must be considered as a unit. Together, they focus our command, linking six focus areas to our mission.

- *Product & Service Delivery* - Safely deliver quality, timely, and cost-effective products and services through collaborative partnerships.
- *Infrastructure Readiness* - Advance our knowledge of inventory, condition, criticality, and cyber security of assets and systems in order to inform investment

“When the next conflict comes, when our Seabees are called upon to provide expeditionary construction support, we need to be able to flex and quickly increase the number of highly skilled and technically trained personnel ready to meet the challenge.”

decisions and improve facilities and utilities readiness.

- *Energy Security* - Enhance shore power resilience and efficiency through demand reduction, renewable integration, and grid management systems.
- *People* - Fill our team with highly qualified, motivated people and invest in them to strengthen capability and enthusiasm for our mission.
- *Financial Trust* - Operate transparent, auditable, and authoritative business systems that align expenditures with resourcing intent and provide timely reporting to stakeholders.
- *Analytical Decision-Making* - Develop robust business analytics capability to facilitate rapid learning, delineate the

relationships between resource and product/service delivery, and improve processes and output.

Today, we must lead in an ever-more complicated landscape with fiscal realities that drive significant change in how we do business. Creativity and innovation will take center stage and must permeate our culture—concepts, technologies and business practices—to achieve enduring improvements to our nation’s defense. NAVFAC Strategic Design is the guiding principle that will ensure we remain ready to support Navy, Marine Corps, and Combatant Commanders in support of their missions.

TME: As the global environment evolves, and U.S. strategy adjusts, in particular, the Rebalance to the Pacific, how will this affect the Navy’s engineering components?

MUILENBURG: We have been focused on a strategic shift to the Pacific since the president announced it almost five years ago. The Navy, Marine Corps, and U.S. Pacific Command (PACOM) continue to place ships, submarines, aircraft, and Marines at the optimal locations to support this shift.

These locations are important as we expand and strengthen our network of international partnerships through interoperability and combined operations. The Navy plans to have 60 percent of its operational assets in the Pacific by 2020.

Infrastructure is necessary to support this force laydown at existing and new locations. This manifests principally as an uptick in construction activity. Most prominent is the Marine Corps relocation to Guam, which will entail approximately \$8.7 billion of construction over the next decade, with more than 100 projects executed. Much of this additional work is occurring in Guam and the Commonwealth of Northern Marianas Islands, but also in Japan, Hawaii, Australia, Singapore, and the Philippines.

To help manage such a large construction program in Guam, we established a new command in August, the Officer in Charge of Construction Marine Corps Marianas. This special purpose command will oversee the approximately 10-year effort.

Besides new construction, we are

experiencing an increase in facilities operations and maintenance funding to support installations and personnel around the Pacific. Installations at Fleet Activities Yokosuka and others throughout the Pacific area of responsibility have seen a substantial increase this year in facilities maintenance and repair that NAVFAC is executing on behalf of Navy missions. In addition, we have also expanded our humanitarian assistance, exercise-related construction, and disaster response work for PACOM.

TME: What emphasis do you place on professional development, including licensure and certification, for Civil Engineer Corps officers and Seabees?

MUILENBURG: Professional development for our workforce is crucial as we face an ever-changing landscape of new technologies. We must learn quickly and continuously adapt our tactics, techniques and procedures to meet the important and stringent requirements of our supported commanders. As such, we seek the most qualified, talented and enthusiastic civilian and military candidates to fill our ranks.

For the officer community, we stress and expect each officer to complete several professional development requirements throughout their careers—many of these requirements are necessary for successful promotion. We groom each officer to be well rounded and competent as an expeditionary warrior, and as a business and technical professional. To remain competitive, as they move up the chain of command, each officer must complete requirements to achieve professional registration as either an engineer or architect.

As well, business training through the Defense Acquisition University provides officers with vital training in areas such as acquisition, contracting, finance, and contract law. The *Defense Acquisition Workforce Improvement Act* requires the Department of Defense to establish a process through which civilian and military persons in the acquisition workforce would be recognized as having achieved professional status. Defined levels of training and experience are required in order to be eligible for a warrant, which is the legal authority to financially obligate the U.S.



Seabees assigned to Naval Mobile Construction Battalion 4 evenly distribute wet concrete with shovels and rakes during concrete placement at Naval Base Yokosuka, Japan. U.S. NAVY PHOTO BY CONSTRUCTION ELECTRICIAN 3RD CLASS CHRISTOPHER EVENSON

government. Other, yet equally important, requirements I keep my eye on include public works, energy resilience, and cyber security training, as well as joint professional military education.

Professional development, licensing, and certification are all important for our Seabee enlisted personnel as well. As an expeditionary construction force, we must be prepared to deploy anywhere in the world to support the warfighter with our unique skills and abilities. Therefore, constant refining of technical skills, project management skills, and leadership development are essential elements to our maintaining the edge.

TME: How can organizations such as SAME support the mission and objectives of the uniformed services?

MUILENBURG: Professional organizations provide a collaborative and educational forum for our technical and business focused workforce to engage like-minded personnel, not only from other military departments but civilian and industry partner organizations as well.

Organizations such as SAME afford the services with opportunities to learn and stay abreast of the changes, both technical and professional, that are taking place in our chosen fields.

TME

Rear Adm. Bret Muilenburg, P.E., CEC, USN, became Commander, Naval Facilities Engineering Command (NAVFAC) and Chief of Civil Engineers in November 2015. Before that he served as Commander, NAVFAC Pacific, and prior to that, as Commander, NAVFAC Hawaii. Adm. Muilenburg's operational tours include assignments with Naval Mobile Construction Battalions 62, 133, and 7; the 30th Naval Construction Regiment; and Task Force Forager, theater engineers for International Security Assistance Force Joint Command, Afghanistan. He made numerous peacetime and contingency deployments, including Bosnia-Herzegovina, Iraq/Kuwait, and Afghanistan. Adm. Muilenburg is a 1984 graduate of the U.S. Naval Academy. He holds master's degrees in Engineering Management from The George Washington University and Environmental Engineering and Science from Stanford University.





(Top) The horseshoe shape and clerestory windows of the Weed Army Community Hospital will allow for daylight to reach up to 90 percent of occupied spaces, reducing lighting demand. (Right) A five-acre, 2.4-MW fixed-panel solar array will provide the majority of the renewable energy and directly power the hospital, clinic, and central utility plant through three separate feeds. USACE LOS ANGELES DISTRICT PHOTOS

Building the World's "Greenest" Hospital

When the Weed Army Community Hospital opens at Fort Irwin in summer 2017, it will boast unprecedented achievements in green and sustainable design for medical facilities.

By Maj. Jeffrey M. Beeman, P.E., LEED Green Associate, M.SAME, USA, and Caitlin McAlpine, EIT, LEED Green Associate

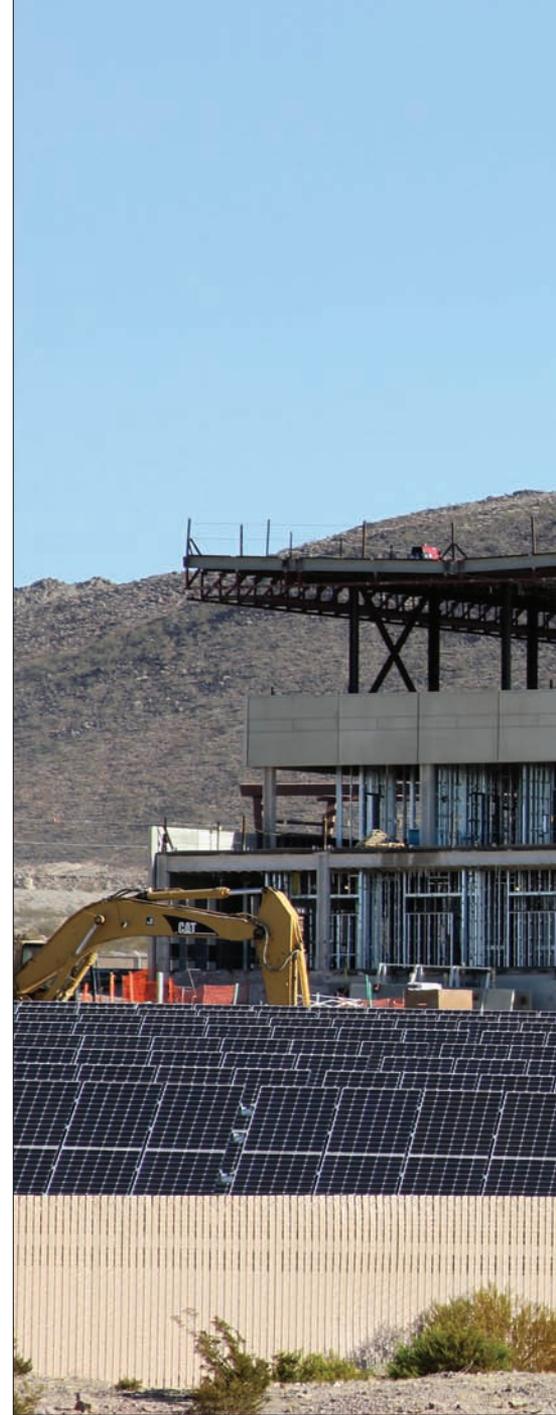
At Fort Irwin, Calif., the Los Angeles District of the U.S. Army Corps of Engineers (USACE) is nearing completion of what will be the world's "greenest" hospital. The facility will serve as a leading example of achieving substantial environmental and sustainability targets without incurring prohibitive costs.

In 2010, U.S. Army Medical Command

identified the need for a new hospital at the National Training Center for a multitude of reasons. Built in 1966, the existing hospital does not meet required seismic standards, nor does the aged chassis support modern healthcare delivery. Mechanical, electrical, plumbing, and communication systems have deteriorated beyond economical repair and there are multiple life safety and code issues consistent with a 50-year-old facility. The hospital is energy inefficient and maintenance intensive. Additionally, many ancillary and support services are currently located in substandard re-locatable buildings that have far exceeded their functional life expectancies.

With tens of millions of dollars invested in training brigade-sized units annually, more reliable infrastructure is paramount to ensure training continues uninterrupted. It is imperative that the soldiers and family members receive appropriate healthcare.

The new 217,000-ft² Weed Army Community Hospital will satisfy these



needs while being the first hospital in the world to achieve LEED Platinum certification, net zero energy, carbon neutrality, and xeriscaping. The design, completed by architect-engineer firm Rogers, Lovelock, and Fritz (RLF), won USACE's 2012 Honor Award for Conceptual Design for shattering boundaries in medical facility design.

LEED PLATINUM ASPIRATIONS

The Army requires that new facilities or major renovations be constructed at a minimum of LEED Silver. Projects can achieve higher standards of Gold or Platinum if no additional cost is incurred.

To achieve LEED Platinum, a building



must earn at least 80 points out of a possible 110. Though historically difficult for hospitals to achieve this, given their high energy consumption and the additional building codes required for patient comfort and safety, at 82 points, the new Weed Army Community Hospital will be the third hospital in the world that achieves LEED Platinum. A LEED Accredited Professional has been a member of the project delivery team from start to finish.

The project has earned points for LEED Platinum through each of the seven prescribed credit categories.

- **18 Sustainable Site Points:** The site selected for construction was considered

a Brownfield and required remediation. The location now has bicycle racks, preferred parking for carpool and low-emission vehicles, and is connected to existing base shuttle services and shaded walking paths. This allows easy access via several methods of transportation. The stormwater design includes bio-retention areas, open stone-lined ditches, dry detention basins, and native plants and trees—ensuring that runoff remains the same as pre-developed rates and maximizes natural filtration. The heat island effect was reduced by selecting materials high in solar reflectance index values (ability to reject solar heat), such

as white concrete for the parking lot, a cool roof, and parking trellis elements. Other strategies included open-grid paving and offset shaded areas.

- **Six Water Efficiency Points:** The stormwater design provides 100 percent of the landscape irrigation required, commonly referred to as xeriscaping. This eliminates the need for a permanent irrigation system. The hospital is outfitted with low flush and flow fixtures that use 30 percent less water compared to the required baseline.
- **33 Energy & Atmosphere Points:** The site features a 2.4-MW solar photovoltaic array and a solar water heating system.



Enhanced commissioning ensures additional testing to guarantee building performance, such as the mechanical and electrical systems. Lighting controls; high-efficiency condensing boilers and water heaters; oil-free water-cooled chillers; window and curtain wall glazing; and improved insulation in the roof, walls, and floors all reduce energy demand. Enhanced Refrigerant Management ensures that appliances and energy systems minimize the use of hydrochlorofluorocarbons and chlorofluorocarbons, two chemicals that have the highest global warming and ozone depletion potential.

- **Four Materials and Resources Points:** The work at Fort Irwin diverted at least 75 percent of waste from landfills by separating reusable materials from waste.

Additionally, materials used had a minimum 10 percent recycled content, with a minimum of 10 percent of materials being extracted and manufactured within 500-mi. These are verified by contractor submitted waste diversion tickets and product data submittals, and approved by LEED-certified personnel.

- **11 Indoor Environmental Quality Points:** Occupants are provided with controls to adjust temperature, lighting, humidity and ventilation, allowing the flexibility to create indoor environmental conditions that are comfortable to diverse building occupants. To ensure occupant safety, carbon dioxide sensors are installed in offices, conference rooms, waiting areas, and the dining facility. The finishes, such as paints, coatings, primers, flooring systems, adhesives

and sealants are all selected to minimize volatile organic compounds, which have a negative impact on indoor air quality.

- **Six Innovation & Design Bonus Points:** The design team achieved exemplary performance with respect to the solar array field and maximizing available open space. A high-performance green cleaning program was implemented that uses only sustainable products, and includes training of personnel in the hazards, use, maintenance, disposal, and recycling of cleaning chemicals, dispensing equipment, and packaging. The green education includes a comprehensive signage program within the hospital that informs occupants of the benefits of green buildings.
- **Four Regional Priority Bonus Points:** Based on environmental priorities



first focused on reducing energy demand and maximizing system efficiency. The horseshoe shape and clerestory windows of the new hospital allow for daylight to reach up to 90 percent of occupied spaces, reducing lighting demand. A buried first floor offers natural insulation and the solar water heating system provides 65 percent of the domestic hot water needs. This lessens the fuel required to operate the boilers. These combined efforts reduced energy consumption by 33 percent below the ASHRAE baseline, allowing RLF to calculate the total energy demand and design a fully offsetting renewable energy system.

The five-acre, 2.4-MW fixed-panel solar array provides the majority of the renewable energy and directly powers the hospital, clinic, and central utility plant through three separate feeds. Since no electricity storage is onsite, excess power generated will be distributed throughout Fort Irwin's grid. When hospital energy needs are greater than that being produced, the local utility provider, Southern California Edison, provides the power needed.

To guarantee solar performance, the energy produced and consumed throughout the first year will be monitored and adjustments recommended to increase efficiency. The solar array qualified for incentives that saved over \$1.5 million, resulting in a simple payback period of 14.5 years (well within its 25-year design life). The solar energy is projected to reduce Fort Irwin's annual power bill by approximately \$700,000. When the added costs for all conservation measures are accounted for, it results in an even better simple payback period of 12.6 years.

FIRST CARBON NEUTRAL HOSPITAL

The Weed Army Community Hospital will be the first hospital in the United States to be carbon neutral (the state at which the net amount of carbon compounds emitted into the atmosphere is zero). This will be achieved through both reduction and offsetting methods.

Direct carbon emitting sources at the hospital include the propane used for the boilers, water heaters, and kitchen equipment, and diesel fuel for the emergency generators. Its indirect carbon emitting sources come when grid power is required

and are generated through a combination of natural gas, coal, and other plants.

The latest data shows 24 percent of Southern California Edison power comes from renewable sources. Other carbon reduction strategies include carbon-absorbing trees and electric vehicle charging stations. To offset the carbon emissions from the direct and indirect sources, the renewable energy produced by the solar array is calculated for equivalent carbon emission value, accounting for carbon neutrality. According to the Environmental Protection Agency, the Weed Army Community Hospital will reduce greenhouse gas emissions annually by 3,925-metric-T when compared to the ASHRAE baseline. This is equivalent to reducing 9,145-barrels of oil, 441,547-gal of gas, or 750 passenger vehicles—or the amount of carbon sequestered by 837-acres of pine/fir forest.

A COLLABORATIVE APPROACH

Fort Irwin's new hospital breaks barriers in both energy conservation and renewable energy production for hospital construction. RLF and USACE Los Angeles District worked together in the planning, design, and construction with the Health Facilities Planning Agency, the Fort Irwin Garrison, additional USACE districts and Centers of Expertise, Turner Construction, and hundreds of subcontractors.

Once thought impossible, the greenest hospital in the world will open its doors in summer 2017, boasting the green energy achievements of LEED Platinum, net zero energy, carbon neutrality, and xeriscaping.

The project delivery team, through sustained partnering efforts, has proven that both substantial environmental benefits and lower operating costs can be achieved. With new benchmarks set, such as the simple payback period of 12.6 years and exceeding 82 LEED points, engineers now have measureable and attainable goals to improve upon in future projects.

TIME

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associated with the desert environment at Fort Irwin—including scarce water resources and an abundance of sun—additional bonus points were awarded for the solar array and stormwater design. The Brownfield site selection and increased access to public transportation, which are typically priorities in any region, also earned bonus points.

The design team was able to achieve LEED Platinum at the cost of Silver using a lifecycle cost analysis and the latest in green technologies.

ACHIEVING NET ZERO ENERGY

A net zero energy building is defined as producing a greater than or equal amount of renewable energy than is consumed over the course of an operational year. To achieve net zero energy at Fort Irwin, RLF



With an oceanic climate, Cordova experiences year-round precipitation, with no real dry season to perform construction. PHOTOS COURTESY AHTNA ENGINEERING SERVICES

Time Critical Repairs in Alaska

In Cordova, Alaska, five-year-old U.S. Coast Guard family housing units experienced significant water leakages, causing mold and rot, and requiring immediate restoration work.

