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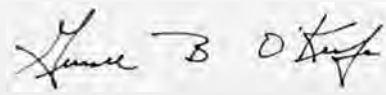

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The Professional Bulletin of Army Engineers

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Front cover: U.S. Army Reserve Soldiers from the 449th Mobility Augmentation Company, 478th Engineer Battalion, 926th Engineer Brigade, 412th Theater Engineer Command, based at Fort Thomas, Kentucky, fire an inert Mine-Clearing Line Charge during a Gate III or section gunnery and Engineer Qualification Table X11 validation exercise at Fort Knox, Kentucky. (U.S. Army Reserve photograph by Sergeant First Class Clinton Wood)

Back cover: U.S. Army photos

DEPARTMENTS

FEATURES

Clear the Way

Brigadier General Robert F. Whittle Jr.
97th Commandant, U.S. Army Engineer School

Initiative in the Engineer Regiment

Initiative has always been one of the great strengths of the Engineer Regiment. As exemplified by our motto, *Essayons*, initiative is the key to success for taming the physics of the modern battlefield and in arriving at engineering solutions for the U.S. Army. Initiative is also a vital element of mission command.

Mission command is defined as "the exercise of authority and direction by the commander using mission orders to enable disciplined initiative within the commander's intent to empower agile and adaptive leaders in the conduct of unified land operations."[1] The most important element in the success of mission command is the ability of the follower to exercise the initiative necessary to achieve the commander's intent. I am emphasizing three important aspects of initiative to leaders at all echelons:

- **Recommend.** Do not approach your boss and say, "Sir, how do you want to use me and my formation?" Instead, present your commander with several feasible courses of action along with a recommendation about how to employ your unit. You are the expert regarding your formation. If you simply ask what tasks your commander wants you to accomplish, you will not be able to influence the missions that you receive.
- **Plan.** Be comfortable forming plans without detailed orders from your higher headquarters. Remember, mission orders are "directives that emphasize to subordinates the results to be attained, not how they are to achieve them."[2] When receiving orders, guidance, or direction from commanders, focus on the task and purpose. Do not ask for details about *how* the commander wants something done; that will constrain you, stifle your creativity, and restrict the scope of your potential courses of action. Once you receive a mission, apply the military decision-making process and determine the resources that are needed to achieve the task and purpose and the specific support that is needed from adjacent units and higher headquarters. Then, coordinate with your headquarters to obtain the resources and support needed to accomplish the mission.
- **Execute.** When executing, remember that the purpose is more important than the task. Battlefield conditions can change, and tasks may no longer fit the situation. Consider an example that I have heard relayed by our senior Army leadership several times: If the task and purpose are to take Hill 501 to destroy the enemy, but the enemy is on Hill 502 and Hill 501 is empty, then take Hill 502 and destroy the enemy. The final task differs from the original; however, the situation changed—and the modified task achieves the basic goal and facilitates victory.

We will always simultaneously serve as followers and leaders. As followers, we must encourage our leaders to give us mission orders and we must take the initiative. As leaders, we must issue mission orders and tell our Soldiers what needs to be done—not how to do it. Encouraging and rewarding initiative will enable future victories on the battlefield and the ingenuity and resourcefulness of the American Soldier.

Endnotes:

[1]Army Doctrine Publication (ADP) 6-0, *Mission Command*, 17 May 2012.

[2]Ibid.

"The most important element in the success of mission command is the ability of the follower to exercise the initiative necessary to achieve the commander's intent."

Lead the Way

Command Sergeant Major Trevor C. Walker
Regimental Command Sergeant Major

Essayons! As I write my last article as the U.S. Army Engineer School (USAES) command sergeant major, I want to start by expressing what an honor it has been to serve the Engineer Regiment for the past 14 months. It has been a true privilege to serve with the Soldiers, civilians, and Families of this great organization. I want to thank each one of you for doing what you do every day to make this the best regiment in the Army. Words cannot express how proud I am of what you are doing to make sure that we remain ready to take on any mission that the Army gives us. Some of you may notice that there is not an immediate replacement for me; and for others, the transition may appear seamless. USAES does great work to make sure that the absence of one person does not create a single point of failure. The Engineer Personnel Development Office sergeant major will be filling the USAES command sergeant major gap until Brigadier General Robert F. Whittle selects my permanent successor in the near future.

In September of this year, I had the honor and privilege of continuing to serve our great Nation as the first command sergeant major of the Security Forces Assistance Command. This new command will oversee the five Regular Army security force assistance brigades and the only Army National Guard security force assistance brigade. The command will be headquartered in the U.S. Army Forces Command (FORSCOM) headquarters building at Fort Bragg, North Carolina. It is exciting to help build this new command and to be a part of history.

We continue to improve the readiness of the Army. In August, USAES received approval for recoding operations sergeant positions in brigade engineer battalions (BEBs) from master sergeants to sergeants major. This will occur in armored brigade combat team BEBs in fiscal year (FY) 2020. These positions, available only to the regionally aligned armored brigade combat teams, will be developmental assignments for new sergeants major to gain invaluable experience. This will maintain the momentum of force modernization within armored brigade combat team BEBs and will coincide with FORSCOM Commander General Robert B. Abrams' Freedom 6 priorities:

- Maximize unit readiness.
- Operationalize the Army Total Force policy.
- Master the fundamentals.
- Strengthen leader development.
- Care for Soldiers, civilians, and Families.
- Inform the force of the future.[1]

In May, USAES received a U.S. Army Training and Doctrine Command tasking to resource the increased length of Military Occupational Specialty (MOS) 12B, Combat Engineer, and MOS 12C, Bridge Crew Member, One-Station Unit Training, expanding it from 14 to 22 weeks. Upcoming changes to Basic Combat Training in FY 19 will place more emphasis on the basics and reflect a decisive-action training environment while increasing Soldier lethality, one of the six Chief of Staff of the Army modernization priorities, which are—

- Long-range precision fires.
- Next-generation combat vehicle.
- Future vertical lift.
- Army network.
- Air and missile defense.
- Soldier lethality.

We are still in the planning phases of the One-Station Unit Training extension. The outcome will be that units receive better-trained, more disciplined engineers with

(continued on page 5)

"Thank you for your leadership and professionalism. The Engineer Regiment cannot accomplish the mission without your continued support."

Show the Way

Chief Warrant Officer Five Jerome L. Bussey
Regimental Chief Warrant Officer

Greetings from the U.S. Army Engineer Regiment and School. As always, our engineer warrant officers continue to enhance the capabilities of our leaders by providing sound technical engineering advice. They continue to train and gain the requisite skills to lead their teams. Our instructors continue to develop creative ways to challenge our students in Warrant Officer Basic, Advanced, and Intermediate-Level Education Courses at Fort Leonard Wood, Missouri.

Command Sergeant Major Trevor C. Walker departed as our school command sergeant major. He is at Fort Bragg, North Carolina, serving as the first Security Forces Assistance Command Sergeant Major. Command Sergeant Major Walker was instrumental to the Engineer Regiment. Not only did he tackle relevant issues related to noncommissioned officers, but he also assisted in shaping the warrant officers and commissioned officers of the Regiment. Thanks, Command Sergeant Major Walker, for all you have done for the Regiment. I know you will have a huge impact on your new organization.

Our instructors continue to challenge our students to reach higher levels of learning and to be the technical experts on whom our leaders can count. After 6 years of gathering dust in Brown Hall, our LabVolt© system was revived by our team. This system is designed to provide our students with realistic training on alternate-current power transmissions—training that was lacking in previous classes. It was astounding to see the work that our Military Occupational Specialty (MOS) 120A, Construction Engineering Technician, Warrant Officer Basic Course students put in on various projects during the course. Students in the last graduating class examined ways to create electricity using thermoelectric-generation technology; they demonstrated the characteristics of a soft-start motor controller for a three-phase motor circuit. Another team used an ammunition box to build a waterproof, multifunctional radio, which featured a solar/wind-charging cable, a USB charging port, and wireless connectivity to play music from a smartphone or other smart device. These are just some of the projects developed by students in Phase III of the MOS 120A Warrant Officer Basic Course.