By Karina Quintans, M.S.A.M.E.

While the design and construction of facilities are routinely executed to a high standard, sometimes issues emerge after occupancy that must be corrected or improved upon, so that a building will perform as the design intended.

In Cordova, Alaska, five-year-old U.S. Coast Guard family housing units experienced significant water leakages, which eventually ruined floors and walls due to deficiencies in the construction of the weather-resistant barriers. By making small penetrations into interior walls, the Coast Guard confirmed high levels of humidity, indicating a risk to human health from mold as well as the possibility of structural failure from rot.

Repairs and alterations were needed to restore and improve all 13 family housing duplex units in two phases. The housing facility is supervised by Coast Guard Base Kodiak, but not located on the installation. The Coast Guard members assigned to the site are charged with maintaining buoys that are part of the navigational system.

INITIATING PHASE ONE

Phase one of the work would be a pilot project to determine the extent of water damage to building structural conditions. The Coast Guard identified one duplex for investigation and evaluation, and anticipated a worst-case scenario based on its location directly in the path of the prevailing weather pattern. With an oceanic climate, Cordova experiences constant precipitation throughout the year, with no real dry season to perform construction. East-northeast winds off of the Copper River flats have delivered wind speeds as high as 100-mph. The area presents challenging conditions.

After demolishing the five layers within the wall structure, over 25 percent of the building's superstructure was discovered rotted through to the sheetrock, with

significant impact to structural components including shear walls and floor joists. Working with the Coast Guard, improvements were made to the design of the fit-for-purpose siding system to ensure protection from future water intrusion in a location that experiences an average of 206 days per year of precipitation.

The design and quality standards established on this pilot phase would soon be adopted as the standard for the remaining 12 housing units.

OVERCOMING CHALLENGES

Due to extensive rot and mold encountered during the pilot project, work on the remaining 12 duplex units was time critical. The Coast Guard made a direct award to fast track this work. Already mobilized in Cordova, and armed with the knowledge and experience from successful completion of phase one, a direct award to Ahtna was the best value scenario, saving both time and money in the procurement process. It also was prudent, in light of the potential for structural failure with 12 occupied units left to repair.

With logistics complex—involving only barges, ferries and planes to mobilize equipment, materials, and supplies to Cordova—detailed upfront planning was necessary to procure everything that would be needed on the site within a single mobilization, especially long lead items. Design plans were imported into AutoCAD to quantify the amount of construction materials and supplies needed. A 15 percent contingency was then added, ensuring all long lead and specialty items were onsite in the proper quantities. By project completion, there was minimal waste and overstock.

Work was executed on the remaining 12 duplex units from October through May, essentially winter in Alaska.

Both Occupational Safety & Health Administration regulations and U.S. Army Corps of Engineers Engineering Manual 385-1-1 were strictly enforced throughout project execution to maximize safety. In fact, safety was reinforced through daily standup meetings that included directives on the appropriate personal protective equipment to wear based on construction hazards and weather conditions. On snow and icy days, the field team wore crampons designed for



In assessing the damage to the housing units, the Coast Guard confirmed high levels of humidity, indicating a risk to human health from mold and the possibility of structural failure from rot.

construction work (to avoid slippage while also being able to climb ladders safely). Insulated, waterproof boots and rain gear kept workers dry. Since all of the sealing work was done from the exterior, the site manager monitored the field team closely for hypothermia. Frequent breaks were included in the daily schedule and the field crew was encouraged to take extra breaks as needed to warm up and avoid hypothermia and frostbite. With low-light conditions at this time of year (four hours of sunlight per day at its lowest), vertical tower light plants with large halogen lights were put into place and used almost continuously.

The field team worked throughout the rain, snow and icy conditions without a safety incident and with no major work stoppages due to extreme weather.

WORKING IN OCCUPIED UNITS

Because the units at Cordova were occupied while the work was performed, with walls open and exposed to the outside wintery conditions, reinforced polysheeting was mounted and draped from ceiling to floor to prevent wind and rain from entering the duplex. The sheeting was secured with nails spaced minimally apart to avoid ripping from the windy conditions. Work areas also were isolated from the occupants by establishing a barrier wall. Caution tape

was applied on walls and the interior door. Designated work areas around each building were delineated using tape and fencing.

Working on occupied units required active stakeholder management and customer service, since residents were quick to call the Coast Guard's onsite facility managers with any issues. Though work was coordinated officially through these managers, the Ahtna site manager also made an effort to speak directly with the residents to ensure minimal impact to their daily lives, as well as quality completion of the repair and finish work (performed by professional craftsmen) in each of their homes. Each unit was thoroughly cleaned of dust and debris at construction completion.

As work progressed during phase two, each of the 12 buildings presented a unique challenge because the extent of the rot was unknown until the siding was removed. Although the pilot project housing unit that was evaluated and repaired was anticipated to be the worst-case scenario due to its location in the path of prevailing winds, the reality was that several units worked on during phase two had worse rot conditions.

ENSURING QUALITY CONTROL

As part of the quality assurance and quality control process, the Coast Guard assigned a Quality Assurance



The field team worked throughout the rain, snow and icy conditions without a safety incident and with no major work stoppages due to extreme weather.

Representative (QAR) who inspected work daily against the drawings and specifications, with a particular focus on the construction of the weather resistant barrier between the exterior siding system and the building substrate. The barriers had complicated design specifications due to the detail required for properly sealing window openings, utility connections/penetrations, and air handling system and vents, to more effectively protect the structure from the harsh weather and constant precipitation.

There were four layers applied to properly seal the penetrations. To ensure design standards and specifications were achieved when constructing the four-layer barrier, field teams were first trained on demonstrations on each of the components of the new siding system using scaled models. In addition, per contract requirements, each of these four layers were photographed as completed, then compiled in a photo log

(one log submitted per building), to ensure weather-proofing was properly constructed.

With a total of approximately 1,400 photos for all 12 buildings, this effort proved much more involved than anticipated and required a workaround. The field staff performed the photography themselves instead of the site/quality control manager. At the end of each day, the cameras were turned in to the site manager who filed the photos on the computer.

The onsite project engineer then organized the photos into a log for printing and binding. The Coast Guard QAR also photographed various aspects of the work, all of which were filed in a daily report.

As part of the quality effort, several betterments were proposed and implemented based on the findings of the pilot project. These betterments were focused on maximizing airflow around windows and at the top of exterior walls to maintain dryness

and avoid repeat rotting of structural elements. In both cases, the betterments eliminated unnecessary materials and extra work, made construction installation much easier to complete, and improved overall aesthetics. More than \$10,000 in materials and labor were saved as a result.

FINISHING AHEAD OF SCHEDULE

The decision to make a direct award for phase two would prove all its worth. Ahtna transitioned quickly from the pilot project to phase two, saving the government approximately 55 days compared to a competitive process.

The work was completed two months ahead of schedule, in May 2016, allowing peace of mind to return to members of the Coast Guard and their families.

TME

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Flexible, reconfigurable work environments extend the useful life of intelligence facilities and support both collaborative and focused tasks. PHOTOS COURTESY CH2M

Enabling Analyst Effectiveness within Military Intelligence Facilities

When designers account for the unique programming and design requirements of 21st century intelligence facilities, they help create secure, functional, and reliable settings that support the mission and enhance personal wellness.

By Kristine Hargreaves, AIA, LEED AP O+M, M.S.A.M.E.

Imagine spending 12 or more hours a day, seven days a week, in a dimly lit room analyzing electronic imagery for the sake of national security. You sit in a large, noisy operations floor occupied by dozens of colleagues with multiple computers and monitors at each workstation. Once you walk through the door to begin your day, you will not leave until your mission is complete. You cannot gaze out a window because there are none.

Facilities like this exist on many military bases and are known as operations centers. They house intelligence analysts and weapons systems, supporting missions

conducted in theatres around the world. But these buildings have few precedents or standards to guide programming and design. Those that do exist, such as the National Geospatial-Intelligence Agency's "Exploitation Facility Standards," are narrow in scope (addressing such topics as lighting and cabling or workstation ergonomics). They provide limited guidance to architects and engineers designing these facilities.

UNIQUE REQUIREMENTS

While detailed facility requirements for maintenance and operations tasks are key components of bed-down programs for a



Creating areas with daylighting or views outside, if compatible with security, can reduce complaints of eyestrain and headaches.

new military airframe or other weapons systems, intelligence facilities have not received such attention until recently. Moreover, the design requirements continue to evolve as missions change and as equipment advances.

Unless directly engaged in supporting intelligence facilities, those programming them may not be aware of the many factors

that promote analyst wellness and productivity while also allowing buildings to be quickly adapted to evolving future needs. But when designers account for the unique programming and design requirements of intelligence facilities, they help the military create functional, secure, and reliable facilities that also support personnel wellness.

This combination promotes higher

productivity in the analysts who spend numerous hours inside, and increases the building's longevity, giving it the flexibility to meet future technological requirements.

SUPPORTING WELL-BEING

The military is recognizing that the largest enabler of productivity and mission effectiveness within intelligence facilities is the analyst who works in support of the war efforts and the greater intelligence community. But the type of work required of these individuals has uncovered several personnel challenges.

- Intelligence analysts experience wellness and health issues ranging from repetitive motion injuries to high stress, depression and anxiety.
- Intelligence analysts have a higher rate of suicide than other service career fields.
- Recruiting and retention of young servicemen and women competes with private industry.
- Transitioning between in-garrison missions and personal life creates stress.

SMART FACILITY DESIGN

Smart facility design that promotes analyst health and wellness can enhance effectiveness, and support the technology and infrastructure required to accomplish the mission. In fact, there are a number of features that may be considered in designing to support analyst workspaces.

- Select analyst workstations that address ergonomics both for the analyst and for maintenance personnel who must have safe and appropriate access to repair mission equipment, which is often tucked beneath the console work surface.
- Integrate windows in appropriate areas, with the proper security measures, and research illumination options and their associated health benefits. Windowless and dimly illuminated spaces can disrupt circadian rhythms, causing health issues.
- Consider transitions between various types of tasks (such as operations versus administrative); between areas of differing environmental conditions (such as spaces of differing illumination levels); and transitions between the workday and off duty. Analysts have said after a tough day, they sit in their vehicles and smoke until they are prepared to resume



The single largest enabler of productivity and mission effectiveness within intelligence facilities is the analyst who works in support of the war efforts and the greater intelligence community. Keeping them healthy and their morale up is a key consideration of designing their workspaces. IMAGE COURTESY CH2M

their personal lives. Include space for rejuvenation or “decompression” to assist in this transition.

- Recognize that workstyles have different needs. Focused imagery exploitation tasks have different furniture and space requirements than collaborative fusion tasks.
- Provide discrete access to counseling and medical support functions within the facility. This can go a long way toward helping to manage stress and encourage personal wellness. An analyst that has to walk past a command suite to see a chaplain may avoid seeking the help they need. Also, consider providing dedicated break areas, both quiet and interactive.
- Promote wellness with healthy options. Provide fresh food options instead of vending machines. Provide indoor bike storage and a small fitness area with lockers and showers. Exercise is proven stress reducer and many analysts have limited opportunities to leave the building to use an installation fitness center.

MAINTAINING FLEXIBILITY

Open and flexible workspaces do pose challenges. For example, to ensure life safety strategies are effective, designers must consider how to sustain egress pathways through areas that building occupants may control. Lighting, power, fire protection and

HVAC systems have to be designed for flexibility that will accommodate space changes with minimal impacts on operations.

Hearing and vision also are risk factors in these environments. Noise from heating and cooling equipment and servers and fans can be alleviated by placement and material choices. Select materials that absorb rather than reverberate sound, but are balanced so as to avoid creating a space that muffles conversation. Ductwork can be placed along outside walls and insulated.

Illumination systems based on the latest research findings can help reduce eyestrain and enhance alertness and focus. High flicker frequency lighting and areas with daylighting or views outside, if compatible with security, can reduce eyestrain and headaches, and if available in the right amounts and at the right times of day, can prevent circadian rhythm disruption. Additionally, provide multiple lighting source options and monitors in multiple locations to reduce glare on surfaces and monitors.

A SYSTEMS APPROACH

Designing 21st century intelligence facilities with a focus on human-centric design requires an integrated approach. Such buildings typically include Sensitive Compartmented Information Facilities, Special Access Program areas, entry control

FUTURE-PROOFING FACILITIES

Another design consideration for military intelligence facilities is “future-proofing,” which is the process of anticipating the future and planning to minimize the impacts of changing or unforeseen conditions (designing to avoid obsolescence of an expensive building, for instance).

Intelligence facilities often adapt to changes in the weapons systems that are driven by evolving missions and technologies. Large, column-free operations floors provide opportunities to reconfigure to changing missions. Demountable partitions may be removed quickly with limited demolition debris and dust, enabling quick changes.

Changing workstyles also can be facilitated through future-proofing. The millennial workforce and their successors are accustomed to work spaces that support collaboration and focused work efforts. Today’s intelligence buildings, for instance, may not be required to support wi-fi and cellular phone usage now, but they should be designed to be easily adaptable in the (near) future.

points, and multiple levels of network security. The best time to factor in all of the considerations is during planning and programming. Early identification of functional requirements is crucial. Spaces and functions not recognized as requirements during programming either must be taken from other authorized space or will be missing from the future building. This can have even greater impact when adapting an existing building not designed as an intelligence facility.

Once the requirements are defined, designers can then develop effective strategies for energy assurance, programming of adequate funds, and a systems approach to integrate all the mission—and individual—needs during design.

TME

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Helping our Veterans Heal

Designers are working to incorporate sustainability principles in therapeutic landscapes to aid in recovery of veterans with Post-Traumatic Stress Disorder.

By Kathleen Madsen, IIDA, LEED AP, NCIDQ, M.S.A.M.E., Cory Ziolkowski, Associate ASLA, and Monica Rios, IIDA, LEED AP, M.S.A.M.E.

Today's Department of Veterans Affairs Medical Centers are pushing the envelope when it comes to treating veterans suffering from Post-Traumatic Stress Disorder (PTSD). Through the combination of therapeutic landscapes principles and LEED benchmarks, a well-rounded solution can be created that establishes a healing environment in which patients can find comfort while contributing to a sustainable space.

Interdisciplinary teams consisting of architects, landscape architects, and sustainability experts are needed to seamlessly build therapeutic landscapes within healthcare facilities.

By working together to create these built environments, teams ensure that LEED design criteria are met to reduce overall energy use of buildings while providing environments that support the healing process for America's veterans.

THERAPEUTIC LANDSCAPES

Proximity to green spaces has been shown to alleviate mental stress and encourage social interaction. Common "Nearby Nature" design features include looped pathways, tree groves, seating areas near and away from social settings, scenic views, and sweet-scented plantings. Studies specific to Nearby Nature design in healthcare projects show a positive link between natural surroundings and the healing process, when having the ability to passively and/or actively interact with that natural environment.

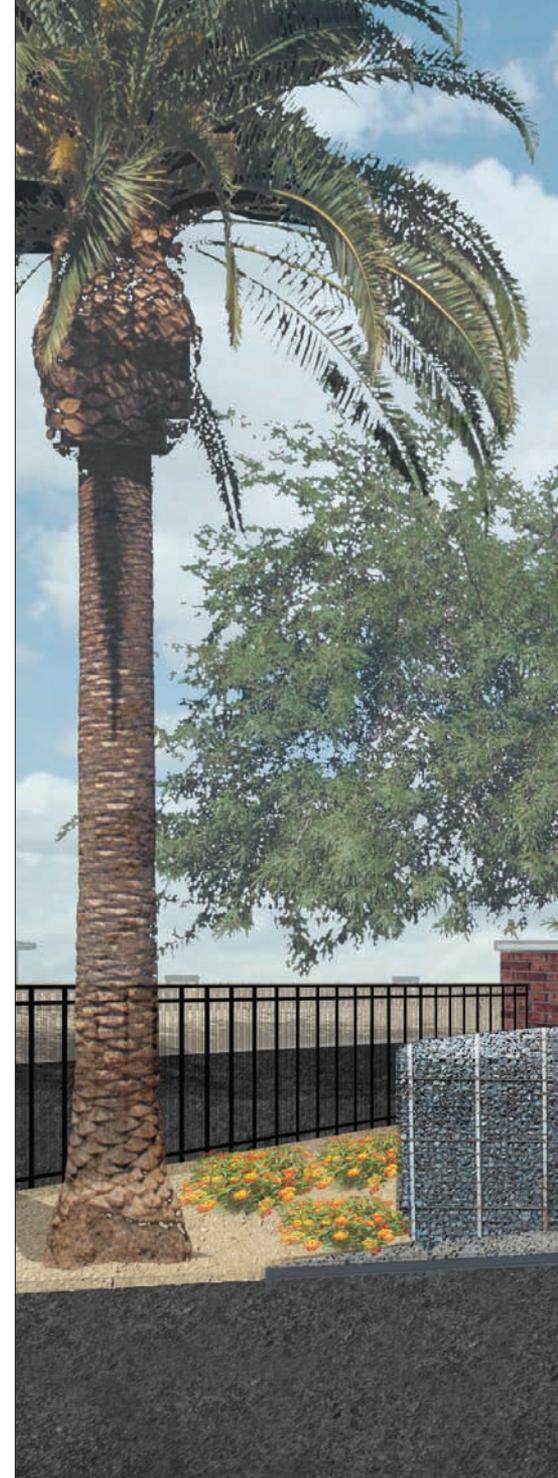
Therapeutic landscapes are built

environments that support the overall health and well-being of an individual. These unique landscapes provide an additional setting where patients, staff, and families can positively interact with one another in a natural environment.

Therapeutic landscapes are becoming more prevalent as an inclusive design element at healthcare facilities. There are multiple approaches to achieving an environment that supports a healthy atmosphere including healing gardens, courtyard spaces, and meditation or walking gardens.

Healing Gardens. Healing gardens are outdoor green spaces in healthcare settings that are designated as a therapeutic area. These gardens are designed, mostly through evidence-based design, to meet the needs of specific patient populations, and tend to be more passive in promoting a calm setting. Studies have shown that healing gardens within healthcare facilities provide a safe setting for social interaction that contributes to improvement in overall mood, immune functioning, and compliance with current treatments. These restorative pathways include the placement of explicit pathways, plantings, and unique features designed to positively influence the level of interaction with the garden surroundings, duration of stay, and reduction in symptoms related to stress and depression. A healing garden's ease of accessibility increases the ability of these strategically built environments to improve the overall sense of health, well-being, and sense of hopefulness for all the patients, staff, and families who require use of the amenities within a healthcare setting.

Courtyard Spaces. Courtyard spaces are built environments that fill the void of a building complex. Most courtyards should be visible and apparent upon entry to the building. One advantage of a courtyard over a healing garden, or adjacent park grounds, is that they are a very secure outdoor space within the building fabric and are easily monitored from anywhere nearby. Healthcare facilities have been placing cafeterias, or food kiosks, next to



these spaces to encourage social interaction through a safe setting between the indoor and outdoor environments.

Meditation Gardens. Meditation gardens, or walking gardens, indicate to users a sense of seclusion and ability to have uninterrupted personal space. These gardens are a natural place where one can find refuge to relax and connect with the natural environment.

Common design features of a meditation garden include prominent elements of rock, wood, and water. Other prominent features may include the sound or visuals



Proximity to green spaces has been shown to alleviate mental stress and encourage social interaction. Common “Nearby Nature” features include looped pathways, tree groves, seating areas near and away from social settings, scenic views, and sweet-scented plantings.

IMAGES COURTESY TK-ARCHITECTURE LLC

of moving water, high quality material of interest, and a focal item. These passive environments are great for healthcare facilities due to their peaceful setting and simplicity of design, which allow users to have an enhanced sense of control when interacting with their environment.

MEDICAL CENTER MASTER PLAN

The healing gardens that were designed for the Phoenix VA Medical Center incorporate techniques from each therapeutic landscape model and integrate multiple guidelines of LEED design.

There are two main areas of the healing garden: a small courtyard area and a larger general healing garden space. Within the courtyard area, there is a large rock wall that separates the space into two more intimate spaces. There is a semi-secluded seating area, with movable seats and tables, off the main path to the courtyard entry. This smaller area includes use of meditative elements with rock, wood, and water.

There are numerous accessible areas around the garden space to provide patients with a more protective area and a feeling of control over their surroundings.

Patients have a variety of areas to actively and passively interact with the more natural features of the healing garden. Seating areas are placed along the main pathway to encourage social interaction among user groups. The walking pathways circle the large rain garden to manage stormwater. The healing gardens make use of vibrant materials and a variety of different plantings to mitigate the heat island effect. This design would encourage everyone inside the buildings to benefit from the views out toward the thoughtfully designed outdoor environment, and to fully enjoy the peaceful



The healing gardens designed for the Phoenix VA Medical Center incorporate techniques from each therapeutic landscape model and integrate multiple guidelines of LEED design.

settings the space encapsulates.

Careful consideration was given to the garden layout so that the building structure and landscape thoughtfully address the needs of a person with PTSD and encompass sustainable design strategies.

- **Site Development:** Credits that contribute to protecting and restoring habitat and maximizing open space. (2 Points)
- **Reduce the Heat Island Effect:** Using low Sun Reflectance Index materials in non-roofed areas. (1 Point)
- **Light Pollution Reduction:** Consciously selecting lights and fixtures that have low glare and minimize light trespass from the building and site. (1 Point)
- **Water Efficient Landscaping:** Carefully selecting plantings that reduce the need for irrigation. (2-4 Points)
- **Innovative Wastewater Technologies:** Using innovative wastewater technologies to capture and reuse non-potable water for landscape irrigation. (2 Points)

Therapeutic landscapes are built environments that support the overall health and well-being of an individual. These unique landscapes provide an additional setting where patients, staff, and families can positively interact with one another in a natural environment.

- **Access to Daylight and Views:** Access to daylight and views for internal building spaces that are adjacent to the therapeutic gardens and courtyards provide occupants with a connection between indoor spaces and the outdoors. (2 Points)

RECONNECTING THROUGH NATURE

Creating a nurturing and therapeutic outdoor environment takes an interdisciplinary team finding natural strategies

and incorporating green building solutions. These therapeutic spaces allow users to have varying amounts of control over their surroundings and how they choose to interact with those around them. This provides a person suffering from an affliction, such as a veteran with PTSD, the ability to comfortably reconnect with their natural and built environments.

With evidence-based design still in the beginning stages of developing solutions for treating individuals with PTSD, it is that much more important for interdisciplinary teams of designers, engineers, sustainability experts and clinicians to keep researching innovative designs for spaces where our veterans can best heal.

TME

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The first step in the charrette visioning process for a new readiness center and aviation support facility in Kankakee, Ill., was establishing the mission for the facility. Of paramount importance was having it showcase the National Guard and become a beacon for new recruits. IMAGES COURTESY BAILEY EDWARD

Designing a Sense of Pride

Meeting the Needs of the Illinois Army National Guard

Scheduled for completion in 2017, a new dual-function Army National Guard readiness center and aviation support facility in central Illinois has been designed to attract and retain the best and the brightest.

By Ellen Bailey Dickson, FAIA, ALA, LEED AP, NCARB, NCIDQ

While National Guard members serve in uniform part-time, their pride in duty is full-time. With this in mind, it was important to National Guard leadership for the Illinois Army National Guard that the first dual-function facility in the nation should be a point of pride to those soldiers currently serving and inspire others to join the National Guard.

The need for a new facility was driven by less-than-adequate conditions at the current Readiness Center and Army Aviation Support Facility located at

Chicago Midway International Airport. The 37,491-ft² armory there is housed with the 48,161-ft² Army Aviation Support Facility in a 1940s-era structure. Because of the age and size of the facility, rehabilitation is not economic and its poor condition is negatively impacting recruiting and readiness.

In fact, the facility has the lowest ISR rating (black) for both Quality and Mission. Additionally, the Midway location is faced with Anti-Terrorism/Force Protection challenges because it is situated on 63rd Street, a major traffic artery, and suffers from a diminishing safety zone between the apron and taxiway because commercial runways have been extended to accommodate the increasing size of commercial airplanes.

To address these existing facility shortfalls in both quantity and quality, the National Guard turned to modernization.

SERVING A NEED

Central Illinois has been experiencing an increase in National Guard recruits and there are no other facilities in the area that can support the size of the units, even with an addition. A site adjacent to the Greater Kankakee Airport was selected as

the best location for the new dual-function facility. The property was donated to the Illinois Army National Guard by the State of Illinois, which is contributing to the cost of development of the project.

The new 182,000 ft² facility has been designed to provide an upgraded, safe and spacious environment for the National Guard. Incorporating and sharing program spaces—a 64,000-ft² Readiness Center and a 118,000-ft² Aviation Support Facility—will save square footage and provide greater flexibility in long-term usability. These two factors were instrumental in the decision to create a one-time dual-function facility.

WORKING TOGETHER

The cooperative endeavor between these two parts of the National Guard required a collaborative approach to address programming of the new facility. Due to time constraints and broad geographic location of users, architecture-engineering firm Bailey Edward led a week-long programming charrette involving Army and Air National Guard national, state and local users and administrators, state administrators, and the entire design team. This team agreed



Because the facility will serve as a training center and Black Hawk helicopter maintenance facility, the design concept expresses motion and its military identity in a contemporary form.

on a project vision and goals; defined final program elements; selected site, plan and massing design direction; established all security levels; set preferred building systems approaches; and identified sustainable design opportunities to achieve LEED Gold.

The first step in the charrette visioning process was establishing the mission for the facility. Of paramount importance was having the facility showcase the National Guard and become a beacon for new recruits. There needed to be design elements that instilled pride and reflected the lives of the troops. The soldier would be integrated into the core and fabric of the building. The Guard also wanted the new facility to “speak” to its current and future soldiers. This meant reflecting aspects of our computer-driven, digital, highly graphic and in-constant-motion world.

The exterior walls are designed to blend art and science, reflecting modern high-tech armed forces through a patterned design reminiscent of the digital age as well as the patterning of soldiers’ camouflage. Using three levels of transparency: clear (glass), semi-transparent (blue polycarbonate) and translucent (white polycarbonate), the main spine wall’s pattern frames views to the exterior and brings daylight into interior spaces while minimizing summer and maximizing winter solar heat gain. By extending the camouflage pattern along the long expanses of the service and hangar walls with the use of three colors of thermally-insulated metal panels, the

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entire building has a cohesive design. To achieve LEED goals for natural daylight and views, strategically placed window openings are interspersed among the colored panels. Ultimately, not only will the walls serve a symbolic purpose, but they will be visually appealing, technically innovative, and thoughtfully sustainable.

Because the facility will serve as a training center and Black Hawk helicopter maintenance facility, the design concept expresses motion and its military identity in a contemporary form. The building plan takes its inspiration from a helicopter’s tail and rotor. The building’s center anchors the three blades or wings of the structure, which houses the facility’s three units.

BUILDING CAMARADERIE

Programmatically, the central area’s communal gathering spaces will build camaraderie. Flexible classrooms and conference spaces will be used by all units, whether five, 20 or 100 are in attendance.

Three classrooms can become one with the aid of foldable partitions. To assist in flexibility, these partitions will be surfaced with white board material, allowing greater presentation and demonstration space than typical foldable partitions.

The center’s medical exam area will incorporate considerations for efficient flow and patient privacy while servicing several units’ annual exam needs. While there may be symbolism at the core of the design inspiration, there are greater common sense achievements in the solution.

The project demonstrates the success of many professionals coming together in a collaborative and engaging process to meet the complex requirements of military organizations that are serving and protecting the public. Combining the inspiration of the National Guard leadership and the responsive creativity of the design team, the Kankakee facility, when it is completed, will be a magnet for new recruits, a standard bearer for top-notch training, and a sustainable and environmentally responsible asset to the local community.

Said former Illinois Governor Pat Quinn: "A new aviation maintenance facility in Kankakee will help ensure our military has the equipment they need to protect our country. The project will also provide a major economic boost to the area that will last for years to come."

TME

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Automated control systems manage lights, shades, and temperature in response to pre-defined building settings, scenes, timeclocks, or user-defined events.
PHOTO BY DOUG SCOTT PHOTOGRAPHY 2015

The Lighting Controls Evolution

While lower energy use is a critical driver of implementing LED lighting solutions, it is just the beginning of the long-term opportunity that awaits in achieving sustainability through advanced controls and smart buildings.

By Andy Wakefield, M.S.A.M.E.

The lighting industry is in the midst of a three-tiered disruption revolution.

First, in just the last few years, LEDs have transformed the lighting landscape, introducing highly efficient lighting into

the industrial, commercial and residential markets. Second, software makes it increasingly possible to monitor, evaluate, and adjust lighting systems from any smart device to improve building maintenance and further enhance energy savings. And third, wireless technology is making it easier to install lighting control in new buildings and retrofit projects, opening up unprecedented possibilities for connected control.

All this change is making buildings smarter and more energy efficient. So what do facility managers and building engineers need to know about control, integration, and how to use the data?

FINDING ENERGY SAVINGS

Retrofitting a facility with LED fixtures and lamps will result in significant energy

savings and efficiency gains. And while lower energy use is certainly a critical aspect of the LED lighting revolution, it is just the beginning of the story.

Layering control solutions into an energy retrofit can increase energy savings by as much as 40 percent. It also makes it easier to maintain these efficiencies over the life of the building, improves occupant comfort, and is more easily adaptable to changes in building use or layout.

A simple control strategy such as occupancy sensing typically reduces energy use by 20 percent to 25 percent. As more control strategies are added, from daylight harvesting, to personal control to high-end tuning, the energy savings increase as well.

While LED retrofits alone generally reduce lighting energy use by 30 percent,

SOFTWARE ENHANCEMENTS

Regardless of your business, we are now part of an “app” culture. Applications are increasingly turning our smart phones, tablets, and even desktop computers into powerful control centers that give us on-demand access to information and data from anywhere. Lighting control systems have had powerful software capabilities for some time, but intuitive new apps and graphical user interfaces can turn smart devices into a command center, allowing facilities staff to unlock the system’s full potential without having to navigate lengthy decision trees. For instance, automated control systems manage lights, shades, and temperature in response to pre-defined building settings, scenes, timeclocks, or user-defined events. The resulting data can help the facilities team see when and where the building is using most of its electricity, and adjust control settings to optimize building performance.

With the right control provider, a facilities team can keep on top of the entire system from anywhere in the building, or even the world. Even fine adjustments to automated controls can help achieve peak energy reductions of up to 30 percent, meet and exceed energy codes, and ensure the facility conforms to federal and state energy mandates.

lighting controls can contribute another 40 percent energy savings—and still deliver a simple payback of less than 2.5 years.

LEDs are best known for their efficiency and long life, but they also are inherently dimmable. New technologies such as color-tuning are making them even more flexible than other light sources.

Today, control and lamp manufacturers have a unique opportunity to work together to provide high quality dimming and superior performance. The result becomes creative, engaging, energy-saving environments that are perfectly suited to occupant preference or specific tasks.

A simple control strategy such as occupancy sensing typically reduces energy use by 20 percent to 25 percent. As more control strategies are added, from daylight harvesting to personal control to high-end tuning, the energy savings increase as well.

TECHNOLOGY REDUCES COSTS

Almost any new lighting control system includes occupancy sensors, and many include daylight sensors that adjust electric light in response to changes in daylight. Wireless protocols make it easier to adjust placement and programming of these controls; but they can still be challenging to make sure they are in the ideal location for achieving energy-saving goals and taking full advantage of available daylight.

Sensor performance can be affected by items such as bookshelves, shades or partitions that often change once the building is fully occupied. Wireless controls can be easily relocated and reprogrammed without rewiring, tearing out walls, or further disrupting the workspace.

How effective are these controls when they are properly installed and setup? Occupancy sensing, daylight harvesting, and automated dimming control automatically adjust lighting in response to occupancy, and reduce lighting levels in response to daylight.

Another notable benefit of wireless sensors and controls is that the sensors can be used pre-system installation. Wireless occupancy and daylight sensors can be installed and programmed to log data that will accurately predict the lighting control system’s energy performance. The same sensors can then be added to the entire system as it is installed and programmed.

ENSURING OPTIMAL PERFORMANCE

Disruptive technologies are introducing advanced control solutions and changing the way we think about total light management. Buildings are more sustainable, comfortable, productive, and smarter. The final piece of the puzzle is making sure all of these technologies work together,

adapt over time, and continue to unlock the building’s full potential. In many cases, the right mix of support services is critical to maximizing system efficiency, ensuring long product life, and minimizing risk from design through building occupancy and beyond. A relatively small, upfront investment in time and money can make the entire job proceed more smoothly, reduce change orders, avoid miscommunications, and save aggravation. The best time to think about services is at the beginning of a project, before proceeding too far into system design, installation, and commissioning.

It is often beneficial to schedule a consultation visit to determine an agreed upon sequence of operations (SoO). The consultation step gives the engineering and facilities teams more time to consider what each space is designed to do, how space occupants will have to be accommodated, and what type of training is necessary for facilities and maintenance teams.

For buildings with a large number of sensors, for example, layout and tuning services ensure sensors are in the right place and are working properly based on the defined SoO. Annual follow up visits can help to ensure the positioning and programming still makes sense once the building is fully occupied.

Choose services that uniquely complement the control solutions in the building. Schedule periodic reviews of energy use data to help enhance energy savings over time. Incorporate training/preventive maintenance services; they provide peace of mind, keep systems and staff up to date, and limit unpleasant surprises.

A SUSTAINABLE FUTURE

Disruptive technologies challenge the status quo and drive change. New lighting sources and control systems are not only creating buildings that use less energy, they are creating buildings designed to save energy without sacrificing occupant comfort or productivity.

That’s great news for the people who work in these spaces—and great news for a sustainable future.

TME

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The Renovation of Building 909

At Buckley AFB in Colorado, a design team is working to preserve the historical characteristics of a post-World War II aircraft hangar while preparing the facility for the 21st century needs of the installation's diverse tenant mix.

By Brian Duggan, AIA, NCARB, CDT

Project success is often a balancing act, a strategic evaluation of many options and a continuous effort to find the best overall solution. Cost, schedule, and quality are typical drivers on every assignment. After that, projects tend to take on a life of their own based on their particular variables, challenges, and opportunities.

For the Colorado Air National Guard (COANG), preserving Building 909, a post-World War II aircraft hangar built in the heart of Buckley AFB, certainly has had its share of challenges—but the work has been an honor to carry out.

PRESERVING HISTORY

Built in 1956, Building 909 has primarily served as an aircraft hangar and the main entry and exit facility for all Guard and active duty deployments in the state, making it as vital to daily operations as it is historically significant.

Building 909's historic charm, however, has been diminished by a combination of time and circumstance over six decades of continual use. In terms of appearance, the biggest impact came after Sept. 11, 2001, when changing Anti-Terrorism/Force Protection regulations required that its many windows be boarded up for blast protection. Other issues, such as a leaky roof, inefficient and failing mechanical and fire suppression systems, accessibility improvements for people with disabilities, and the overall need to modernize the building's technological capabilities, are



Built in 1956, Building 909 has primarily served as an aircraft hangar and the main entry and exit facility for all Guard and active duty deployments in the state. PHOTO COURTESY COLORADO AIR NATIONAL GUARD

all common signs of an aging facility.