Instructors of the MOS 125D, Geospatial Engineering Technician, Warrant Officer Advanced Course are training the students to write scripts using common industry standard programming languages and applications. These scripts emphasize solving labor-intensive tasks and eliminating complex workflows that are currently used. Geospatial tasks are becoming increasingly complex and time-consuming, and traditional tools and workflows are not capable of meeting the challenges that lie ahead. We are placing emphasis on data science, automation, and computational thinking to meet these challenges and demands. The last Warrant Officer Advanced Course capstone project demonstrated the complexity of the course and the added rigor to ensure that the students are receiving the best and most up-to-date training, which will provide our leaders with a timely common operational picture.

Congratulations to all fiscal year 2018 warrant officer selectees. You are about to embark on a rewarding and challenging career change; but always remember, you are still Soldiers and must continue to do Soldierly things. Just as you were a top-notch noncommissioned officer, we want you to be the best engineer warrant officer that you can be. We had a good year of assessing and selecting engineer noncommissioned officers to be engineer warrant officers. Although the number of packet submissions doubled from last year, we cannot be complacent, thinking that our mission is complete. The fiscal year 2019 mission has increased the need for quality noncommissioned officers to become engineer warrant officers. Thanks to all our noncommissioned officers, warrant officers, and commissioned officers for helping with this effort; we appreciate your hard work in helping the warrant officer cohort. Soldiers who want to be an engineer warrant officer can visit the following Web sites:

- U.S. Army Warrant Officer Recruiting Prerequisites for MOS 120A, <http://www.usarec.army.mil/hq/warrant/prerequ/WO120A.shtml>.
- U.S. Army Warrant Officer Recruiting Prerequisites for MOS 125D, <http://www.usarec.army.mil/hq/warrant/prerequ/WO125D.shtml>.

Over the past few months, engineer warrant officers have been making an impact in the field and leading engineering teams in many locations around the globe. They are providing technical expertise for building and improving roads on U.S. Marine bases; improving parking lots at the Joint Readiness Training Center, Fort Polk, Louisiana; and assisting the Federal Emergency Management Agency and other U.S. government agencies with the collection and processing of geospatial data. Stay tuned for future *Engineer* and *Army Engineer* articles that will showcase the significant impacts our warrant officers are having in the field.

Team, thank you for being there when called upon. *ESSAYONS!*

(Lead the Way, continued from page 3)

increased mental and physical toughness. The extension will reduce first-unit-of-assignment training and integration tasks. More information is contained in the regimental update that Brigadier General Whittle sent out to leaders of the Engineer Regiment in July. The update is also posted on the Army Career Tracker Career Management Field (CMF) 12 enlisted community blog site.

In July, we received approval for an MOS 125D, Geospatial Engineering Technician, degree plan with Park University. This degree plan offers a bachelor of science in geography degree for 125Ds. Park University has awarded credit for training that has already been completed in the Army to help 125D Soldiers pursue their degrees. Soldiers can find information about this program on the Army U Web page at <https://armyu.army.mil/> and on the engineer credentialing milsuite site at <https://www.milsuite.mil/book/groups/engineer-credentialing-forum/overview>. This is a great opportunity for 125Ds to begin or continue working on their degrees and to receive credit for training that they have already completed. This is just the beginning for the Engineer Regiment; we are also currently working on a degree plan for MOS 12Y, Geospatial Engineer. We will continue to pursue degree plans for all of our engineer MOSs, providing a platform for our Soldiers to be successful. In the future, the Regiment will be working with Park University to provide the same opportunities for our MOS 12N, Horizontal Construction Engineer; MOS 12H, Construction Engineering Supervisor; and MOS 12T, Technical Engineer, in the form of a construction management degree. Our goal is to provide a degree path for all CMF 12 Soldiers. As we complete each program, it will be added to the Army U site and the engineer credentialing milsuite page.

The Chief of Staff of the Army has approved the Army Combat Fitness Test. This physical fitness test is based on unit and/or individual occupational physical demands. Occupational fitness requirements for close-combat battalion and below units will be maintained regardless of age or gender. The Army Combat Fitness Test is scheduled to replace the Army Physical Fitness Test of record for the Army no later than the first quarter of FY 21. In FY 19, 60 battalions across the Regular Army, Army National Guard, and U.S. Army Reserve will be selected to run a pilot test on the scoring and equipment standards ahead of the first year of Army implementation, scheduled for FY 20. More information on the Army Combat Fitness Test can be found on the Army Career Tracker CMF 12 enlisted community page at <https://actnow.army.mil/>.

I want to continue to urge you to frequently visit the Army Career Tracker CMF 12 enlisted community page to view policy updates and initiatives currently being worked by the Engineer Regiment. There are approximately 90,000 Regular Army and Reserve Component Soldiers in the Engineer Regiment, and the community page has only about 5,000 members at this time; however, membership is steadily increasing. If you are not a member, I urge you to become one. As a member of the page, you will receive messages when there are additions from the newsletter. This can help you stay informed about what is going on within the Regiment. In addition, USAES will initiate questions in the blog area on this site, asking opinions on initiatives or possible changes. We want your feedback because the outcome will likely affect you in the future. We also want your feedback on the community page itself. Does it have everything it should have? If there is something that you think is important but is not on the page, please let us know. It is all a part of improving the Engineer Regiment.

I want to thank the USAES staff, 1st Engineer Brigade, the Office of the Chief of Engineers, and the Maneuver Support Center of Excellence team. Thank you for your leadership and professionalism. The Engineer Regiment cannot accomplish the mission without your continued support. Also, thanks to all engineers across the Army; you are all true professionals, and I look forward to seeing your accomplishments in the upcoming years. I have the utmost confidence in the way the Engineer Regiment is headed, and I know that you all will benefit from the hard work that everyone does at USAES and the U.S. Army Corps of Engineers.

Finally, I really enjoyed the time I spent as your USAES command sergeant major. This was truly one of the best positions I have had in my time in the military. The best parts were visiting the engineer units to see everything that is going on to support the Army mission and being an advocate for those units, helping them with their mission sets. Thanks for letting me be a part of your team. Sapper 7 fading out.

Essayons!

Endnote:

[1]Paul Boyce, "Abrams: Make a Difference for Soldiers," <https://www.army.mil/article/181058/abrams_make_a_difference_for_soldiers>, accessed on 28 August 2018.

Lessons Learned

From Deploying a MEB to a DSCA Operation

By Colonel Jan K. Behn, Colonel Craig W. Strong, Lieutenant Colonel James R. Hewitt, Major Jeremy D. Chancellor, Major Jonathan D. Wymer, and Major Alex M. Zeller

"This is not a time to think about your house; a time to think about your earthly possessions. This is a time to think about securing your life, the lives of your children, the lives of your neighbors"[1]

Hurricane Irma ripped through the islands of Saint Thomas and Saint John on 6 September 2017, with wind speeds of more than 140 miles per hour.[2] Within weeks, Hurricane Maria, a second Category 5 storm, hit Saint Croix, Saint John, and Saint Thomas, wiping out what Hurricane Irma had missed. This was an unprecedented disaster for the Virgin Island Territories, leaving them flooded, powerless, and damaged beyond imagination.[3] Support forces under the Emergency Management Assistance Compact[4] arrived in the territories within days after the hurricanes hit, and a joint task force (JTF) was established on 26 September 2017. An infantry brigade combat team (BCT) stood up and initially commanded the JTF until the arrival of the 67th Maneuver Enhancement Brigade (MEB), Nebraska Army National Guard, on 14 October 2017.[5] This article summarizes the 67th MEB experiences and lessons learned during the mission. The 67th identified key points for advanced planning for the JTF and the addition of MEB capabilities.

Advanced Planning Considerations

Supporting fellow Americans in disaster relief is an honor and responsibility. It is an honor to work with the best military and civilian leaders in the world and a responsibility in that it provides an opportunity to offer input for improved response capabilities in the future. This specific experience indicated that three advanced planning considerations need to be implemented now.

First, the assigned JTF should come from an inland state that is not affected by the storm. For hurricane relief in U.S. territories, this specification does not include coastline states that have experienced or are preparing to experience the hurricane season themselves. Assistance should come from farther inland. Being at the epicenter of a disaster significantly reduces the capabilities of the JTF. For example, JTF members may have limited access to equipment, which may have been damaged, or they may have Families who need their Soldiers and civilian leaders home with them. The JTF is responsible for giving the supported area a chance to "catch its breath" until the transition phase, when the impacted area can take over its own hurricane relief.

"A commander with the right tools is prepared to evolve with the mission to ensure that the needs of the operational phases are anticipated and that unforeseen needs arising . . can be engaged in a smart manner."

Second, with assets (including commercial assets) such as airlift and sealift in short supply, the economy of planning and assigning an appropriate JTF should not involve multiple rotations of units during limited timeframes of operational need. The JTF for the Virgin Island mission consisted of two separate brigades that executed all levels of mission planning and mission execution and a transition of authority weeks into the disaster. Imagine a race car driver stopping his or her car in the middle of the racetrack to change drivers with only a few laps to go. The lesson to be learned from this metaphor is that the transition of authority from one brigade to another within weeks of the initial unit's defense support of civil authorities (DSCA) assignment is akin to stopping a race car mid-race to change not only the driver but also the motor and pit crew.

Third, assigning the right size and appropriate JTF for DSCA missions is important. The transition between a BCT and MEB would be appropriate in a combat zone as forces move through phase lines within a division area of operation. A MEB would not be the right size of unit to assign to forward line operations at the start of a combat mission; however, the initial assignment of an infantry BCT was essentially the wrong tool for the DSCA operation. MEBs "provide an economy-of-force capability so that BCTs or maneuver units

can focus on combat operations."[6] This does not mean that a BCT is not capable or that the unit assigned to the mission is not able to execute in an honorable and professional manner. MEBs are literally designed to support missions such as domestic disaster relief. According to Lieutenant Colonel Trevor J. Mann (Virgin Island Counterdrug Coordinator), "The BCT brought an infantry mission command. The difference is the MEB was more uniquely designed to command here because of the mission of a MEB."[7]

Memorandums of agreement should be established between specific units/JTFs and territories as soon as possible and in advance. Once in place, the framework to identify needs, capabilities, and response actions could be planned ahead of time. Proactive efforts taken under a memorandum of agreement with a previously assigned territory partner establish a networked relationship and, more importantly, a level of trust that affects open, honest communication and shared expectations and goals from the start of mobilization to the stand-down. Agreements and plans include provisions for regional training with territorial partners, reconnaissance, and terrain familiarization. They should also include advanced monitoring/awareness of factors that might result in deployment, such as weather conditions and the identification of advanced-party needs for transitioning to the zone prior to the disaster strike, preplanning for the movement of equipment and personnel to and from the site, and evaluating the equipment and personnel needed for the anticipated mission (including linking/relationship building with on-site points of contact required to execute assignments before arrival).

Design of the JTF

The JTF assigned to a DSCA mission can expect the following operational requirements when considering key tasks for disaster operations:

- Security.
- Medical support.
- Chemical hazards detection.
- Route clearing and debris removal.
- Supply distribution.
- Joint reception staging and integration.
- Personnel tracking.

For environments like those of the islands, aviation and sea movement capabilities should be included. The assigned JTF must be multifunctional and able to bring together multiple capabilities to work in unison and in coordination with civilian leaders. The JTF also needs to plan for transitions within the mission as the environment begins to stabilize between the response and recovery phases.[8] Improved response time by local authorities can reduce immediate security issues related to looting. Transition to a more robust distribution operation may occur as roadways are cleared. The JTF commander must have access to unit resources and an understanding of how

A Soldier from the 67th MEB assists with a clean-up project at a local St. Croix cemetery, ensuring that the graves of Soldiers and first responders were set back in place.

Soldiers from the 67th MEB help clean up a school in Saint Croix.

transitioning capabilities can and should be used, if available. Should a cook be assigned to control traffic? Should a military police Soldier be used to deliver supplies? Should either be assigned to clear roadways with construction equipment? How much risk can a commander assume if the needs start to outweigh the availability of troops in the assignment of tasks? The more knowledge and practice the JTF commander has with multifunctional support options, the easier it will be to anticipate the needs of the mission and thoughtfully advise civilian authorities about the capabilities and limitations of available resources.

The 67th MEB also significantly benefited from the assignment of joint personnel, such as a U.S. Air Force strategic air planner and an Army aviation liaison. The Nebraska National Guard is blessed to have the capabilities of its own internal air wing (155th Air Refueling Wing) for air assets and subject matter experts. Other areas that integrated and worked seamlessly with the staff were the judge advocate general and the chaplain. The assignment of a contingency contracting team and public affairs officer was deemed vital for establishing long-term resource support and assisting in telling the "Guard story" in the area of operations.

Being a multifunctional Army National Guard brigade ensured that not only could staff fill key roles, but their civilian skills could also be called upon as well. In the 67th MEB example, the adjutant for the unit was also a reporter for a local news station, enabling public affairs officer support. A commander with the right tools is prepared to evolve with the mission to ensure that the needs of the operational phases are anticipated and that unforeseen needs arising from chaotic disaster sites can be addressed in a smart manner.

MEB Capabilities

The MEB is uniquely structured to handle all tasks that might potentially be assigned to a BCT, but with added expertise in key DSCA operations-related fields such as engineering; military police; hazmat; and chemical, biological, radiological, and nuclear areas. As a modular brigade headquarters, the organization can track and control operations in the operational environment and be prepared to request and receive force structure to augment mission success. Lieutenant Colonel Mann asks, "What's one of the first boots on the ground we want? We want military police and engineer assets. The MEB has military police and engineers . . . that are in your table of organization and equipment. The MEB has military police and engineers assigned to you. They are units that you know how to command and control and you employ in your fight, so it should come natural."[9] In a division support area, the MEB is responsible for—

- Managing terrain.
- Collecting information.
- Informing and influencing activities.
- Controlling air and ground movement.
- Targeting.
- Clearing fires.
- Conducting security.
- Recovering personnel.
- Considering environmental impacts.
- Conducting minimal essential stability tasks.

The MEB controls the terrain within its assigned area of operations, which allows freedom of mobility for operational

and tactical commanders.[10] In DSCA operations, the primary tasks include chemical, biological, radiological, and nuclear operations; support to civilian law enforcement agencies; and other tasks that ensure the success of disaster relief efforts during postincident response. The MEB is designed to provide mission command over chemical, biological, radiological and nuclear and military police units that can support typical disaster relief tasks.

The 67th MEB oversaw aviation operations to help transport personnel and equipment throughout the three islands, provided logistical resupply to include refueling the generators that kept emergency personnel able to operate equipment, and provided military police support to the local Virgin Island police departments. The MEB has an advanced understanding of military policing operations, which allowed the command post to more effectively battle-track operations on the ground and provide more expertise to subordinate units augmenting the local Virgin Island police departments. Additionally, the MEB provided support to other units such as medical professionals who augmented local hospitals and preventative medicine personnel who inspected areas for significant hazards, such as mold and disease. The multifunctional headquarters of the MEB was able to adjust to changing tasks throughout its time as the mission command nexus during operations.

Placing liaison officers (including one Airman who was a subject matter expert in Federal Emergency Management Agency operations and related incident command system documents and requirements) alongside Virgin Island territorial emergency management agency personnel also paid dividends. The relationships built with civilian leadership in the emergency management arena improved mission success and provided networking opportunities that should be built upon so that lessons learned and best practices are not lost and preparations for future hurricane seasons can be made.