Even still, while the primary objective of the design process was to preserve and modernize Building 909, that was far from the biggest challenge. Revitalizing the facility has been on the to-do list for more than a decade. The issue always has been activating the space with the right mix of uses to justify the expense via the Department of Defense Form 1390/1391.

The 1390/1391 programming document is used to define a request for federal funding by describing the needs, requirements, and costs of any military construction spending. In the case of Building 909, the right mix of users included a total of 12 different groups drawn from a combination of COANG, the Colorado Army National Guard, and the U.S. Air Force, each of which already has operations at Buckley.

The task of making all of the disparate user groups fit together seamlessly into 62,663-ft² of existing space fell to a design team led by Burns & McDonnell. The firm secured the project through an Indefinite Delivery/Indefinite Quantity contract and brought in D2C Architects to lead programming and architectural design. The firms had worked together previously on an Army National Guard Readiness Center in Malta, Mont.

CREATING SHARED SPACES

For security clearance reasons, many of the user groups programmed into Building 909 cannot have parts of their operations co-mingle. Finding ways to create shared spaces was an important goal. Classrooms, training spaces, conference rooms, and breakrooms all will benefit from increased programming with more user groups.

The use of limited modular interior walls promotes a sense of openness and allows for reconfiguration flexibility. Much like the strategic dance of finding dedicated space in the floor plan for each tenant, because of the federal funding, each of the user groups (COANG, the Colorado Army National Guard, and Air Force) each had to have independent project costs for its own portion calculated and documented down to the square foot.

Central to Building 909's modernization is the integration of more technologically advanced systems. Included among them will be a new mission training center and four F-16 Fighting Falcon flight simulators that will also have the capacity to take on the F-35 Lighting II platform.

To accommodate the flight simulators, the design calls for a "building within a building." A 55-ft wall will divide the hangar into two sections—repositioning

PLANNING FOR THE PROJECT

Early on in the planning for the Building 909 renovation, an interactive design charrette led by D2C Architects activated and empowered the users. Through past experience working with National Guard agencies in six states, the firm has evolved its processes to best understand and utilize the invaluable insights that only the user can provide.

For Building 909, a full-day charrette, involving the entire design team, client leadership, and user groups, introduced a series of three conceptual floor plans to illustrate ways the space could be utilized. Discussions included a dissection of the positives and negatives of each option, plus estimation of associated costs. Hand-drawn floorplan overlays and diagrams were accompanied by detailed cost models and efficiency calculators to allow real-time reconfigurations. By having leadership-level participation from each of the 12 main user groups, security concerns, common area overlaps and administrative redundancies were all discussed and largely resolved on paper during a day's work.

"I was amazed during the design charrette how easily we were able to bring so many different perspectives and personalities together," says Lt. Col. Thomas Nefe, USAF, Assistant Base Civil Engineer with the 140th Civil Engineer Squadron and project manager for the rehabilitation of Building 909. "The design team's guidance was excellent because they understood our users and their needs. Just as importantly, they really knew the complex regulations governing a building like this on an active Air Force base."

The initial charrette was so successful that not only did the design team emerge with a workable programming solution, all 12 user group leaders decided to continue to reconvene to review subsequent submittals.

"This is a special building in so many ways," Nefe adds. "It was the first building ever built for the Colorado Air National Guard and it is the first and last building seen on every flight arriving and leaving the base. Between the reconfiguration of users, the preservation of our history, and the sustainable design strategies built in, we can be sure we are making wise use of taxpayer dollars by reducing our footprint and improving our efficiency."



Targeting LEED Silver certification when scheduled for completion in the fall of 2017, Building 909 will incorporate photovoltaics, geothermal heating and cooling, solar hot water, and thermally efficient Low-E glazing sustainability measures. IMAGES COURTESY D2C ARCHITECTS

two-thirds as simulators and equipment storage, while leaving a third as traditional hangar space. Within the hangar, the design team was also thrown a late curveball in February 2015, when the Air Force issued a design criteria update that required an upgrade to the High Expansion Foam Fire Suppression System.

READY FOR THE FUTURE

On the preservation side, design efforts have been deliberate. In addition to removing inappropriate exterior awnings, interior preservation efforts included maintaining a few of the hangar's overhead mono-rail cranes; refurbishing existing light fixtures as LEDs; and preserving existing handrails throughout the building. These small touches were greatly enhanced

when a trove of historic artifacts was discovered in a long-forgotten storage closet, some of which will be on display when the renovation is finished.

Sustainable design is key to most facility modernization projects. Targeting a LEED Silver certification when scheduled for completion in the fall of 2017, Building 909 will incorporate a variety of sustainable strategies, including photovoltaics, geothermal heating and cooling, solar hot water, and thermally efficient Low-E glazing. Add in the benefits of having fully functional spaces serving a diverse pool of users and Building 909 will look both classic and modern—and ready for another 60 years.

TME

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Global Trends in Construction Disputes

Between 2014 and 2015, construction dispute values and the quantity of disputes in North America declined, but globally, the cost and time involved solving construction disputes is rising.

By Roy Cooper

When construction projects devolve into argument and dispute, it may appear in hindsight that the operation was bound to fail from the start. An analysis of how each region of the world fared in five key areas (length of disputes, average value, common causes, most popular methods, and region-specific nuances) demonstrates that may very well be true.

The good news for North America, according to the *Global Construction Disputes Report 2016*, released earlier this year by industry design and consultancy firm Arcadis, is that the costs involved in solving construction disputes have decreased for the third year in a row.

Elsewhere, however, the cost and time involved solving construction disputes is rising. In fact, North America is the only global region where it is taking less time to resolve disputes. If this continues, these trends represent a positive signal for domestic projects, reducing unanticipated construction spending.

DISPUTES IN NORTH AMERICA

Between 2014 and 2015, dispute values and the quantity of disputes in North America declined. In fact, the value of disputes in the United States has dropped from a high of \$64.5 million in 2010 to \$25 million in 2015.

There are several reasons for this change. In recent years, many major construction contracts have included provisions that outline a specific procedure for addressing disputed issues. The result is that the field staff of active projects is resolving more

GLOBAL CONSTRUCTION DISPUTES

Region	Dispute Values (US\$ millions)					Length of Dispute (months)						
	2010	2011	2012	2013	2014	2015						
Middle East	56.3	8.3	112.5	9	65	14.6	40.9	13.9	76.7	15.1	82	15.2
Asia	64.5	11.4	53.1	12.4	39.7	14.3	41.9	14	85.6	12	67	19.5
North America	64.5	11.4	10.5	14.4	9	11.9	34.3	13.7	29.6	16.2	25	13.5
UK	7.5	6.8	10.2	8.7	27	12.9	27.9	7.9	27	10	25	10.7
Continental Europe	33.3	10	35.1	11.7	25	6	27.5	6.5	38.3	18	25	18.5
Global Average	35.1	9.1	32.2	10.6	31.7	12.8	32.1	11.8	51	13.2	46	15.5

SOURCE: ARCADIS GLOBAL CONSTRUCTION DISPUTES REPORT 2016

and more of the “less volatile” disputed issues. Fewer disputed issues grow into full-blown disputes that involve consultants and counsel. The downside of this, however, is that even though more disputes are being settled early, the ones that remain then metastasize into complicated, emotional affairs, with large damages at stake. These take longer to resolve, since U.S. courts dislike trying construction cases due to their large volumes of documents and complexity. Typically, courts are willing to entertain delays to the case calendar in hopes that the parties will settle the dispute.

UNDERSTANDING CAUSES

To avoid disputes, it is helpful to understand what causes them. The top three causes in North America according to the report are errors and/or omissions in the contract document; failure to properly administer the contract; and differing site conditions. This was the first year that “failure to properly administer a contract” was measured as a reason for disputes.

It is interesting, but not surprising, that this reason jumped to second place in the United States and was the top reason globally. Some of the most overlooked components of every dispute are the human factors. Pride, reputation, animosity, and the need for vindication are often the impediments to settlement and the reasons why a dispute travels to the litigation stage.

Still, should a dispute materialize formally, both parties involved could see themselves in a situation where differing views and interests could prolong the

matter. It is generally agreed that a speedy settlement of any dispute is desired.

GLOBAL PERSPECTIVE

In North America, the report finds the most disputes were in the transportation, water and wastewater sectors. Globally, the property/building construction sector had the most disputes, closely followed by the social infrastructure/public sector. The natural resources sector had some of the largest disputes. North America also bucked the global trend of having one in four joint ventures ending up in dispute.

Overall, trends observed globally differed from the scene in North America. For instance, globally, construction disputes decreased marginally in value; increased in duration; and most commonly resulted from a failure to administer the contract.

BENEFICIAL PROGRESS

The big takeaway from this recent study of construction disputes is an appreciation of how the industry in the United States is helping itself to minimize the loss in time and expense in this area. Risk of dispute is still very real, especially when the economy holds down activity. Continued success will depend on staying ahead of these indicators and addressing disputes early and often.

We must embrace the many initiatives being deployed by construction professionals, lawyers and the judiciary across the globe, and do all we can to facilitate the settlement of such disputes.

 Roy Cooper is Vice President, Head of Contract Solutions, Arcadis North America; roy.cooper@arcadis.com.

Fueling a Worldwide Mission

A new state-of-the-art fueling station at Moody AFB exemplifies what can be achieved when design and construction teams coordinate hand-in-hand.

By Susan Johnson, CPSM, M.S.A.M.E., and John Malutich

A new fueling station was sorely needed at Moody AFB, Ga., home of the 23rd Wing and first responders for Air Combat Command. The existing station was old and inadequate. It was built more than 20 years ago and dispensed only two types of fuels.

Working with base personnel, the U.S. Army Corps of Engineers, and the U.S. Air Force, engineers and constructors with Pond designed and built a modern, efficient unmanned fueling facility. The new station has four dual-automotive fuel dispensing points, one for each fuel product—regular unleaded automotive gasoline, E-85, diesel, and biodiesel—that are used for ground vehicles on base.

Construction of the new station included installing petroleum, oil and lubricant storage tanks, pumps, pantographs, an off-loading facility, protective canopies, dispenser islands, site lighting, piping, and other ancillary items for receiving, storage, and distribution. The fueling system has four 10,000-gal aboveground double-wall fire-resistant storage tanks, four pumped offload headers, a fuel tank catwalk, secondary containment for truck fill/offload, and two C-300 loading fill stands.

Additional work included a remote secondary spill containment basin, storm water detention, force protection, and storm sewer improvements. A new facility was also built to house electrical and control systems and new access roads allow for safe flow around loading/offloading stations.

TECHNICAL INNOVATIONS

Maintenance trenches are often described as a “maintenance nightmare”



The new fueling station at Moody AFB dispenses four types of fuel for ground vehicles on base. PHOTO COURTESY POND

because they fill with debris, are odorous, the pipes corrode, and they are difficult to access due to metal grates placed over top. Instead of installing carbon steel pipe in maintenance trenches, as was done on the previous system, double-walled, FlexWorks plastic piping was used, which eliminated the need for maintenance trenches.

Moody AFB is located in a remote area of southern Georgia. Most of the materials and subcontractors had to come from Atlanta, more than three hours to the north. To reduce the field time required on base during construction, fueling equipment was laid out off-site on a series of metal pipes and bracing. This “fuel skid” allowed for welding and prefabrication of the fueling system to occur in a welding shop, instead of in the field. The entire unit was then brought on base and offloaded into place with a crane. In addition to reducing field time, the skid also allowed for easier maintenance of the system later, and it is a cleaner system to maintain.

EFFICIENT AND COST-EFFECTIVE

The engineering and construction team was collocated under the same roof, which allowed for greater collaboration between designers and construction professionals. Moreover, it enabled the team to quickly work through issues that commonly crop

up on projects, avoiding lengthy delays.

For example, when groundwater was encountered, the team had to rework the storm sewer plan. There also were issues with a local surveyor who had misinterpreted the plans. Being collocated, the design and construction teams were able to immediately work together and provide the clarification needed to ensure that the issue did not impact the client or affect the intent of the design.

Construction on the project began in May 2014, was completed in November 2015, and cost \$3.9 million. The site’s total disturbed area was 1.25-acres.

SUPPORTING MISSION NEEDS

The new service station at Moody AFB not only makes refueling more efficient, the facility is more environmentally sustainable.

Despite the base’s remote location, it is a strategic installation. The host unit, the 23rd Wing, carries out worldwide close air support, force protection, and combat search and rescue operations. Personnel can now use access cards at any time day or night to start the pumps, making sure their mission is covered 24/7.

TME

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The Engineer Who Captured RICHMOND

In April of 1865, it was a young civil engineer born in Germany, raised in Cincinnati, and trained at West Point who captured the Confederate capital and effectively ended the Civil War.

BY G. WILLIAM QUATMAN, ESQ., FAIA

Name the Union general who captured the Confederate capital of Richmond, Va., in April 1865. No, not Ulysses S. Grant—nor any of the others leaders you have likely heard of.

You would be surprised at how many Civil War buffs would be stumped at this same question. It was a 29-year old German immigrant named Godfrey Weitzel, a West Point-trained engineer, a major general of the volunteer army, and captain in the Army Corps of Engineers. His military achievements were matched by his post-war engineering feats yet his name has been largely lost to history. This is his story.



Maj. Gen. Benjamin Butler's staff officers, including Maj. Gen. Godfrey Weitzel, seated to the right with his riding boots on.

We have all heard the expression “Like Grant took Richmond.” Most are, therefore, surprised to learn that Gen. Ulysses S. Grant never set foot in Richmond until after the end of the Civil War. It was not the short, bearded general from Galena, Ill., who seized the Confederate capital; instead, it was a tall young officer, measuring 6' 4" and hailing from Winzeln, Germany, Godfrey Weitzel, who bravely led the all-black 25th Army Corps of Union troops into the burning city on April 3, 1865.

No doubt, Grant's nine-month siege and his final assault on nearby Petersburg led to the evacuation of Richmond and Weitzel's ability to enter unopposed. But the Federal officer who officially accepted the surrender of the Rebel capital was, in fact, a young civil engineer.

Godfrey Weitzel was always in the right place at the right time. If it was not for a chance first assignment in New Orleans, fresh out of West Point, he might have never amounted to more than a first lieutenant, perhaps an engineer assigned to one of the lesser-known major generals. One success led to another, however, and Godfrey Weitzel's mentors saw to it that he gained recognition and promotions, each one placing him into a key location or battle. Win or lose, he seemed to come out on top with another commendation, brevet or promotion. His timing was impeccable. Maj. George C. Strong, the Chief of Staff for Maj.

Gen. Benjamin F. Butler, once said of Godfrey Weitzel: “A braver and stronger man doesn't live.” Weitzel was respected by the top commanders in both the blue and the gray: P.G.T. Beauregard, Robert E. Lee, David G. Farragut, David D. Porter, Benjamin F. Butler, Ulysses S. Grant, and President Abraham Lincoln, all of whom played a significant role in shaping his career. Yet for a man who was known by all these great names of American history, he is one of the least known of all the war's heroes.

POTENTIAL AT AN EARLY AGE

Godfrey Weitzel immigrated with his parents in 1837 and the family settled in Cincinnati, like so many other Germans did. His



Godfrey Weitzel was 6'4". Shown with his officers in Petersburg, Va., Weitzel is on the left side of the stairs, standing, hand in pocket.

father ran a small grocery store in the Over-The-Rhine neighborhood, where "Gottfried" excelled in all of his classes, graduating at the top of his high school class. Civic leaders encouraged the boy to apply for a position at West Point Military Academy, which was not only maybe the best education a young man could get, but it was free. Local politicians lobbied for the appointment even though Godfrey was just 14-years old, two-years below the required age for a cadet. Fibbing about his age, he was accepted to the academy and arrived in June 1851 as the youngest cadet on campus.

A year into his education at West Point, a new superintendent took over, a colonel from Virginia named Robert E. Lee. Superintendent Lee took special interest in the top cadets in each class and young Godfrey rose to the top, graduating second in his entire class (just as Lee had done in 1829).

The top cadets got assigned the best positions in the Corps of Engineers and Weitzel was chosen for duty in New Orleans, where he worked under Maj. P.G.T. Beauregard for four years from 1855 to 1859 on the new Custom House and on improvements to Fort St. Philip and Fort Jackson, two key locations below the city that guarded against a foreign invasion. After duty in New Orleans, Weitzel was tapped as an assistant professor and sent back to West Point until the outbreak of the war in April 1861.

THE WAR BETWEEN THE STATES

In Washington, D.C., Federal Army and Navy officers met to plan an attack on New Orleans, knowing that whomever held that port city could control the supply line to the South from the Gulf of Mexico up the Mississippi River. The only problem was that these Northern men did not know how to pass the two impressive Southern forts that blocked their path. Lt. Godfrey Weitzel, ironically, was stationed in Washington at the time and soon it became known that a young officer had intimate details

of Fort St. Philip and Fort Jackson, including their weaknesses. Maj. Gen. Benjamin F. Butler made Weitzel his chief engineer and gave him authority to obtain all the supplies that he would require to seize the two forts.

Following Weitzel's advice that the Navy should run up close to the forts to draw fire, while Union infantry paddled up streams in the unprotected rear, the Federals seized both forts on April 24, 1862, and later captured New Orleans. For this, Weitzel was made the military mayor of the city (twice) until his services were needed in the battlefield. At age 26, Weitzel was made a brigadier general and given command of troops to flush out Rebel resistance in the back woods, cane fields and bayous of Louisiana. He went on to participate in some of the most critical land and sea battles in Louisiana, Texas, North Carolina and Virginia as his career rose to unimaginable heights.