Conclusion

According to Mr. David W. Haas, Federal Emergency Management Agency Deputy Chief for the Virgin Island mission, "We couldn't have done it without the [Army] National Guard or Department of Defense, especially early on in the disaster. You are the 911 force; you are who we rely on significantly to fill capability gaps early on in any disaster, as responders are overwhelmed."[11] Assuming this statement to be true (and we do), how are we capitalizing on this belief? The hurricane planning season for next year is now. Partnerships need to be formally established, and units need to be begin initial planning and training. We have experienced the *what*, *when*, *where*, *why*, and *how*, but the *who* needs to be solidified in a more timely and thoughtful fashion before we find ourselves too deep within the eye of the next storm.

Endnotes:

[1]Don Buchanan, "Governor Says Territory Must Prepare for Maria," *The Source,* 17 September 2017, <https://stcroixsource.com/2017/09/16/governor-says-territory-must-prepare-for-maria/>, accessed on 31 July 2018.

[2]A. J. Willingham, "A Look at Four Storms From One Brutal Hurricane Season," 21 November 2017, <http://www.cnn.com/2017/10/10/weather/hurricane-nate-maria-irma-harvey-impact-look-back-trnd/index.html>, accessed on 31 August 2018.

[3]Cory Schouten, "The Caribbean's Long Hard Road to Normalcy after Irma," 13 September 2017, <https://www.cbsnews.com/news/hurricane-irma-caribbean-islands-severe-damage/>, accessed on 29 July 2018.

[4]*What is EMAC?*, 2011,<https://emacweb.org/index.php/learn-about-emac/what-is-emac>, accessed on 18 September 2018.

[5]Don Walton, "Guard Unit From Nebraska Headed to Virgin Islands," 13 October 2017, <http://journalstar.com/news/local/guard-unit-from-nebraska-headed-to-virgin-islands/article_b3fca12c-07f0-51d5-99da-f1fbef622e69.html>, accessed on 29 July 2018.

[6]Field Manual (FM) 3-81, *Maneuver Enhancement Brigade*, 21 April 2014.

[7]Trevor J. Mann, personal interview with Second Lieutenant Rachel Hofstra, 11 November 2017.

[8]Joint Publication 3-28, *Defense Support of Civil Authorities*, 31 July 2013.

[9]Mann, 2017.

[10]FM 3-81.

[11]David Haas, personal interview with Second Lieutenant Hofstra, 10 November 2017.

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MASTER PLANNING IN A CONTINGENCY ENVIRONMENT:

PLANNING AND EXECUTING INSTALLATION IMPROVEMENTS IN KUWAIT

By Lieutenant Colonel David W. Noble

Camp Patriot, Kuwait, was the military melting pot at the start of Operation Iraqi Freedom. Stood up in January 2003 by a cohabitating U.S. Navy and U.S. Marine presence, Camp Patriot served as the staging ground for U.S. military forces entering Iraq. Embedded within the larger Mohammed Al-Ahmed Naval Base and commonly referred to as Kuwait Naval Base (KNB), Camp Patriot quickly became a strategic and enduring location for sustained operations. "We are guests here," said Captain Donald P. Cook, the first commanding officer of Camp Patriot, in 2003.[1] "Our role and our relationship is and has been extremely important to our hosts, and our relationship has developed into a very unique friendship that can never be forgotten," he added.[2]

Over the course of time, oversight of the camp has transitioned from Navy, to Marine, and then to U.S. Army units. Field artillery, infantry, and engineer units have called Camp Patriot home since its establishment 15 years ago.

In January 2018, the Office of the Secretary of Defense decided that U.S Army Central Command (ARCENT), as the predominant user of the location, would relieve U.S. Naval Forces Central Command and become the lead Service for KNB. This action was the latest in Army-level oversight on the development of Camp Patriot.

ARCENT, which established its foothold in KNB in 2005, had drafted the initial Camp Patriot master plan, published in 2008. As is typical of other military master plans, the Camp Patriot master plan provided guidance on the future of the camp infrastructure, renovations, new construction, and occupation. Unfortunately, in reality, minimal improvements were approved for Camp Patriot over the course of the decade since the master plan was written.

Members of the 40th Brigade Engineer Battalion (BEB) became the most recent occupants and custodians of Camp Patriot in November 2017. As garrison command lead for Camp Patriot, the "Battering Rams" battalion hosted a

Facilities and activities at Camp Patriot (top left: the dining facility; top right: the chapel entrance; bottom: a flag ceremony)

theater-wide effort for an updated installation master plan at KNB a month later. Battalion representatives overseeing construction, camp operations, and force protection activities were integrated with the master planners to develop a revised master plan more suitable for the evolving operational purpose of the site. These personnel kept in mind the words of Major General Meredith "Bo" Temple, former U.S. Army Chief of Engineers, who in the January 2008 edition of *Public Works Digest,* states, "Area development plans are, basically, mini master plans that enable an installation to complete a comprehensive planning process that is National Environmental Policy Act-compliant and sustainable, resulting in a holistic set of requirements sited in a well-planned community. This process achieves goals of sustainable development and creates quality neighborhoods that are walkable and are great places to work, live, and play."[3]

During the December 2017 Camp Patriot master plan development sessions, the 40th BEB, working with Cornell, Howland, Hayes, and Merryfield (CH2M); the U.S. Army Corps of Engineers; ARCENT; and Area Support Group–Kuwait engineers, developed a proposal that would exponentially improve Camp Patriot.

Engineers at Camp Patriot have initiated many of the projects incorporated in the master plan during the December 2017 planning sessions. Officers and noncommissioned officers began the planning and execution of renovations, new construction, and relocations of many facilities across the site in accordance with the master plan. Degreed engineers were afforded the opportunity to refresh their knowledge by taking project ownership, developing construction designs, and establishing timelines to organize various projects.

Motor pool expansion

Grading of the expansion area to allow follow-on occupation

Wheeled fleet at the new expansion area

Ribbon-cutting ceremony for a maintenance bay

Installation of temporary perimeter fencing to secure the expansion area

Phase 1 electrical, water, sewage, latrine, and shower projects were initiated through the Department of Public Works. The camp motor pools, originally at two separate locations, were consolidated into one motor pool. The repurposing of existing structures increased transient billeting capacity by 50 percent. The creation of the town center consolidated the chapel; fitness center; education center; and Morale, Welfare, and Recreation facilities into one central area, increasing resiliency. Over the course of the deployment, the battalion implemented trafficability, utility, operational, and quality-of-life improvements.

The incoming 150th BEB, Mississippi Army National Guard, recently conducted its predeployment site survey of KNB and Camp Patriot. The reconnaissance included extensive emphasis on the initiatives started by the 40th BEB. The ability to transition the master plan and provide direction and guidance to continue ongoing efforts resulted in a minimum 18-month period to accomplish the original planning goals. At the current rate, the improvements, along with Phase II–IV efforts, will have a positive impact on Camp Patriot for years to come.

During the 2017–2018 battalion deployment to Kuwait in Support of Operation Spartan Shield, engineers were able to capitalize on the vast technical opportunities that managing Camp Patriot afforded. Leaders became more knowledgeable about base camp and project management through the adherence to, and implementation and oversight of, the Camp Patriot master plan.

Endnotes:

[1]Joseph Krypel, *Camp Patriot: Rotating Door of Diversity*, 7 May 2003, <http://www.navy.mil/submit/display.asp?story_id=7299>, accessed on 30 July 2018.

[2]Ibid.

[3]Merideth Temple, "Master Planning—The Essential Process to Manage Change," *Public Works Digest*, January 2008, p. 3.

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TRAINING ENGINEER LEADERS OF THE FUTURE:

Engineer Basic Officer Leaders Course Modernization

By Major Niall T. McCracken, Captain Adam J. Leemans, and Mr. John R. Espe

Big changes are occurring at the U.S. Army Engineer School (USAES), Fort Leonard Wood, Missouri, and the Engineer Basic Officer Leader Course (EBOLC). These changes are being driven by recent developments in doctrine and policy, as well as feedback from U.S. Army Forces Command (FORSCOM) units and collective-training establishments. In light of changing demands from the field Army, the Department of Instruction, USAES, engaged with numerous stakeholders, including the Combat Training Center and Army National Guard, U.S. Army Reserve, and operational force leaders, to obtain feedback on the capabilities of new platoon leaders to identify where training can be improved to better prepare future leaders. This feedback and the subsequent revision process were the result of a critical-task and site selection board, held in March 2018, which brought in leaders from a broad range of Regular Army, Army National Guard, and U.S. Army Reserve engineer units to use a critical eye to review tasks taught during EBOLC. The outcome was a comprehensive new Military Occupational Specialty (MOS) 12A, Engineer Officer, critical-task list that was approved by the USAES commandant for implementation in associated professional military education courses. Combining the realignment of the course with updated Field Manual (FM) 3-0, *Operations*,[1] EBOLC is designed to better prepare platoon leaders for the threats and missions associated with large-scale combat operations versus counterinsurgency operations.

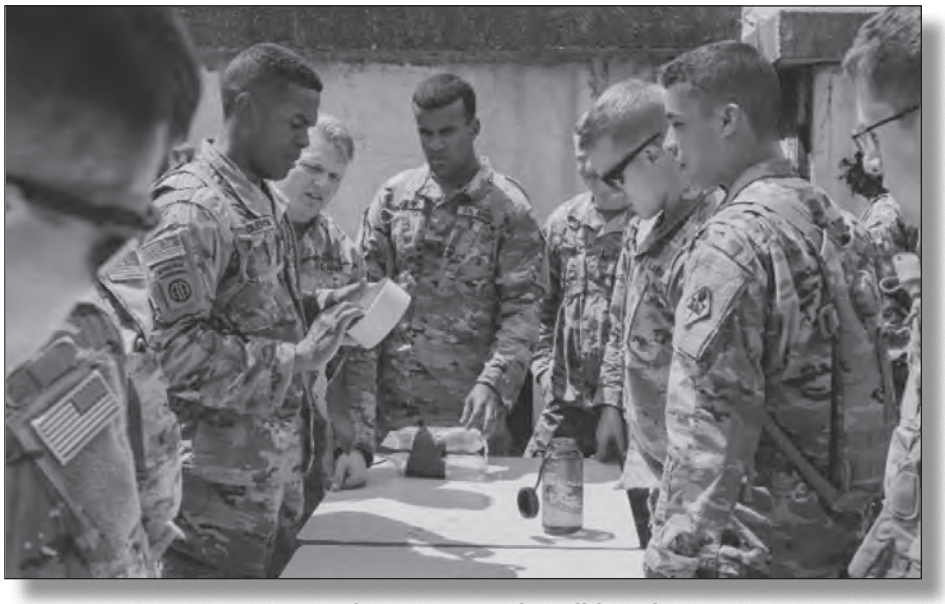
Feedback and doctrine updates have resulted in significant changes to the content, context, and focus of teaching within the Tactics Division of EBOLC. Heavily impacted areas include—

- **Decisive action.** The Stability Operations Module of the course has been reduced, and the Assured Mobility Module has been transitioned to reflect new emphasis on forced-entry operations. Forced-entry operations training supports the decisive-action planning and execution emphasized in FM 3-0.[2] While route clearance operations are still important to the assured mobility mission, the emphasis on breaching enemy obstacles and gap crossing has increased.
- **Task force engineer.** An entire Task Force Engineer Module has been created to emphasize the importance of the mission and help the new engineer lieutenant differentiate between platoon leader responsibilities and responsibilities of the task force engineer. New engineer leaders will be exposed to staff responsibilities and instructed on integrating staff planning into platoon operations under the maneuver task force model.
- **Field training exercise.** In the updated construct, the time that students spend in the field has been increased by 30 percent, allowing more time for officers to develop and practice their tactical knowledge and understanding while being assessed under pressure. Field Training Exercise I focuses on common small-unit tactics to ensure that students understand basic Army Techniques Publication (ATP) 3-21.8, *Infantry Platoon and Squad*, tactical operations and team-through-platoon-echelon leadership roles in the field.[3] It also establishes a universal foundation upon which Soldiers can build before undertaking engineer-focused missions in subsequent field training exercises. Field Training Exercise II introduces engineer mobility, counter-mobility, and survivability tasks

that were studied in the classroom environment. Field Training Exercise III builds upon these tasks at the platoon level in support of a maneuver formation operating in a more dynamic and complex environment against a peer/near-peer threat.

- **General engineering.** The General Engineering Division of EBOLC is charged with providing a baseline understanding of construction and bridging missions to every new officer in the Engineer Regiment. This task is difficult due to the fact that not all students have a background in construction or engineering. The instructors must know how to engage students to ensure that the material is challenging enough for degreed engineers and not too overwhelming for students who are new to engineering concepts. In an effort to match the requirements of the Engineer Regiment and to reflect changes recommended by the critical-task and site selection board, the division completed a module overhaul. The focus transitioned from creating technical experts to developing project managers with technical understanding. This better prepares EBOLC graduates to apply resource and time management skills to any mission that they encounter. It also sets the conditions for future construction platoon leaders to fill the role of a project manager who trusts his or her noncommissioned officers and warrant officers to provide experience and technical expertise.
- **Project management.** EBOLC has always included some project management-related instruction; however, it was not always clear how it related to the rest of the material in the course. All of the project management instruction is now presented at the beginning of the construction portion of the General Engineering Module. Students begin by learning about the different construction MOSs, the various construction units in the Engineer Regiment, and the roles and responsibilities within those construction units. The instruction then focuses on how to break a project down into individual construction activities, estimate durations, sequences, and schedule activities. This logically leads to the critical-path method of scheduling, generating Gantt© charts, and learning how to level resources. Lastly, students learn how to develop a bill of materials, quality control plan, and safety plan. The final test requires that students apply these lessons and develop a plan to complete a small construction project using joint construction management software and Microsoft® Project®.
- **Technical leaders.** Throughout the horizontal- and vertical-construction blocks of instruction, certain learning objectives were reevaluated to determine their relevancy. In one example, students spent half a day learning how to estimate earthwork volumes using the counting squares and stripper methods. These methods are generally inaccurate and have been largely replaced by software such as Terramodel®. Furthermore, warrant officers and MOS 12T, Technical Engineers, are trained to estimate earthwork volume. This class was modified to include how earthwork volumes are calculated and to focus on how to most efficiently move the material around a worksite. These changes have resulted in drastically improved engagement from students, who have a better understanding of their roles and responsibilities as platoon leaders when their platoons are engaged in missions of these types.

An EBOLC student briefs his analogue OPORD.



EBOLC students prepare demolition charges.

- **Interactive learning.** Another major revision across the course was a reemphasis on homework. By having students preread modules, more class time is spent on discussions and hands-on training. For example, in the utilities class, what was formerly classroom instruction delivered primarily through a PowerPoint® presentation became an interactive class taught in a Southeast Asian hut with exposed utilities. The instructor, an MOS 12H, Construction Engineering Supervisor, led students around the structure, showing them how the utilities were installed. The structure contains intentional design flaws throughout, enabling the instructor to show the students how plumbing is installed in right and wrong ways. Time for this type of instruction is only possible because students are required to review the material before class. A graded quiz is given each morning to assess students' comprehension of the reading assignment. While some pushback might be expected from the students, they actually enjoy this style of instruction because the classroom time is better spent solving practical, realistic problems.

Units receiving EBOLC graduates get officers with a strong understanding of the fundamentals of engineer operations at the platoon level. These officers have a solid grasp of mission planning and operations order production and briefing, competence in combat and general engineering, and a knowledge of project management processes and geospatial fundamentals. They have a baseline knowledge of task force engineer duties and planning processes. And they have been educated on garrison functions, including training, personnel, maintenance, and supply management at the platoon level. However, gaining units must understand that these officers are not finished products and that they still have much to do to master the fundamentals of leadership at the junior company grade level. This is why unit level leader development programs are so important. Recommended focus areas for new lieutenant development for companies and battalions include planning/conduct of qualification ranges, platoon/company/battalion battle rhythm events, counseling and development of subordinates, maintenance of/accounting for equipment, and building of confidence in integrating and interacting with maneuver commanders in a tactical environment over a long period of time.