The bright young engineer was promoted to full major general at age 29 and given command of an entire Army Corps, the 25th Corps. This corps was unique in that it was comprised solely of black troops, the only such corps in the Union Army and the very last corps formed during the war. His command of former slaves led to a death sentence from Jefferson Davis, the "black flag," which the Confederate president ordered against all commissioned officers who commanded black troops. An injury to Maj. Gen. Edward Ord resulted in Weitzel being given command of all Union troops outside of Richmond, just as spring arrived in 1865. With Grant's success breaking Lee's lines outside of Petersburg, Weitzel found himself knocking on the door to Richmond, which was set ablaze on April 2, 1865, and abandoned by Jefferson Davis's local guard as they fled town.

The next morning, April 3, Maj. Gen. Godfrey Weitzel marched into the Confederate capital and accepted its surrender from the city's mayor, Joseph C. Mayo.



Ord & Weitzel Gate at Arlington National Cemetery, Va., in honor of Edward Ord and Godfrey Weitzel.

SEIZING THE CONFEDERATE CAPITAL

The irony of freed slaves wearing the Union blue and marching into the Southern capital was apparent to everyone who witnessed the scene. Flames roared out of windows and rooftops, and brick walls came crashing down. Missiles and projectiles from the exploding Confederate armory looked like holiday fireworks. Weitzel rode into the city with a force of several thousand troops not far behind him. As musicians played strains of “Yankee Doodle” the emotion was too much to restrain. Union troopers began to shout, cheer, and sing. Weitzel rode up Main Street when suddenly, through the smoke and haze, crowds of dark figures materialized. Hundreds of recently freed slaves pushed and shoved to get the closest look at the liberators, reaching out to touch the flanks of the strong cavalry horses.

The young general inherited a city dying in its own fires, set not by Federals, but by Confederates. “I found the greatest confusion, pillaging and disorder reigning, and the city on fire in several places,” Weitzel wrote. “I immediately set everyone to work to restore order and to assist in subduing the fires. I succeeded in doing this at about 2 p.m., by which time a large and valuable portion of the city had been consumed.”

Richmond was in a perfect pandemonium, with fires and explosions in all directions, the citizenry running to and from on the streets while slaves emerged to greet the all-black Union troops. Weitzel’s assessment was that there were about 20,000 people left in Richmond, half of them freed slaves who packed each side of the street rejoicing as tears streamed down their excited faces. Godfrey Weitzel had important news to share and he needed to send an urgent message to Gen. Grant. He wrote a dispatch announcing the 25th Corps’ triumphant entrance into Richmond:

The young general inherited a city dying in its own fires, set not by Federals, but by Confederates.

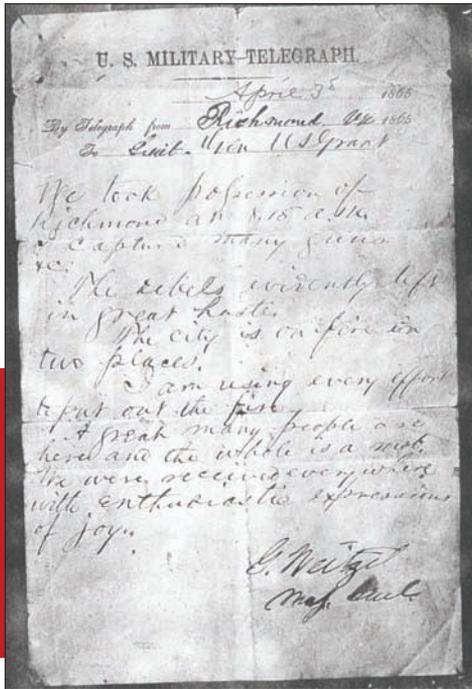
“We took possession of Richmond at 8:15 a.m. I captured many guns &c. The rebels evidently left in great haste. The city is on fire in two places. I am using every effort to put out the fire. A great many people are here and the whole is a mob. We were received everywhere with enthusiastic expressions of joy.”

The telegraph message was taken off the wires at City Point and sent to the War Department in Washington. From there to the rest of the Northern states, sparking spontaneous celebrations when read in cities like New York, Boston, Washington and Philadelphia. Within 24 hours the message was quoted in every Union newspaper, turning young Godfrey Weitzel into a hero.

That night, Weitzel was given living quarters in a three-story mansion on the corner of 12th and Clay Streets, which had been set aside for his use by none other than the Confederate executive, Jefferson Davis. The housekeeper was under instructions from Davis that the Confederate “white house” was to be surrendered for the occupancy of the commanding officer of the Federal troops who might occupy the city. That officer was Godfrey Weitzel.

LINCOLN ARRIVES IN RICHMOND

The next morning, April 4, 1865, an anxious Abraham Lincoln had planned to see Richmond as soon as it was in Union hands. Despite warnings from the Secretary of War of the danger, President Lincoln was determined to see the capital and to greet the people of Richmond. “Thank God that I have lived to see this! It seems to me that I have been dreaming a horrid dream for four years, and now the nightmare is gone. I want to see Richmond,” Lincoln said. The presidential party of Lincoln and his 12-year old son Tad steamed out of City Point aboard the *River Queen* and transferred to Rear Adm. David Porter’s flagship the *Malvern*, which steamed



Godfrey Weitzel's April 3, 1865 telegraph to Gen. Ulysses Grant: "We took possession of Richmond at 8:15 a.m."

toward the fallen city. Porter's ship ran aground on a sandbar and the admiral transferred the Lincolns to his captain's gig, a barge rowed by 12 sailors as oarsmen. Lincoln called it "his buggy."

President Lincoln came on shore about nine o'clock in the morning, with no fanfare or official reception. Godfrey Weitzel had received a telegram from City Point that the president was headed toward Richmond; but Adm. Porter made better time in coming up river than Weitzel expected. Weitzel was terribly embarrassed that he was in his office at the Virginia Capitol and not present to greet President Lincoln on the landing, and that no military escort had been provided. With a dozen sailors for protection, the presidential party proceeded on foot to Weitzel's headquarters, some two miles away. "I was therefore very much surprised to hear, just about the time I intended to get into my [carriage], that the president was already at my quarters. I drove over as hastily as possible and found the report correct," Weitzel wrote.

President Lincoln was shown into the reception room by one of Weitzel's aides and took a seat at Jefferson Davis' desk, when there was a knock on the door. Judge John A. Campbell, a former justice of the U.S. Supreme Court who held a position in the Confederate government, had stayed behind in Richmond and asked for an audience with the president. Lincoln agreed to meet with the judge but only if Weitzel could sit in as a witness.

Campbell pitched a novel to the president, assuring him that if he would allow the former Virginia Legislature to meet in Richmond, "it would at once repeal the ordinance of secession and then General Robert E. Lee and every other Virginian would submit." Campbell's suggestion was a way for Lee to save face, and to end the conflict—at least in Virginia—without further loss of life. The judge succeeded in convincing Lincoln of the feasibility of the peace-plan, primarily on the basis that it would save "the effusion of much blood."

The next day, Lincoln directed Weitzel to grant passes to the

members of the "so-called" legislature of Virginia with permission to meet in Richmond. Lincoln then departed for City Point, but wrote a letter to Weitzel confirming his instructions.

A WORLD TURNS UPSIDE DOWN

Following presidential orders, Weitzel issued the invitation to the Rebel government to return to Richmond when word got back to officials in Washington that the Confederate legislature was reconvening, by authority of a 29-year old Union officer. The Secretary of State countermanded the order and, under pressure, so did the president. Godfrey Weitzel's world was about to be turned upside down. The president's loyal advisors began to spin the story that Lincoln never issued such an order, attempting to cover what they felt was Lincoln's blunder. Blame was thrown entirely on young Godfrey Weitzel, an inexperienced officer whose loyalty to the Union flag was even called into question. The order became moot a few days later when on Palm Sunday, April 9, 1865, Lee surrendered. Lincoln wrote to Weitzel about the Virginia legislature, stating: "Do not now allow them to assemble, but if any have come allow them safe return to their homes."

This was Lincoln's last message to Weitzel. The president was assassinated just days later at Ford's Theater on April 14, 1865.

On April 13, Maj. Gen. Godfrey Weitzel was officially removed from command in Richmond. Secretary of War Edwin Stanton wrote to Grant asking: "Had not Weitzel better have duty elsewhere than Richmond?" The *New York Times* came to Godfrey's aid in an article that attempted to defuse some vicious rumors, explaining his actions, but the damage was done to Weitzel's reputation. Following his departure from Richmond, Weitzel's 25th Army Corps was shipped to the Texas-Mexico border, where the French government had taken control and installed Emperor Maximilian I as its leader after exiling Mexican president Benito Juárez. Weitzel

organized a large fleet at Hampton Roads, Va., that sailed for Texas in June. He set up his headquarters at Brazos Santiago, near the south end of what is now Padre Island. For nine months, Weitzel monitored the activities of the French military and its Imperial Guard stationed in Matamoros. When the French finally pulled its army out of Mexico and President Juárez resumed power, the 25th Army Corps was called home—the very last Army Corps to be mustered out of the U.S. Volunteers, on March 1, 1866.

WEITZEL'S POST-WAR LIFE

Despite all of his promotions in the volunteer army, Weitzel resumed his title of Captain of Engineers. On Aug. 8, 1866, however, he was promoted to full major in the regular Army. Weitzel spent the next 16 years in the service of the Army Corps of Engineers, designing locks and dams, lighthouses and harbors on the rivers and Great Lakes. He worked on many projects including improvements to the Louisville Canal. In 1873, he was made Engineer of the 11th Light House District, where he designed a massive lock at the St. Mary's Falls Canal on the U.S.-Canada border at Sault Saint Marie. The \$2.4 million project was the largest of its kind in the world when completed in 1881 and was named the "Weitzel Lock" in honor of its designer. He also served on at least five different engineering boards and translated several German engineering books into English.

Though the Weitzel Lock has since been replaced, several of his quaint lighthouse designs can be seen today. His design for McGulpin Point Light was so successful that the Lighthouse Board chose to use this design in the construction of Eagle Harbor Light, White River Light, and Sand Island Light. His design of the Saginaw River Lighthouse was challenging due to swampy ground, which

required timber piles driven deep to provide a solid foundation on which timber forms for the concrete base could be erected and filled.

The Spectacle Reef Lighthouse on the northern end of Lake Huron was designed by Godfrey Weitzel. The most expensive lighthouse ever built on the Great Lakes at that time, it is said to be the most spectacular engineering achievement in lighthouse construction on Lake Huron. The Spectacle Reef Lighthouse was pictured on a U.S. postage stamp and is listed on the National Register of Historic Places.

This was Lincoln's last message to Weitzel. The president was assassinated just days later at Ford's Theater on April 14, 1865.

DEATH OF A YOUNG GENERAL

Godfrey Weitzel's health gradually began to decline and he was assigned to lighter duty in Philadelphia, where he and his wife Louisa moved in the summer of 1882. He died at his home from complications of typhoid fever on March 19, 1884, at the age of 49. His remains were taken by train to his boyhood home in Cincinnati, where he received a hero's funeral, with his horse-drawn hearse escorted by a squad of enlisted soldiers. Godfrey Weitzel was buried in a modest family grave in Spring Grove Cemetery. In recognition of his service to the nation during the Civil War, a large gate and road were named in his honor at Arlington Cemetery on the property formerly owned by Robert E. Lee.

Although thousands of visitors today walk "Ord & Weitzel Street" at Arlington Cemetery, amid the rows of white tombstones, few know the story of its namesake, Godfrey Weitzel, the young engineer who captured Richmond.

TME

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This article is adapted from the book, "A Young General and the Fall of Richmond," by G. William Quatman, Ohio University Press (2015).

COMMENTS

from the Executive Director

Measuring Our Progress

As we near the end of our first year of executing the 2020 SAME Strategic Plan, let me start by saying there are a lot of great things happening in this Society. Thanks for your commitment!

The SAME national leadership will gather for the fall Board of Direction meeting in Atlanta on Nov. 15, 2016, where we will assess our progress toward the Strategic Plan. Thank you to everyone who has helped our Post Presidents, Regional Vice Presidents, Committee & Council Chairs and other leaders throughout the organization gather insights from members. We need to understand the challenges that our Posts, Student Chapters, and members face, so that we can decide how to support you to better enable our success!

The SAME Small Business Conference is coming to Atlanta, Nov. 16-18, and it is shaping up to be the best yet. We have changed our format so federal agency briefings will be primarily business-line oriented. There are two main reasons for this, which was welcomed by all the agencies. First, as we expand participation by other agencies, such as the Department of Veterans Affairs (VA) this year, it is easier to integrate them into a business-line discussion. Second, this format allows companies to focus their participation relevant to their business. As we go forward, we will continue to improve the market research value that the conference offers for both industry and government participants.



“ Thanks to all who attended this year’s Post Leaders Workshop, including a record 160 Post leaders, the Executive Committee and Committee & Council Chairs, and a good representation of our National Office staff. ”

PROVIDING VALUE TO MEMBERS

One of the biggest things we recognized during the development of our Strategic Plan is that SAME is truly a *volunteer organization*. As such, we launched a concerted effort to use our Post Leaders Workshop as an opportunity to teach leaders how to recruit, manage and retain volunteers. I see many examples of Posts that are reaping the benefits of the training. We will continue to grow Post participation in this key training event. Thanks to all who attended this year’s Post Leaders Workshop, including a record 160 Post leaders, the Executive Committee and Committee & Council Chairs, and a good representation of our National Office staff. Participant feedback has been that the entire event was helpful for their SAME work, their professional work, and their personal lives.

In September, we conducted our first CEO Roundtable. We had 35 senior industry leaders, the service engineering chiefs, the VA Construction & Facilities Director, and SAME’s national leadership. We addressed two key issues: implications of the upcoming change of administration on program execution, and the recent changes in small business rules. The intent of the Roundtable was to offer senior leaders the opportunity to share perspectives as they discuss challenges and solutions that could shape their guidance to their organizations. Then in October, the Tulsa Post hosted a Post-level Issues Workshop to support the SAME Industry-Government Engagement Plan. The Issues Workshops will be essential to improving the value we provide to the collaboration between industry and government and we look forward to more Posts hosting these events.

Lastly, the SAME National Foundation Board nominating committee convened on Sept. 28, 2016, and recommended several notable members for positions on the Foundation Board. The full Board will convene in January 2017. We are off and running! You can find all governance documents and information on the SAME national website at www.same.org/governance.

To all of our volunteers, *THANKS* for your dedicated service to SAME, our profession, and to our nation!


Brig. Gen. Joseph “Joe” Schroedel, P.E., F.SAME, USA (Ret.)
SAME Executive Director

Real TiME

PODCAST

SAME LAUNCHES NEW PODCAST

SAME has launched the new *Real TiME* podcast. The podcast will feature an inside look across the Society and the work that our 30,000 members and 105 Posts are doing to support national security and strengthen the engineering potential of the United States. The first podcast interview is with Col. Barry Totten, USA (Ret.), the first President of the new Tennessee Valley Post, based in Oak Ridge, Tenn.

You can listen to the *Real TiME* podcast by visiting the iTunes store and searching for “Society of American Military Engineers,” or by visiting SAME’s SoundCloud webpage.

STREAMER SUBMISSIONS DUE JAN. 20

Each year, Streamer Awards are presented to Posts in recognition of outstanding performance and achievement in support of the SAME mission and *Strategic Plan*. Posts interested in applying for a Streamer Award can visit www.same.org/streamerawards to view criteria and download submission documents.

All Streamer submissions are due by Friday, Jan. 20, 2017.

AWARDS NOMINATIONS DUE FEB. 1

SAME’s annual Awards & Medals Program recognizes Sustaining Member organizations—companies and agencies—as well as individual members for excellence in engineering, architecture, education, technology, leadership, and more. To submit a nomination, visit www.same.org/awards.

Nominations must be submitted by Wednesday, Feb. 1, 2017.

BOARD OF DIRECTION NOMINATIONS DUE DEC. 1

Nominations for National Officers and Elected Directors to serve on the SAME Board of Direction are open from Oct. 1, 2016 through Dec. 1, 2016. Elections for candidates approved through the nomination process will be held in spring 2017.

For more information on qualifications to serve and to submit nominations, visit www.same.org/boardnominations.



SOCIETY TRIVIA: DID YOU KNOW?

1 What was the name of *TiME*’s predecessor and in what years was it published?

3 Who was SAME President in 1941 and is known as the “Father of the Seabees”?

2 In what year was the first SAME National Conference branded “JETC” held, and where?

Answers to September-October “Did You Know”:
 (1) Maj. Gen. Mason M. Patrick, USA (Ret.), SAME President, 1930 (2) Junjian “JJ” Tang, AIA, LEED AP (3) Texas, 7; California, 7; Florida, 7



PROGRAMS UPDATE

From live webinars to onsite presentations, SAME continues to work to bring forth valuable continuing education opportunities so you can grow professionally.

Webinars. Our Committees & Councils have been busy planning many great webinars for the rest of this year and into 2017. On Nov. 10, join Beth Rudy, Senior Consultant of Insight Management Consulting LLC, for an engaging presentation, “How to Put Your Motivators to Work.” In December, don’t miss “Be a Leader Who Makes a Difference: Positive Influence in the Workplace,” with Paul McMurray. All of SAME’s upcoming webinars are advertised in advance through our new monthly e-newsletter *Real TiME*. Check your inboxes or visit www.same.org/realtime to see the latest issue.

National Events. We are having huge success from our Call for Presentations. At the upcoming SAME Small Business Conference (Nov. 16-18 in Atlanta), we will have doubled the number of education sessions that were provided last year. We just finished a Call for Presentations for the 2017 Facilities Management Workshop, being held Feb. 8-10 in San Antonio. And in November, the Call for Presentations will open for next year’s JETC in Columbus, Ohio.