Conclusion

Revisions across technical and tactical aspects of engineer officer training have resulted in a course that is more relevant and more engaging for new officers and better meets the needs of the operating force. Ultimately, these changes are possible as a result of the hard work and dedication of a team of highly motivated instructors from the USAES Department of Instruction and the 554th Engineer Battalion, Fort Leonard Wood, who are committed to continuously improving training and building future engineer leaders. If you would like to join this team and help prepare the next leaders of the Engineer Regiment to meet the challenges of the future, then please contact the EBOLC chief by telephone at (573) 239-0009 or e-mail at <usarmy .leonardwood.engineer-schl.mbx.dotlddoi@mail.mil>.

Endnotes:

[1]FM 3-0, *Operations*, 6 October 2017.

[2]Ibid.

[3]ATP 3-21.8, *Infantry Platoon and Squad*, 28 April 2016.

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Mr. Espe is the chief of the Tactics Division, EBOLC. He holds a bachelor's degree in social science from Washington State University, Pullman. He is a retired major and a graduate of the Army Command and General Staff College, Fort Leavenworth, Kansas.

Maneuver Support, Sustainment, Protection, Integration Experiment

By Mr. Dennis G. Hutchinson

In 2017, the Army Capability Integration Center (ARCIC) initiated a new, live, prototype experiment venue–the Maneuver Support, Sustainment, Protection, Integration Experiment (MSSPIX). This article describes how government and private-sector organizations can participate in this new experiment.

The venue is one of four integration experiment venues organized under the Army Capability Integration Center Live Prototype Assessment (ALPA) effort. The other three are the Army Expeditionary Warrior Experiment at Fort Benning, Georgia; the Maneuver Fires Integration Experiment at Fort Sill, Oklahoma; and Cyber Quest at Fort Gordon, Georgia. All of these venues are intended to execute an annual assessment of prototype technologies that provide Soldiers with new or improved capabilities. As noted in the *Army Campaign of Learning, Annual Planning Guidance for FY19–23*, "ALPA assesses the recommended solution approaches to solve/mitigate the Army's most critical capability gaps identified in the capability development community's [capability needs analysis]."[1]

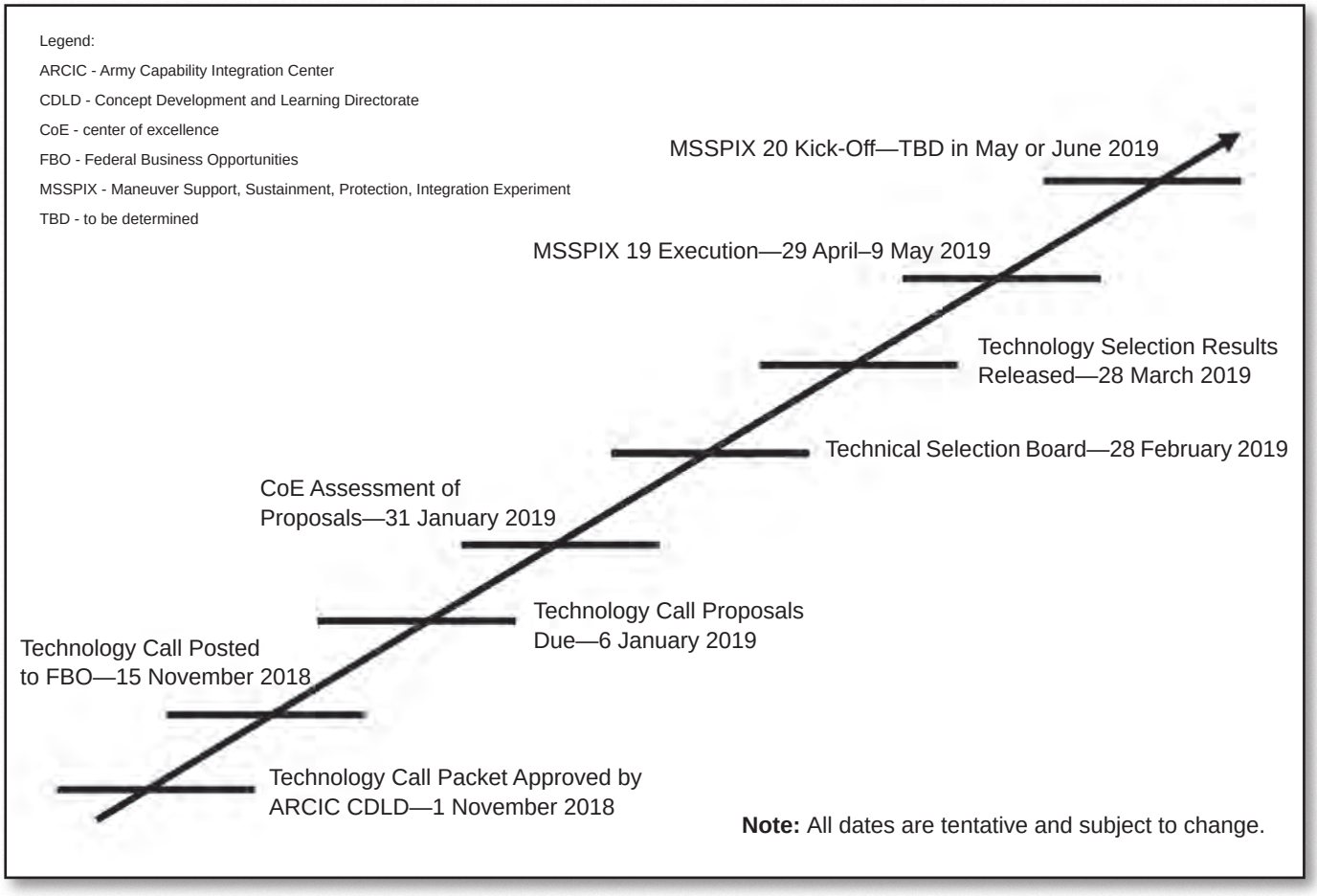
MSSPIX differs from the other venues; it is a collaboration between the Maneuver Support Center of Excellence (MSCoE), Fort Leonard Wood, Missouri, and the Sustainment Center of Excellence (SCoE), Fort Lee, Virginia. Both centers of excellence leverage their battle laboratories (the Maneuver Support Battle Laboratory [MSBL] and the Sustainment Battle Laboratory [SBL], respectively) to plan, execute, and report/document the experiment each year.

A crawl-walk-run approach was adopted to build MSSPIX. The "crawl" phase, which was executed in 2017, was led by the U.S. Army Training and Doctrine Command (TRADOC) Capability Manager–Maneuver Support. This effort consisted of six individual experiments simultaneously conducted at Fort Leonard Wood. The results were captured in a single report. Some of the assessed technologies included a fire control system, leader-follower technology, an explosive ordnance disposal common robotic system, and a training package for operation of a base camp.

In 2018, responsibility for planning and execution at MSCoE shifted to MSBL. MSBL personnel introduced the "walk" phase. U.S. Army Research, Development, and Engineering Command and Engineer Research and Development Center, U.S. Army Corps of Engineers, elements were asked to provide research or engineering efforts that were mature enough for a prototype assessment and appropriate for the venues and proponents involved. The elements also needed to be willing to provide resourcing for inclusion in the assessment.

A CBRN Soldier puts an unmanned aerial vehicle into operation.

By the execution on 3 April 2018, nine technologies from the government and private-sector organizations were included in the experiment. The capabilities assessed included the integration of chemical, biological, radiological, and nuclear (CBRN) sensors on robotic platforms; an additive manufacturing capability used to build structures; software to enable the informed identification of base camp and airfield site selection; software to aid in planning the design and operations of base camps; a remote bridge assessment tool; and a render-safe technology for explosive-ordnance disposal Soldiers. Additionally, there was one technology that leveraged the venue for the conduct of a limited objective assessment. This limited objective assessment was included on short notice at the request of the Requirements Determination Division, Capabilities Development and Integration Directorate, MSCoE.



Draft timeline for MSSPIX 2020 future operations

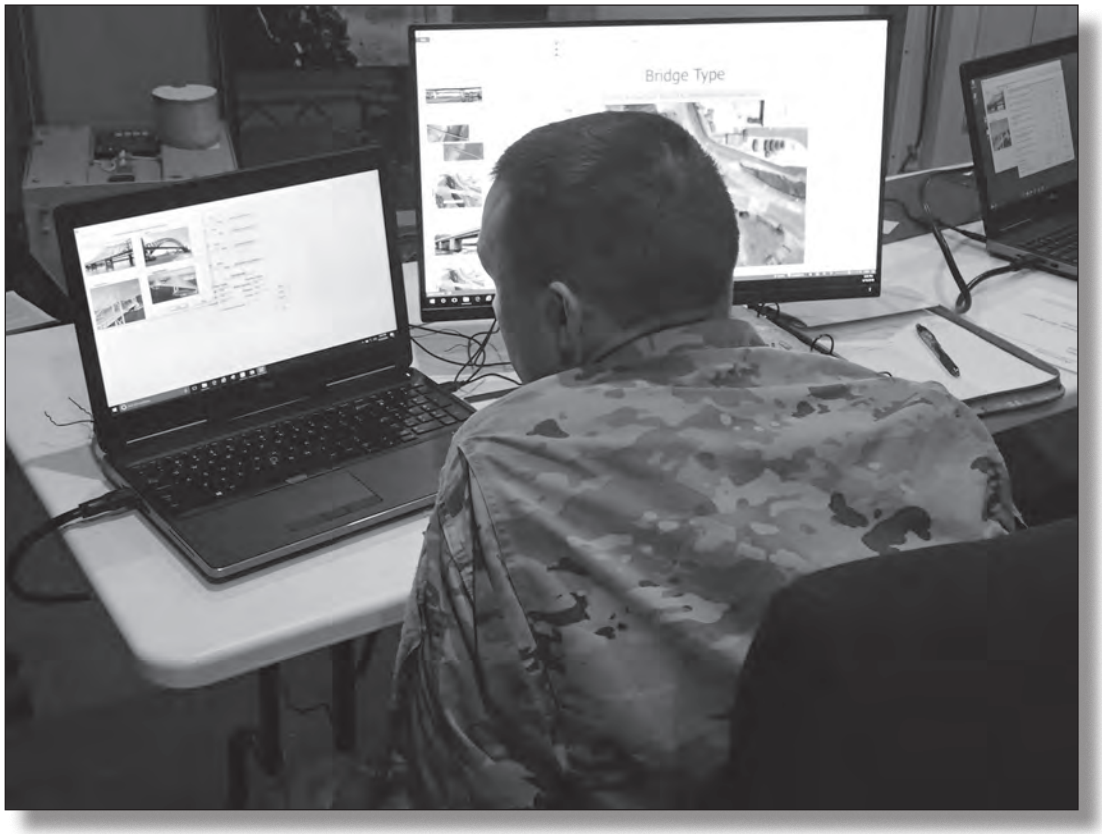
The "run" phase, MSSPIX 2019, will be executed in April 2019 at Fort Leonard Wood. In October 2017, the Concept Development and Learning Directorate, ARCIC, sought proposals and sent a technology call memorandum through formal channels to Army organizations. The U.S. Army Contracting Command, Redstone Arsenal, Alabama, then posted a Broad Agency Announcement to the Federal Business Opportunities Web site at <www.fbo.gov>, seeking proposals from the private sector. Currently, MSSPIX 2019 is slated to assess 26 technologies—15 from government organizations and 11 from private-sector organizations.

For MSSPIX 2020, the desire is to sustain the process to receive proposals and conduct technology selection activities. The five overarching experiment objectives, which will remain unchanged, answer the following questions:

1. How does the Army better enable Force 2025 and Beyond Soldiers to understand the operational environment (conditions, circumstances, and influences) in support of the employment of capabilities that enable commanders' decisions? (MSCoE)
2. How does the Army conduct shaping activities to influence the local population, enemy forces, and other actors as well as the terrain within the operational environment? (MSCoE)
3. How does the Army better mitigate the effect of obstacles designed or employed to impede freedom of movement? (MSCoE)
4. How can maneuver support forces be better enabled to provide enhanced technical protection capabilities? (MSCoE)
5. How does the Army provide the capability to extend endurance and operational reach, increase operational readiness, reduce demand, and execute responsive sustainment to widely dispersed units in support of multidomain battle operations? (SCoE)

Although the objectives never change, the desired focus areas are subject to change each year based on changing priorities. The focus areas provide technology providers with a clearer view of what MSCoE and SCoE are interested in assessing. As an example, gap crossing could be a focus area under Objective No. 3 above.

The execution date for MSSPIX 2020 has not been determined but will likely fall in the April–May 2020 timeframe. After the technology call memorandum is signed by the Concept Development and Learning Directorate, another Broad Agency Announcement will be posted to the Federal Business Opportunities Web site by the Army Contracting



An engineer Soldier works with the Remote Bridge Assessment Tool.

Command. This is expected to happen in October or November 2018. For private-sector organizations that have search filters set to monitor postings, the recommended subject will be "MSSPIX 20 Technology Call." Additionally, the North American Industry Classification System code previously used was 541 (Professional, Scientific, and Technical Services)/541990 (All Other Professional, Scientific, and Technical Services).

To participate in MSSPIX, technology providers (government or private-sector organizations) can expect to incur travel expenses for their organization to attend limited planning events and the assessment, costs for the development and delivery of training for their users to fully understand the technology, costs associated with attaining a safety release, and shipping costs to transport the technology to the assessment location. As a general practice, safety releases require funding only if an item requires testing. Testing may be avoidable if the U.S. Army Test and Evaluation Command, Aberdeen Proving Ground, Maryland, is provided sufficient information from historical records to assess a technology. The MSSPIX team will connect technology providers with points of contact in the Army Test and Evaluation Command early in the current-operations stage. The assessment and analysis, as well as access to Soldiers who will use the technologies, are provided at no cost to technology providers. Building the assessment is a cooperative effort between the MSSPIX team, technology providers, and technology sponsors. A sponsor (typically a TRADOC representative from a center of excellence/capability developer) represents Soldiers employing a capability.

It's important to note that MSSPIX is not a test. In Army acquisition language, tests are used to support acquisition decisions. While testers can certainly leverage MSSPIX results, this does not alleviate developmental or operational testing requirements. MSSPIX will not provide a comparative analysis of systems, regardless of their status (fielded Army equipment or capability from the private sector.)

In summary, if you have a technology that you believe is a good fit for MSSPIX and would like for it to be used by Soldiers during an assessment, watch for the technology call each fall on the Federal Business Opportunities Web site. While there are some limits to what can be assessed, every attempt is made to accept all proposed technologies that show a clear alignment to the experiment objectives and subordinate focus areas.

Endnote:

[1]TRADOC, *Army Campaign of Learning, Annual Planning Guidance for FY19–23*, 18 October 2017, p. 7.

Mr. Hutchinson is a capability development experimentation analyst for MSBL, Fort Leonard Wood. He holds a bachelor's degree in business administration from Columbia College, Missouri; a master's of business administration degree from Webster University; and a master's degree in project management from Western Carolina University, North Carolina.