Continuing Education Courses. The Honolulu Post recently invited SAME National to deliver a Continuing Education Course to its local area and in conjunction with other professional associations. Instructor Bill Sorrentino delivered a course titled “Project Management: Skills and Techniques to Up Your Game” where 18 people took part (see photo above) and offered outstanding feedback. Along with industry attendees, many AFCEC and NAVFAC personnel attended, and AFCEC has already recommended this to its counterparts in Europe. Bill is booked for Stuttgart, Germany on Monday, Feb. 27, 2017, the day prior to the SAME Europe Engineer Capabilities Workshop, which is being held Feb. 28-March 2.

All ideas are welcome to me at ndesport@same.org. See you in Atlanta for the SAME Small Business Conference!

Col. Nick Desport, RA, LEED AP, F.SAME, USAF (Ret.)
 SAME Director of Programs

POST NOTES



The **Scott Field** and **St. Louis Posts** on Sept. 16 jointly held a Trivia Night and Silent Auction to benefit the Missouri Patriot Paws Organization. This organization provides Missouri military veterans suffering from Post-Traumatic Stress Disorder or Traumatic Brain Injury with a trained service dog, most of which have been rescued from local shelters. The event raised almost \$13,000. SAME National donated two registration tickets to the 2017 JETC as well as two hotel stays.



SAME National President Capt. Mike Blount, F.SAME, USN (Ret.), visited the **Pensacola Post** on Sept. 15, where he discussed the 2020 *SAME Strategic Plan*, the value of professional associations, and military membership. The Post's military membership is primarily Navy engineer personnel given its proximity to the local naval air station.



On Aug. 16, Nancy Manley F.SAME, of the **Robins AFB Post** (above left) was presented an RVP medal for her dedication over 15 years stepping up in various leadership positions including Membership Director and National Liaison. Nancy has been an SAME member for more than 25 years. She retired this fall. Cindy Miller, Deputy Director to the Regional Vice President, presented the medal.

POST BEST PRACTICES

GIRL SCOUTS STEM DAY

Each year, the Pikes Peak Post hosts a STEM Day for Girl Scouts in the spring with the U.S. Air Force Academy, offering activities for Girl Scouts (grades 2-12) to have fun learning about science, technology and engineering, including building and launching a rocket and breaking steel and concrete. To learn more about how your Post can host a similar event, contact Todd Cartwright at tac-vw@comcast.net.

ENGINEERING MERIT BADGE

The Rock Island Post recently presented a Best Practices webinar on its program with the Boy Scouts of America to co-sponsor a Boy Scout Engineering Merit Badge Workshop each year during Engineers Week. To listen how your Post can implement a similar program, visit the Post Resource Center under "Get Connected" at www.same.org, and then find the webinar located right beneath STEM Camps in the Post Best Practices tab.

Want more Best Practices? Visit the Post Resource Center under "Get Connected" at www.same.org.

POST LEADERS WORKSHOP



2016 POST LEADERS WORKSHOP

The 2016 Post Leaders Workshop was held Aug. 28-30 in St. Pete Beach, Fla. A record 160 Post leaders attended the training, which offered expert insight on how to recruit volunteers and get more members engaged.

Attendees were also treated to presentations by Col. Stretch Dunn, USA (Ret.) on Vietnam military engineering and support to veterans; Capt. Jim Donahue, F.SAME, USCG (Ret.), on spreading the work load among volunteer leaders; and Lt. Col. Buddy Barnes, F.SAME, USA (Ret.) (photo above left), on ways to engage non-military public agencies. In addition, SAME's Committees & Councils briefed attendees on their work plans for the coming year and provided insight into how Posts can utilize the national Committees & Councils to support their local programs.

Next year's SAME Post Leaders Workshop will be held Aug. 20-22, 2017, once again in St. Pete Beach. To see more photos from this year's event, visit SAME's Flickr page.



LETTERS

to the Editor

I would like to express my appreciation to all of those who took part in the preparation of the Vietnam Commemorative Issue. It brought back many memories of my three tours in Southeast Asia. The first was in Thailand in the 809th Battalion in 1963. That was followed by two Vietnam tours, the first in 1967-1968 with the 815th and the 70th Battalions and the second in 1970 with the 27th Battalion and the 45th Engineer Group. I particularly enjoyed seeing the contributions of several individuals with whom I had served. I have always been convinced that we engineers from all the services did an exceptional job there.

—Col. Charles Myers, F.SAME, USA (Ret.), Palatka, Fla.

Awesome, warm, and personal. The Vietnam Commemorative Issue made me feel much better about serving, as I felt today our country does appreciate our sacrifices. I enjoyed learning what a number of my fellow soldiers actually did while in Vietnam—soldiers I had served with after, but never discussed their experiences. Reading it also made me wish I had sent in my story as the engineer on a MACV team as far north as you could go.

—Lt. Col. Jack Seibert, F.SAME, USA (Ret.), Atlanta, Ga.

Received my copy of *The Military Engineer* Vietnam Commemorative Issue and I'm thoroughly impressed. The stories, and a great collection of pictures, captured quite accurately my recollections of time spent in country. I especially enjoyed the discussions about Cam Ranh Bay, Nha Trang and Hon Tre Island, but also found that the work in other areas seemed very much like what we experienced. Good to see the articles about contractors, Seabees, Air Force and Army engineers, and the special detachments, as I had opportunities to work (and trade) with all of them. I congratulate you on the excellent job done to provide a comprehensive, yet personalized review of the work we did in "Nam" 50 years ago.

—Barry Pritchard, Chicago, Ill.

I was reading the "Duty and Purpose" article in the *TME* Vietnam Commemorative Issue and I was very pleasantly surprised to see my picture on page 16! I do not know who took the picture (there is no photographer credit), but the caption data are all correct. I was a young lad of 23 at the time, and I commanded a Rome Plow Company engaged in jungle clearing operations with the infantry.

—Col. William Gang, USA (Ret.), Rancho Sante Fe, Calif.

Congratulations for all the great magazines you have put out over the years; I always look forward to subsequent issues. I particularly want to commend you for the recent Vietnam Commemorative Issue. It was very well done, and brought back a lot of memories of great soldiers that I worked with and days gone by.

—Col. Albert Kraus, P.E., USA (Ret.), Canandaigua, N.Y.

What a phenomenal edition of *TME*! Bravo Zulu. I am absolutely blown away. This is tremendous from cover to cover. What an effort it had to be to put all this together.

—Rear Adm. Gary Engle, P.E., DBIA, F.SAME, USN (Ret.), Seattle, Wash.

That is an absolutely wonderful compendium that you pulled together. I never imagined it would turn out so well. As a 23-year-old returning from war, I was spit at and called a "war monger pig" on my journey back to New York. When I got home, I buried my uniforms as deeply in my closet as I could. As a result, I can honestly say I was never really proud of my service in Vietnam. Until now. Thank you for recognizing the work of me and my fellow vets.

—Thomas Dickmann, P.E., F.SAME, Pleasantville, N.Y.

We want to hear from you! Email us your feedback at editor@same.org.

NOTE: Letters selected for publication may be edited for length and clarity.



Setting a Contingency Theater: Reviewing the 2016 JETC Table Top Exercise

By Lt. Col. Shawn Howley, M.SAME, USA (Ret.), and Col. William "Bill" Haight III, P.E., M.SAME, USA (Ret.)

One of the objectives of the 2020 SAME Strategic Plan is to establish the Joint Engineer Training Conference (JETC) as the premier national training event for all military, federal and public sector engineers and the supporting A/E/C industry. SAME's national Joint Engineer Contingency Operations (JECO) Committee succeeded in moving closer to this goal by conducting the first-ever Table Top Exercise (TTE) at this year's JETC in Phoenix.

With the reduced size and scope of ongoing contingency operations relative to the peak of operations during Operation

Iraqi Freedom and Operation Enduring Freedom in Iraq and Afghanistan there have been concerns expressed about the readiness and capacity of the Total Joint Engineer Force to "set" a new contingency theater in a new conflict area. The "Total" Joint Engineer Force includes all active and reserve component military engineering units from all services; the institutional engineering elements, such as the U.S. Army Corps of Engineers, Naval Facilities Engineering Command, and Air Force Civil Engineer Center; and the members of industry that support military contingency operations with engineering and logistics.

The exercise had two specific goals. The first goal was to educate and train members of the engineering community on the capabilities, capacities and limitations for employment of each element of the Total

Joint Engineer Force. The second was to identify current and future obstacles and limitations through a notional scenario in order to inform force shaping actions and generate further study aimed at improved engineering readiness and responsiveness.

The TTE was named Operation "Atlas Sunrise" based on the training exercise used at the Joint Engineer Operations Course. The North Africa scenario assumes a growing insurgency in the region, a request for U.S. assistance, and a ramp-up of activities over several months that starts with security engagement tasks and develops into a Joint Force deployment and intervention.

Almost every Combatant Command (COCOM), Service Component Command, Service Engineer, and Service Engineer School participated. Engineer officers from the Joint Staff, the COCOMs and the Joint

Operational Engineering Board (JOEB) Coordination Group served as facilitators, as well as industry senior leaders. In addition, there were multiple senior officers, non-commissioned officers and civilians from a variety of commands and government organizations in the engineering and logistics community, as well as participation from several of the leading industry firms that support contingency operations.

The TTEx construct employed four pillars and two areas of interest as an analysis framework. The construct pillars consisted of Engineer Force Capability; DOD & Services Logistics Support; Contingency Contracting Support; and Industry Support Capability. The areas of interest were Unity of Effort and Unity of Purpose; and Engineer Planning Process.

The subject matter expert participants were broken into four focus groups aligned with each of the exercise pillars and were charged to analyze both areas of interest for planning and execution actions required, by phase, for their pillar. The examination was limited to Phase 0-Shape, Phase I-Deter, Phase II-Seize initiative, and initial considerations for Phase III-Dominate.

FOCUS GROUP ONE – ENGINEER FORCE CAPABILITY

Observations from Focus Group One highlighted that in the Unity of Effort and Unity of Purpose interest area there is a lack of joint engineer unity of effort. Their recommendation is to improve the targeting of engineer effects. They also noted the need to ensure that the right engineering capability is in the right place and at the right time, and recognized the challenges associated with access to reserve components without sufficient advanced notice. This was tied to a need to improve unity of effort with prime contractors, which may be called upon for support in lieu of military forces when uniformed capacity is otherwise not available.

For the second area of interest in the Engineer Planning Process the group noted that there is an engineering gap in planning across all operational phases throughout the joint community. Their recommendation is to articulate engineer planning activities better in joint and service doctrine. They specifically noted



the lack of viable collaborative planning tools, processes, joint training, exercises, education, requirements determination, acquisition, and the inability to validate engineer planning assumptions.

FOCUS GROUP TWO – DOD & SERVICES LOGISTICS SUPPORT

Focus Group Two noted in the Unity of Effort and Unity of Purpose interest area that the planning process needs to revise acquisition requirements for service interoperability, and pre-approved funding and designated responsibilities for developing or expanding intermediate staging bases and ports of departure. In the second interest area of the Engineer Planning Process, there is a need to increase joint training on planning and theater opening.

FOCUS GROUP THREE – CONTINGENCY CONTRACTING SUPPORT

The observations from Focus Group Three summarized that in the Unity of Effort and Unity of Purpose interest area there is a need to include contracting commands and officers earlier in the crisis action planning timeline.

Likewise, for the second area of interest in the Engineer Planning Process, the group identified that there is the need to coordinate and publish a contract management and theater access/clearance plan for contractors earlier in the planning cycle.

Those interested in participating in the 2017 TTEx can visit www.same.org/jeco or contact the authors for more information.



SUPPORTING JOINT ENGINEERING

The Joint Engineer Operations Course, held several times throughout the year, is designed to educate engineer officers and noncommissioned officers from all the military services for operations in the joint environment.

SAME supports the course by providing perspective from industry contractors who have experience in downrange operations. The “Contractors on the Battlefield” briefings gives insight into how the engineer forces work in concert with contractors and are able to leverage one another’s skills and capabilities. In September, 78 students from all services and the Defense Logistics Agency (above) listened to Scott Booth of KBR and Charles Mouzannar, Amec Foster Wheeler, during presentations at Ford Island, Hawaii.

FOCUS GROUP FOUR – INDUSTRY SUPPORT CAPABILITIES

Focus Group Four recommended for the Unity of Effort and Unity of Purpose interest area that Contractor Capability Packages (CCPs) be developed, to include separate private security contractors, to augment military unit security and staffing capabilities and fill organizational capacity shortfalls for contingency environments. Also, if necessary and feasible, such CCPs could replace military capabilities in non-contingency environments so military engineering units could be used elsewhere on higher priority missions. Additionally, the group recommended reorganizing the Joint Task Force (JTF) structure to integrate contracting officer and contractor management into operations under the JTF commander.

For the second area of interest in the Engineer Planning Process, there is a need to enhance contract vehicles to include Capability Based Packages and Over The Horizon Intermediate Staging Bases to support on-call contractor resources for in-theater employment.

THE WAY AHEAD

The inaugural TTEEx provided an opportunity for the Joint Engineer Community to educate and train on the capabilities, capacities and limitations for employment of each element of the

The inaugural TTEEx provided an opportunity for the Joint Engineer Community to educate and train on the capabilities, capacities and limitations for employment of each element of the Total Joint Engineer Force.

Total Joint Engineer Force. The results will be used by the JOEB Coordination Group to advise the JOEB, which consists of all the service engineer chiefs and the Joint Staff J4, on establishing the FY2017 JOEB Work Plan. The JOEB will determine which of the observations will be examined further by staffs, school houses, and commands in order to develop new or revised doctrine, techniques, training and/or policies to improve the capacity and readiness of the Total Joint Engineer Community to support future contingency operations.

To build on the momentum created at the 2016 TTEEx, and to continue increasing the training relevance and usefulness of the conference for the total joint military engineering community, both government and industry, SAME will host the second TTEEx at the 2017 JETC in Columbus, Ohio, using an Humanitarian Assistance/ Disaster Response scenario based on the existing unclassified Defense Planning Scenario.

In particular, participants will examine the adequacy of Engineer Command and Control structures to organize and execute the complex nature of such an event. The JOEB Coordination Group has expressed an interest in this focus given that the next revision for Joint Publication 3-34, Engineer Operations, will start in 2017.

TME

Lt. Col. Shawn Howley, M.SAME, is Director of Joint Engineer Education Programs, U.S. Army Engineer School, Fort Leonard Wood, Mo.; shawn.p.howley.civ@mail.mil.

Col. William “Bill” Haight III, P.E., M.SAME, USA (Ret.), is Senior Vice President, Louis Berger; whaight@louisberger.com.

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The Military Engineer

2017 TME Editorial Calendar

Get Published! TME is accepting articles on the following topics for possible publication in 2017!

January-February

- Environmental Engineering
- Innovative Financing & Partnerships

March-April

- The Infrastructure Issue
- Spotlight on Resilience
- Special Feature on Seabees' 75th Anniversary (Article submissions due Dec. 16.)

May-June

- Energy & Sustainability
- FY2018 Engineering Service Programs

For more information, including submission deadlines, visit www.same.org/tme or contact editor@same.org.

July-August

- Project Delivery
- Joint Engineer Operations

September-October

- Asset Management
- Health & Safety

November-December

- Design & Construction
- Humanitarian & Civic Assistance

Every issue also welcomes submissions for:

- Spotlight Articles
- Professional Insights:
 - Contracts & Acquisition
 - Business Development
 - Research & Innovation
 - Training & Development



2017 NATIONAL EVENTS

SAME/IFMA Facilities Management Workshop
Feb. 8-10, 2017 • San Antonio, Texas

Europe Engineer Capabilities Workshop
Feb. 28-March 2, 2017 • Stuttgart, Germany

SAME Capital Week
FY2018 DOD & Federal Agency Program Briefings
March 7, 2017 • Bethesda, Md.

Academy of Fellows Investiture
March 8, 2017 • Bethesda, Md.

Golden Eagle Awards Dinner
March 8, 2017 • Bethesda, Md.

Transition Workshop & Job Fair
March 23-24, 2017 • Linthicum, Md.

Joint Engineer Training Conference
May 23-25, 2017 • Columbus, Ohio

Post Leaders Workshop
Aug. 20-22, 2017 • St. Pete Beach, Fla.

Small Business Conference
Nov. 15-17, 2017 • Pittsburgh, Pa.

WWW.SAME.ORG/CALENDAR



S T E M Corner

STEM OUTREACH: IT'S A GROUP EFFORT

At the Post Leaders Workshop (Aug. 28-30) in St. Pete Beach, Fla., the SAME STEM Committee had a great opportunity to interact with more than 160 key local, regional and national leaders in our Society. Many folks at the event were very supportive of STEM activities and wanted to get involved.

STEM is a major focus for the majority of our 105 Posts and can have an enormous long-term impact, especially when you connect the dots and realize STEM success is, collectively, the actions of a Post STEM coordinator, school outreach efforts, golf events to raise money for STEM scholarships, Girl Scouts and Boy Scouts badging programs, STEM competitions and challenges, mentoring at the middle and high school levels, and summer STEM Camps recruiting—just to name a few opportunities to get engaged.

Think about this: potentially one-third to nearly one-half of SAME Post volunteers are engaged in some form of STEM support activities. Share your programs with us and your best practices, as we all work to grow our nation's future engineers...because together, we can do more.



(Top) Lt. Marcie Nordt, USA, of the SAME Fort Campbell Post, along with 10 other volunteers from the U.S. Army Corps of Engineers, judge the Army's Junior Solar Sprint Car competition at the TSA National Conference in Nashville, Tenn. (Right) Students present during the Planning a Mission to Mars competition at the TSA National Conference.

GROWING CAMPS PROGRAM

Mentoring Campers. A great way to continue to support the STEM Camps students throughout the school year is to invite the campers to your Post meeting and have them brief members on their experience. Please provide any feedback from your campers to the national STEM Committee and continue to track and mentor their progress.

New STEM Camps. We are currently working on several fronts to expand SAME's annual STEM Camps program.

- **Navy Pensacola Camp:** We are working with the Navy in the Florida Panhandle to establish a camp at Naval Air Station Pensacola. Details are still being worked out. Matt Haupt and Gerald Morris are the lead organizers.
- **Navy "other location":** SAME National President Capt. Mike Blount, F.SAME, USN (Ret.), along with a dedicated team, is working at the senior levels to find a new home the SAME/Navy camp that was formerly held at Port Hueneme, Calif.
- **New Air Force STEM Camp:** We also are working with the Air Force STEM Director Rick Baker from Wright-Patterson AFB, Ohio, to find a location for a new Air Force camp. If your Post is co-located with an Air Force base and has the energy and leadership to launch such an initiative, let us know. Right now the model is for a 40-camper program, with live-in arrangements. But we could start smaller if that proved to be a better fit.

SUPPORTING STEM PARTNERS

TSA National. The SAME STEM Committee recently was represented at the Technology Student Association's (TSA) National STEM Conference in Tennessee, along with 7,500 students from all over the country. Both the Nashville and Fort Campbell Posts also were on hand and engaged in the conference. The quality of the presentations and products developed by the students is incredible. These high schoolers and middle schoolers had already competed at the state level and advanced to nationals. Events were varied, with titles such as Endurance Flight, Robotics, Solar Sprint Car, Problem Solving, Technical Debate, Planning a Mission to Mars, and more.

TSA and SAME Posts. In meeting with TSA state representatives, we discussed a connection between SAME and TSA at the state level. TSA state representatives are very active and host numerous competitions and conferences. We will be reaching out to SAME Post leaders to ask you to develop local relationships with TSA. This is a win-win, as it provides your Post with instant connections to thousands of students interested in STEM and STEM events.

NSTA National STEM Forum. The National Science Teachers Association STEM Forum was held in Denver this summer. The SAME STEM Committee was involved. We presented on our great efforts as a Society to lead STEM initiatives, including the camps and other events in this arena. There were more than 3,000 teachers present and it was an excellent venue to share our STEM message.

If you are interested in getting involved in these or other national STEM opportunities, please contact the SAME STEM Committee or visit www.same.org/stem.

We continue to learn more about the many STEM activities that our Posts are involved in, but of course there is so much more going on out there across the Society and we want to highlight this great work. At the recent Executive Committee meeting, held during the Post Leaders Workshop, it was agreed that Posts will identify a local STEM Coordinator and provide the name to SAME National. This will help tremendously by allowing direct connection among a STEM "braintrust" across the organization. It would be valuable as well for all Post STEM Coordinators to join the national STEM Committee.

TME

Lt. Col. Scott Prosuch, F.SAME, USA (Ret.) is Chair, and Carrie Ann Williams, CPSM, M.SAME, is Vice Chair, SAME STEM Committee. They can be reached at sprosuch@earthlink.net; and carrieann@andanaconsulting.com.

WHERE ARE THEY NOW?

Hundreds of SAME Engineering & Construction Camp alumni have gone on to become engineers in the private sector and leaders in the U.S. military. Know of a former camper who has gone on to great things? Email Scott Prosuch at sprosuch@earthlink.net.

2ND LT. JACOB MILLER, USAF



- SAME/U.S. Air Force Academy Camp, 2010
- Montana State University and Air Force ROTC graduate, 2015 (Electrical Engineering)
- Currently assigned to Wright-Patterson AFB, Ohio

RYAN MILLER



- SAME/U.S. Air Force Academy Camp, 2013
- President of School Honor Society and Business Professionals of America
- Currently an Air Force ROTC cadet at Montana State University (Electrical Engineering major)

GRACIE MARULANDA



- SAME/U.S. Air Force Academy Camp, 2016
- Eight-time Karate Black Belt National Champion
- Recently presented at the South Florida Post luncheon on her camp experience and "The Drive to be the Best"
- She was recruited at the Dojo by South Florida Post President Daphne Gurri, also a karate student

NICHOLAS WRIGHT



- SAME/U.S. Army Camp, 2014
- Plays football and soccer
- Member of Beta Club, Astronomy Club, Mu Alpha Theta, and National Honor Society
- Accepted a West Point appointment, 2016 (will major in Engineering)

Bridging the Cultural Divide

Understanding in the Joint Environment

By better articulating how all military engineers contribute to a common purpose, beyond component tasks, a greater shared understanding can be achieved across the joint community.

By Maj. Vincent A. Rea, RA, M.SAME, USAF

Every year, the U.S. Air Force provides several Field Grade officers the opportunity to attend a sister-service, professional military school. Upon graduation, these officers return to leading airmen in their primary specialty, armed with valuable lessons from their joint education.

As a student in the 2016 U.S. Army Command & General Staff College's graduating class, I attained a clearer picture of how the other military branches perceive the role of airpower in warfare. I also became aware of how that perspective differs from a typical Air Force officer's point of view. After reflecting on this disparity, I developed a stronger vocabulary to describe cultural differences that result in miscommunication between the joint services. As an officer in the Air Force's engineer community, it is vital to understand our role within the larger context of the Air Force. By better articulating how engineers contribute to a common purpose, beyond our component tasks, we can achieve shared understanding throughout the joint community.

DEFINITIONS MATTER

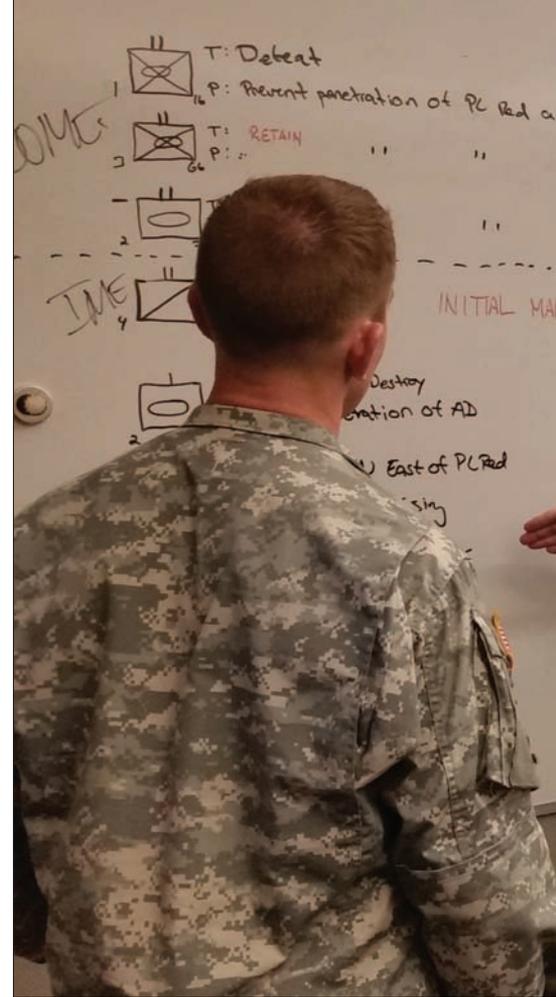
During 15 years of joint operations in multiple theaters, engineers were tested with employment in challenging environments. The evolution of the airman's involvement in ground maneuver during that time showcases Air Force contributions to the joint fight. Strategic leaders in all uniformed services continue leaning on

engineers to solve complex problems on the battlefield, often asking for far more than just airfield construction. Regrettably, despite recent impacts on two major military campaigns, senior U.S. Army and U.S. Marine Corps leaders do not generally view Air Force engineers as having the same level of war time proficiency as land-component engineers. Similarly, leaders in the Air Force engineer community have anecdotally conceded the argument that airmen are not "combat engineers" in the sense that they are not Sappers.

This argument is not an indictment of the Sapper institution, nor of their capabilities or training. Rather, it is an agreement that Air Force engineers are not formally trained to enable the same type of movement and maneuver. Regardless, fundamental engineering principles are constant across all services. A combat engineer removes obstacles to movement and maneuver. Air Force engineers pass the litmus test by removing obstacles to employing airpower in combat.

To be effective joint partners and equally recognized in the joint environment, Air Force officers of all specialties must understand and use a common language in joint operations. We must dispense with our aversion to the doctrine that lays out that language. At the same time, we must articulate what distinguishes us from the other services. For example, to enter the Civil Engineer career field, the Air Force demands officers obtain a formal degree in an engineering discipline, after which the Air Force Institute of Technology spends tremendous additional resources cultivating technically proficient officers with an accredited, graduate-level education.

In the 21st century, installations are a battlefield. At the tactical level, Remotely Piloted Vehicle missions and cyber activities are controlled from government buildings, while providing effects direct to the warfighter. At the strategic level, Inter-Continental Ballistic Missile silos are launched from a facility. In each case, the



The U.S. Air Force provides several Field Grade officers the opportunity each year to attend a sister-service, professional military school. These officers then return to their primary specialty after graduation, armed with valuable lessons from their joint education. PHOTO COURTESY U.S. ARMY COMMAND & GENERAL STAFF COLLEGE

To be effective joint partners and equally recognized in the joint environment, Air Force officers of all specialties must understand and use a common language in joint operations.

Air Force engineer's responsibilities rest firmly within the combat realm, particularly so in contested environments such as Iraq and Afghanistan.

SYSTEMS-FOCUSED CULTURE

To better explain the difference between Air Force expectations for engineers, and those of the joint community, officers must understand why those divergent perspectives exist. Specifically, Annex 3-34 of Air Force doctrine distinctly describes airpower as not only the aircraft that delivers it, but



“coordinated activities [between] elements in the warfare system.” This same document identifies the installation as a key component of a triad, that includes the “weapon system” and “weapon support system.”

The land component, by contrast, traditionally views combat power in terms of a unit’s ability to lethally move and maneuver. Counterinsurgency missions have reduced the frequency of offensive military operations and increased the value of stability operations. Presence trumped maneuverability, and made strategic basing and installation engineering more valuable.

The joint community continues to take for granted the role of the installation in providing airpower. This diminishes opportunities for engineers to propose valuable input during operational planning. Understanding our own doctrine, and relating it to joint doctrine, could help the combined arms community incorporate vital facility and infrastructure considerations earlier in the planning process.

The installation-culture does not easily translate between services because of disparate philosophies. One large difference is the scale at which each component contributes to warfare. Though it does not denote the

importance of the contribution itself, the dissimilarity reminds us that each branch serves a specific purpose under a common overall objective. Air Force engineers strive to embody their service manifesto, “Global Vigilance, Global Reach, Global Power for America.” They focus on weapon systems and their employment through a worldwide installation network. Conversely, the Army focuses on individual soldiers and their ability to carry out a mission, within precise parameters of time and place, “to fight and win our nation’s wars.”

On an Army post, facilities support training for yet unknown missions. On an Air Force base, current operations often bleed into future operations with no discernable transition. This allows the Air Force to “Seize the Initiative,” and the Army to mobilize to “Dominate,” as stated in the joint phasing concept. Consider an infantry soldier’s rifle. It is his primary means of defense, and his most compelling concern is its effective operation. Such is the case for airmen and their airbase. During wartime, the soldier and airman both employ their weapons in equally important ways, but the Army invests predominately in its soldiers and the Air Force in its installations.

RELATING THROUGH DOCTRINE

My joint education experience provided me with many important lessons, primarily a refined understanding of the cultural differences between the air and land components. I realized, however, that such gaps can be transcended by increased familiarization with our doctrine.

Improved doctrinal competency fosters a common vernacular and yields more fruitful engagement between components. My time at the Command & General Staff College has shown that the joint community accepts the Air Force’s contributions to operational planning. The only request is that we help build shared understanding by utilizing common, joint terms. This is true not just for Air Force engineers, but all Air Force officers.

There remains a need to facilitate dialogue about the military engineer’s mandate within joint operations. If doctrinal fluency can spark inter-service discourse, which is my belief, then the next step is to find additional means to close the cultural gap.

TME

Maj. Vincent A. Rea, RA, M.SAME, USAF, is Commander, 423rd Civil Engineer Squadron, RAF Molesworth-Alconbury, United Kingdom; vincent.rea@us.af.mil.



SAME Medals & Awards

Nominate an outstanding SAME Member, Sustaining Member Company, or Public Agency for one of SAME's prestigious awards and medals!



Award nominations are due to SAME by
close of business Wednesday, Feb. 1, 2017.

Each year, SAME presents awards and medals to individuals and organizations from the uniformed services and the private sector in recognition of achievement in support of the engineering profession, the nation's national security objectives and the *SAME Strategic Plan*.

Most awards and medals will be presented at the Society Ball & Awards Gala on May 25, 2017, during the Joint Engineer Training Conference & Expo in Columbus, Ohio.

NOTE: The Golden Eagle Awards are presented at the Golden Eagle Awards Dinner in March and the Small Business Awards are presented at the Small Business Conference in November. For details on these awards, visit www.same.org/goldeneagle and www.same.org/sbc, respectively.



A complete listing of awards and nomination instructions can be found by visiting www.same.org/awards.

INDIVIDUAL AWARDS (UNIFORMED OR CIVILIAN)

- Bliss Medal:** For excellence in education and student mentoring.
- Gerald C. Brown Mentoring Award:** For outstanding mentoring efforts by an SAME Fellow (*presented at Academy of Fellows Investiture*).
- Goethals Medal:** For preeminence in engineering, design or construction.
- Paul R. Smith Noncommissioned Officer Medal:** For outstanding leadership and contributions to military engineering by a noncommissioned officer.
- Post Service Medal:** For significant and faithful service to SAME at the Post level.
- President's Medal:** For outstanding SAME leadership and accomplishment.
- Technology Advancement Medal:** For initiative in the advancement and transfer of technology.
- Toulmin Medal:** For most outstanding article written for *The Military Engineer* by an SAME member.
- Urbahn Medal:** For preeminence in architecture.
- Walter O. Bachus Gold Medal:** For SAME lifetime achievement.

YOUNG MEMBER AWARDS

- Sverdrup Medal:** For engineering leadership by a uniformed Young Member.
- Tudor Medal:** For engineering leadership by a civilian Young Member.
- Young Member Medal:** For outstanding leadership and accomplishments in support of the SAME mission.

STUDENT AWARDS

- David M. Fraser Award:** For engineering excellence and leadership by a first class cadet at the U.S. Military Academy (*presented at the Engineer Dinner at West Point*).
- Student Leadership Medal:** For outstanding leadership in support of student professional development, mentoring and the SAME mission.

ORGANIZATIONAL AWARDS

Recognizing organizations for eminent contributions to SAME in support of its mission:

- Public Agency Award**
- Robert B. Flowers Small Business Award**
- J.W. Morris Sustaining Member Award—Large Company**
- Seymour S. Greenfield Sustaining Member Award—Medium Company**
- Sustainability Awards:** For outstanding efforts to meet the goals of *Executive Order 13514*, presented in two categories: 1) Towards Net Zero; and 2) Education and Outreach.



A SHORT HISTORY OF THE VIETNAM WAR

Military education often involves looking back at prior wars. Many books have been written about the Vietnam War, along with numerous other compendiums. The TME Vietnam Commemorative Issue published by SAME this past summer provided some excellent articles on engineer efforts, as well as reflections from some of us who served in Vietnam. I felt it also would be beneficial to offer in the pages of TME a political-military perspective to complement the engineering lessons.

To provide a short history of the Vietnam War, I went to the

U.S. Military Academy History Department to learn what book it uses to teach cadets about the war. The academy has published "The West Point History of Warfare," a digital interactive textbook that has seven volumes and 71 chapters, four of which are dedicated to Vietnam. Following is an excerpt from the text of these chapters to provide readers with a short history of the Vietnam War, where one may see many parallels to the wars in Iraq and Afghanistan. For a longer summary of the Vietnam coverage from the book, visit the SAME blog at www.same.org/blog.—R. W.

VIETNAM, 1954 - 1965

Peace came to Vietnam in the summer of 1954. The Geneva Accords ended eight years of war between France and its Vietnamese allies on one side and Communist-led revolutionaries, known as the Viet Minh, on the other. But peace did not last.

By the mid-1960s, the conflict had become a major preoccupation of the superpowers. Above all, the United States became increasingly involved in Vietnam, replacing France as the principal Western power attempting to control the nation's postcolonial evolution. As combat turned increasingly in favor of the insurgents in the early 1960s, Washington pumped vast military and economic support to the South Vietnamese regime in Saigon. Expanded U.S. aid failed to achieve Washington's goals, and in 1964 many leaders began to believe that the only way to prevent a Communist victory was to send American combat forces to take charge of the war.¹

ESCALATION OF AMERICA'S INVOLVEMENT, 1965-68

The decision to deploy U.S. ground combat troops to South Vietnam in March 1965 remains one of the most controversial foreign policy decisions in American history. Having served in an advisory role for over a decade, civilian and military officials believed they had reached their limit of influence in Saigon. If the Government of Vietnam was to be saved, Americans would have to assume greater responsibilities.

Hanoi had, in fact, expanded its political activities and military actions throughout the south. The Vietcong raised the stakes on Feb. 7, 1965, with a morning mortar attack on the U.S. barracks at Pleiku Airfield in the Central Highlands. Less than a week

later, President Lyndon Johnson began Operation Rolling Thunder, a retaliatory air campaign against the North that would last well into 1968. It was a frightening display of American technological and air superiority. Yet despite promises of forcing Hanoi leaders to their knees, Rolling Thunder failed to break the enemy's will.²

TET OFFENSIVE, 1968

Shortly after midnight on Jan. 30, 1968, Vietcong and Peoples Army of Vietnam (PAVN) forces made a nationwide assault on South Vietnam during its most sacred of holidays. In coordinated attacks, some 84,000 insurgents and PAVN troops struck 36 of the 44 provincial capitals, the U.S. embassy in Saigon, and the six largest cities in South Vietnam.

A Gallup poll that March found only 33 percent of Americans believed the United States was making progress in the war. For an increasingly isolated president, the collapse of congressional and public support forced painful decisions on the war's future conduct. When President Johnson spoke to the American public on March 31 about his decision to de-escalate the war in a bid for peace, he concluded that "partisan causes" should not interfere with his management of the conflict, and as such, he would not seek or accept another term as president.

Johnson's bombshell reverberated through the nation and reignited serious questions about claims of victory in the aftermath of Tet. If U.S. forces had been so successful, why was the United States bidding for peace and the president departing the oval office? Military Assistance Command, Vietnam (MACV) had failed to convince Americans that its battlefield

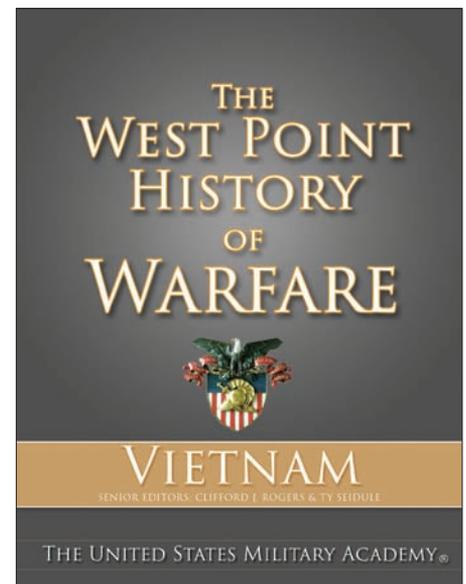


IMAGE COURTESY U.S. MILITARY ACADEMY

successes were leading to victory in the war. Tet illustrated—better than any event between 1965 and 1968—that battlefield successes did not translate automatically into larger political progress.³

DE-ESCALATION OF THE WAR, 1968-72

On Jan. 20, 1969, Richard Nixon was sworn in as the nation's 37th president. Nixon wanted an end to the war in Vietnam. Withdrawal required maintaining an image of strength during peace negotiations for the United States to retain credibility as a world power and deterrent to Communist expansion. To serve these geopolitical interests, Vietnam could not be construed as a U.S. defeat. The de-escalation signaled impending changes to U.S. military strategy. MACV's revised mission backed away from defeating the enemy and forcing its removal from South Vietnam. The Americans



instead would provide “maximum assistance” to Army of the Republic of Vietnam forces while supporting pacification and targeting enemy supply areas.

Nixon and Henry Kissinger realized that despite the previous year’s bombing of Cambodia, the North Vietnamese were expanding their sanctuaries and merging them into a “liberated zone.” Still, the supplies continued to move southward, on bicycles and ox carts if necessary.

By 1970, the trail was supporting truck convoys of 40 to 60 vehicles. There seemed little choice. The war had to be widened to declare victory and peace.⁴

EXPANDING THE WAR TO CAMBODIA

On April 30, 1970, the president announced that U.S. combat troops were fighting in Cambodia. Nixon affirmed this was not an invasion, but a limited “incursion” to drive out the enemy and destroy its military supplies. The Cambodian incursion’s political effects offered greater cause for concern. At home, protests erupted in

the wake of Nixon’s address. Ohio National Guardsmen fired into a demonstration at Kent State University on May 4, leaving four students dead. A wave of campus antiwar rallies swept the nation, closing nearly 450 colleges and universities. In Paris, Hanoi suspended negotiations.

By December 1972, Nixon, having reached his limits with stalemated discussions, ordered a massive air campaign against North Vietnam to break the deadlock. Nixon intended the bombing assault, codenamed Linebacker II, to induce both Hanoi and Saigon to return to the negotiating table. He hoped to illustrate to both sides that he would intervene in any civil war potentially looming on the horizon.

On Dec. 26, the Politburo agreed to resume talks while Nixon pressed Thieu to support the armistice. North Vietnamese units were allowed to remain in the south and the Provisional Revolutionary Government (PRG) of the Republic of South Vietnam was recognized in the signing procedures. One month later, on

Jan. 27, 1973, the United States, North and South Vietnam, and the PRG signed the Paris Agreement on Ending the War and Restoring Peace in Vietnam.

VIETNAM AFTER U.S. WITHDRAWAL

In 1973, all U.S. troops were withdrawn from South Vietnam, but the war was not over for the Vietnamese. It would continue for two more years and result in the fall of Saigon and the reunification of Vietnam under Communist control. In the early morning hours of April 29, 1975, the North Vietnamese began a rocket attack on Tan Son Nhut Airfield. After much discussion, the president directed the implementation of the final phases of Operation Frequent Wind, the American evacuation of Saigon. Over the next several days, U.S. helicopters airlifted some 7,100 American and South Vietnamese military and civilian personnel out of the Saigon embassy. Navy ships ferried more than 70,000 South Vietnamese to American vessels in the South China Sea. On April 30, President Duong Van Minh

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announced the unconditional surrender of the Republic of Vietnam. At that moment, the Republic of Vietnam ceased to exist as a sovereign nation and, for the first time in its history, the United States lost a foreign war.⁵

EVALUATING AMERICA'S INVOLVEMENT IN VIETNAM

Despite the passage of time, the debate about the outcome in Vietnam continues. There has still been no general agreement about what went wrong, but it is clear that the United States, although never defeated in the military sense, failed to prevent a Communist takeover in South Vietnam. The reasons why are complex and include elements of each of the major arguments. It is true that the enemy better harnessed the energies of Vietnamese nationalism; but that does not mean that the South Vietnamese government could not have done the same had there been a more effective effort on Saigon's part.

In the end, Vietnam was a different kind of war that required different approaches

and methods. Its complexity lay in the compound nature of the conflict: it was an insurgency and a conventional war.⁶

Section Footnotes:

¹ Mark Atwood Lawrence, "Revolutionary War in Southeast Asia, 1954-1965," chapter eds. Clifford J. Rogers and Gail E. S. Yoshitani, in *The West Point History of Warfare* (hereafter cited as *WPHW*), eds. Clifford J. Rogers and Ty Seidule (New York: Rowan Technology Solutions, 2016), paras. 63.2-4 of Web Reader edition.

² Gregory Daddis, "American Escalation in Vietnam, 1965-1967," ch. eds. Clifford J. Rogers and Gail E. S. Yoshitani, in Rogers and Seidule,

WPHW, paras. 64.5-6.

³ Daddis, "American Escalation," paras. 64.51-59.

⁴ Gregory Daddis, "American De-escalation in Vietnam, 1968-1972," ch. eds. Clifford J. Rogers and Gail E. S. Yoshitani, in Rogers and Seidule, *WPHW*, paras. 65.9-14 and 65.40.

⁵ James H. Willbanks, "Victory and Defeat in Vietnam," ch. ed. Clifford J. Rogers and Gail E. S. Yoshitani, in Rogers and Seidule, *WPHW*, paras. 66.2 and 66.48-49.

⁶ Willbanks, "Victory and Defeat," para. 66.64.



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VETERANS SMALL BUSINESS WEEK

The Small Business Administration (SBA) is celebrating veteran small business owners during National Veterans Small Business Week (NVSBW), Oct. 31–Nov. 4, 2016.

“Veteran entrepreneurs are a driving force in our economy. Each year, the SBA assists thousands of veterans, reservists, members of the National Guard, and service-disabled veterans to start and grow their small businesses,” said Barbara Carson, Associate Administrator for SBA’s Office of Veterans Business Development. “Veterans are integral to the growth of America’s small businesses. Nearly one in every 10 American businesses today is owned by a veteran, collectively employs nearly six million workers and generates more than \$1.2 trillion in receipts.”

During NVSBW, SBA district offices and resource partners will host local events including Boots to Business and Boots to Business: Reboot, webinars, and workshops on access to capital, federal procurement, and entrepreneurial development. *(Contributed by SBA)*

DRONES AND SMALL BUSINESSES

Small business owners told a Congressional subcommittee this fall that new federal regulation that allows commercial use of small unmanned aircraft systems (UAS), otherwise known as drones, are opening up the skies and opportunities for new jobs and economic growth. However, effective and efficient implementation of the rule and the Federal Aviation Administration’s (FAA) next steps to safely integrate drones into the national airspace system are critical to the industry’s success.

FAA projects 90 percent of drone owners will be small businesses, making clear and sensible regulation essential as these entrepreneurs try to get startups off the ground and improve existing small businesses day-to-day operations through this technology.

“Unmanned aircraft systems, or UAS, increase human potential, allowing us to execute dangerous or difficult tasks safely and efficiently,” testified Brian Wynne on behalf of the Association for Unmanned Vehicle Systems International. “From inspecting pipelines to surveying bridges

to filming movies, UAS help save time, save money and, most importantly, save lives.

The development of the new regulatory framework for commercial drones has been a focus of the House Small Business Committee. The *FAA Modernization and Reform Act of 2012* provided FAA with new authority and new mandates to accelerate the safe integration of UAS into the national airspace system. Section 333 of the act authorized certain commercial drone operations on a case-by-case-basis. From September 2014 through August 2016, FAA granted 5,552 exemptions, indicating a tremendous amount of early adoption.

The final rule that allows civil operations of small UAS was issued on June 28, 2016 and went into effect on Aug. 29. Small UAS are those that weigh 55-lbs or less.

The rule establishes Part 107, the new regulatory framework for small UAS operations, which includes pilot requirements, operational restrictions, and aircraft requirements for commercial purposes. *(Contributed by House Small Business Committee)*



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AIDING GUARD & RESERVE MEMBERS

Sen. Jeanne Shaheen (D-N.H.), the lead Democrat on the Senate Committee on Small Business & Entrepreneurship, earlier this year advanced legislation in committee to improve access to SBA programs for members of the National Guard and Reserves. The *National Guard and Reserve Entrepreneurship Support Act* would improve and increase access to the Military Reservists Economic Injury Disaster Loan (MREIDL) and the Repayment Deferral for Active Duty Reservists programs.

MREIDL is a direct loan program that provides emergency assistance to Guard/Reserve entrepreneurs experiencing hardship due to deployment. Repayment Deferral for Activity Duty Reservists authorizes SBA to work with lenders to defer interest or loan repayment for Guard and Reserve members facing similar situations.

These programs were established by Congress in 1999 to assist small businesses led by Guardsmen/women and Reservists, but despite the benefits, the programs are underused due to lack of awareness.

The *National Guard and Reserve Entrepreneurship Support Act* would restructure the programs so that they are not limited to periods of conflict, reflecting the shift reserve forces have experienced over the past decade from a strategic reserve to an operational reserve.

(Contributed by Senate Committee on Small Business & Entrepreneurship)

SMALL BUSINESS WEEK AWARDS

SBA is accepting nominations for its 2017 National Small Business Week Awards.

Since 1963, National Small Business Week (to be held April 30–May 6, 2017) has recognized the outstanding achievements of America's small businesses for contributions to local communities and to our nation's economy. SBA gives out awards in several different categories during National Small Business Week:

- **Small Business Person of the Year**
 - ▶ One from each of the 50 states, the District of Columbia, Puerto Rico, the U.S. Virgin Islands, and Guam.
- **Exporter of the Year**

- **Phoenix Awards for Disaster Recovery**
 - ▶ Phoenix Award for Small Business Disaster Recovery
 - ▶ Phoenix Award for Outstanding Contributions to Disaster Recovery, Public Official
 - ▶ Phoenix Award for Outstanding Contributions to Disaster Recovery, Volunteer
- **Federal Procurement Awards**
 - ▶ Small Business Prime Contractor of the Year
 - ▶ Small Business Subcontractor of the Year
 - ▶ Dwight D. Eisenhower Awards for Excellence (for large prime contractors who use small businesses as suppliers and contractors)
 - ▶ 8(a) Graduate of the Year
- **Jody C. Raskind Lender of the Year**
- **Small Business Investment Company of the Year**
- **Awards to SBA Resource Partners**
 - ▶ Small Business Development Center Excellence and Innovation Center Award

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All nominations must be submitted no later than 3 p.m., Tuesday, Jan. 10, 2017. All nomination packages may only be hand delivered or mailed to an SBA office. Email submissions of awards forms will not be accepted as they contain personally identifiable information.

For more information, visit www.sba.gov/nsbw/awards.
(Contributed by SBA)

HELPING VETERAN ENTREPRENEURS

SBA in September announced the four awardees of the Service Disabled Veteran Entrepreneurship Training Program (SDVETP) grant. The grants assist with providing entrepreneurial training to service-disabled veterans interested in starting or growing a small business.

- Entrepreneurship Bootcamp for Veterans with Disabilities: Syracuse University's Institute for Veterans and Military

- Families, Syracuse, N.Y. - \$100,000
- Veterans Entrepreneurship Program: Riata Center for Entrepreneurship, Spears School of Business at Oklahoma State University, Stillwater, Okla. - \$100,000
- Veterans Entrepreneurship Jumpstart Program: St. Joseph's University, Philadelphia, Pa. - \$50,000
- Dog Tag Bakery Inc. - Washington, D.C. - \$50,000

The SDVETP grant funding competition was open to eligible institutions of higher learning, private organizations or businesses, non-profit and non-profit community-based organizations, and state, local or tribal governmental agencies.

The initial award is for 12 months; there can be an option to continue the grant for up to two additional years.

For more information, visit www.sba.gov/vets.
(Contributed by SBA)



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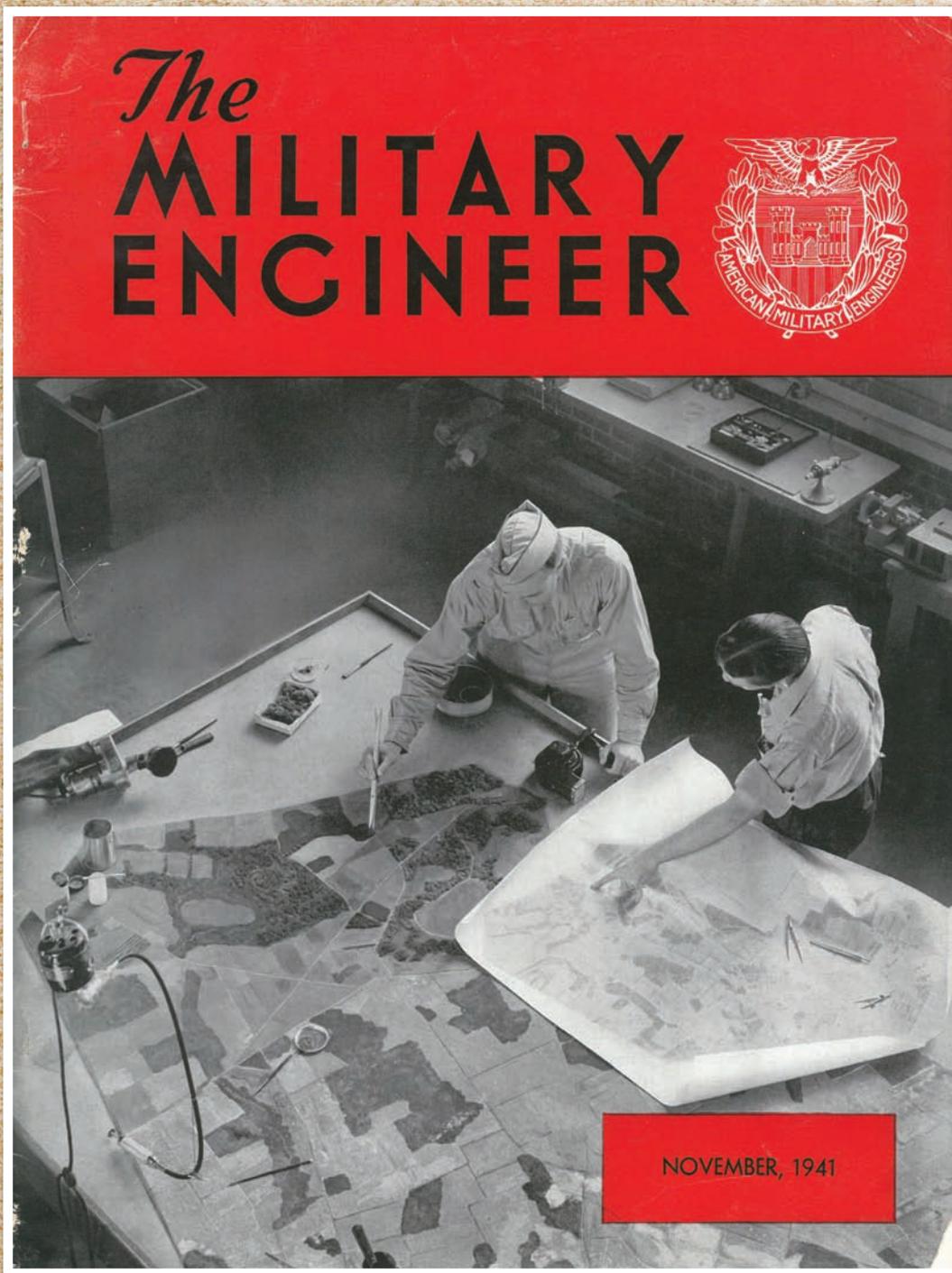
Making a Model of a Large Airfield

The Military Engineer

Vol. 33 • No. 193 / November 1941

“Model study facilitates the testing of camouflage materials and technique, an important activity of the Corps of Engineers. This model is being constructed by Engineer Officers in the Model Shop of the Engineer Board at Fort Belvoir, Virginia.”

Editor’s note: The image featured on the cover of the November 1941 issue of *The Military Engineer*, 75 years ago, highlighted the usage of modeling to provide a functional perspective of a construction project. Today, computer-aided design, building information modeling, and even virtual reality capture and 3D printing are given architects, engineers and constructors unprecedented ways to “model” their creations.





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