HOW THE 2D CAVALRY REGIMENT BUILT A PREMIER TRENCH RANGE IN EUROPE

By Captain Spencer W. Donaldson

In the summer of 2017, the 2d Cavalry Regiment (2CR), Vilseck, Germany, built a premier training range in Europe. The range included a nearly 900-meter-long Eastern-style doctrinal defensive trench line. The range was constructed as the result of Regimental Commander Colonel Patrick Ellis' vision to employ his engineers to build the trench and conduct a live-fire exercise in it during the first iteration of enhanced Forward Presence (eFP), Poland, in October. Located on the northeastern border of the North Atlantic Trade Organization (NATO) Bemowo Piskie Training Area, eFP Poland is a U.S.-led battle group, established in March 2017. Managing the construction of the trench entailed not only monitoring the physical aspect of building the trench, but also fostering interpersonal relationships among members of NATO. This combined effort resulted in the shaping of a diplomatic expression of partnered deterrence against Eastern aggression.

The physical aspect of building the trench referred to as Objective Ford required research, resources, and ingenuity in design. No other U.S. unit in recent history has constructed a trench of this magnitude; therefore, a template for construction did not exist. However, the need has been identified, as trench warfare has surfaced in Ukraine. It is common knowledge among engineers that maneuver units are not training to fight a civil war against U.S. obstacles and designs, but instead to fight against a foreign near-peer adversary using its own doctrine. Research into Eastern doctrine was required to establish a base of knowledge; and

Bunker under construction

Construction of the first section of retaining wall

in this case, that research needed to be supplemented with U.S. doctrine to ensure safety. Resourcing the equipment and materials was necessary in order to build the bill of materials. Doing so in a foreign country in which the United States has only recently established its military presence is a mission in itself. Finally, the range was constructed in a race against time, with minimal resources on hand to be prepared for the battle group's troop level live fires.

After receiving the mission to build a trench on a forward base, a pre-site assessment needed to be conducted. Designing and constructing the trench entailed researching designs, studying range regulations, and visiting an existing trench range in Germany. Constructing a fighting trench is not a focus for Regular Army units or personnel at the Maneuver Support Center of Excellence, Fort Leonard Wood, Missouri. The first step in researching trench design and construction is to consider what already exists. Trenches on training ranges in Germany differ greatly from a trench designed to be defended. A typical training trench is about 10 feet deep and built with formed concrete and railroad ties. This design, while nothing close to an Eastern design, addresses two important factors for every range: The trench must be safe for training, and it must be robust enough to endure long periods of inattention.

Defining the requirement entailed researching the desired end state and then researching its construction. Visits to the battle group provided information on the design of a contemporary trench in Ukraine and a realization about how to conduct engagement area development of Objective Ford. To meet those Eastern specifications, 2CR designed Objective Ford to replicate a location where an Eastern defense would emplace its armored vehicles and bunkers. Inside the trench, special care was taken to build the bunkers and apply Eastern dimensions for the trench line. An Eastern trench line has different styles of turns depending on the type of terrain. In the case of the flat, open terrain of Objective Ford, Eastern defense called for a zigzag pattern. The dimensions inside the trench line were then addressed. Eastern front-line trenches are designed for combat versus training, with high walls meant to keep rounds inside the trench. The Eastern design is only hip tall and one person wide. Special care was taken to test and modify these dimensions before construction to meet safety standards while still replicating an Eastern-style trench. In the case of a training range, the floor is expanded to allow a Soldier in full gear to pass another Soldier in the trench. The constant zigzags inside the trench favor the defender while an opposing force is attempting to clear the trench. The communication trenches behind the battle positions are deeper, and fewer zigzags are implemented to allow for expedient movements. Common construction

2d Cavalry Regiment sappers and 18th Military Police Brigade carpenters establish an on-site workshop.

techniques taught in the Missouri University of Science and Technology Geological Engineering Program were applied to safely design the wall.

During the planning phase, time and effort were put into resourcing the required materials, personnel, and equipment. Lumber size and price standards vary across Europe and even within Poland. Developing a bill of materials and cost analysis required a reconnaissance of local lumberyards for available materials. The task force engineer was tasked with the reconnaissance of rental equipment and lumberyards in the area. The English language is not as prevalent in Poland as it is in Western Europe, so acquiring costs was painstaking, as it is necessary to work through interpreters to understand foreign business rules. Power tools, hardware, and quick-setting concrete were resourced from local vendors to complete the bill of materials.

Sapper sifting concrete in the trench.

In the wake of ongoing summer training, a multinational effort was made to resource equipment and personnel to support the construction of Objective Ford. Most of the 2CR earthmoving equipment, prime movers, and operators were already committed to the preplanned summer training operations in southern Europe. Working through minor issues, 2CR effectively transported construction equipment from Germany to support operations and then heavy equipment operators from 2CR became the primary means of excavation. Polish allies provided further equipment support. Due to the large scope of the project, Polish bucket loaders were called upon to perform bulldozing operations. The sandy soil of northeast Poland permitted bucket loaders to perform such operations as digging vehicle fighting positions. In order to move construction equipment to and from the project site, the battle group called on recovery assets in its forward support troop and a British attachment.

By the end of the project, Soldiers from every U.S. Army engineer company in Germany had worked on the trench. The primary work force for building the retaining wall was the battle group sapper platoon, supplemented with infantrymen who rotated every week. Carpenters from the 18th Military Police Brigade, Sembach Kaserne, Rhineland-Palatinate, Germany, were requested to construct the more technical portions, such as the bunkers and target boxes.

Sappers constructing the retaining wall.

Developing, excavating, and building a combat training trench with a sapper platoon and limited equipment required resourcefulness. 2CR flexibility was required to support construction when both 2CR engineer companies were already committed to summer training. In lieu of an engineer company command leading the construction, the Regimental engineer deployed forward to the eFP battle group to manage construction of the project.

Ingenuity was needed to outfit and train Military Occupational Specialty 12B, Combat Engineers (Sappers), to complete the job of Military Occupational Specialty 12Ws,

Polish engineers construct a vehicle fighting position.

2d Calvary Regiment engineer directing Polish operators to set anchors

Carpenters. Outfitting and training sappers required a vertical-construction subject matter expert. Fortunately, a former civilian construction contractor was serving as a squad leader in the platoon. His expertise was priceless throughout the project, from selecting the tools and hardware to leading Soldiers in the trenches. Planning how to construct the trench required ingenuity, as field manuals do not cover how to construct a retaining wall. A work rate guide does not exist for building a retaining wall, despite extensive research, including phone calls with home improvement experts. Developing a work rate for building the retaining wall included a systematic time analysis with experts from the Corps of Engineers Reachback Operations Center, Huntsville, Alabama.

In planning to develop the trench for a live-fire range, certain live-fire standards had to be met and the trench had to be built to last. To make the range meet live-fire standards, exposed metal had to be minimized, which was a factor to be considered when constructing the retaining walls. To extend the life of the trench, the posts were set into the ground with concrete and anchored with cables. For safety and longevity, 2CR incorporated an anchor that is not of Eastern design. To follow safety principles but still simulate a regional peer threat, 2CR chose to bury the anchors and compact them with locally sourced plate compactors. The design required a wider trench to facilitate the work. 2CR excavated a modified antivehicular ditch, a common equipment operator task. Boards were screwed to posts from the outside, and then an anchor cable was installed below grade. The soil was then backfilled against the exterior of the wall, covering the anchors and screws.

Sapper testing the anchoring system

Fostering interpersonal relationships among NATO countries required overcoming the language barrier, learning military customs and courtesies, and assuming risk where possible. Construction in foreign countries is a challenge, as the business rules vary across borders. Interpreters were invaluable in dealing with local vendors. Standards for products such as lumber vary, and business often takes place during an extended conversation over coffee. With only 2 months available for construction, time was valuable so contracting was not an option. In Poland, construction vendors do not have modern equipment to process purchases,

A bulldozer is used to backfill after anchoring.

even at wholesale stores, so valuable time was allotted to allow them to acquire the right equipment.

While building the trench, 2CR adjusted to the customs and courtesies of its ally. A major cultural difference was encountered, as the management of facilities in Poland is kept at a higher level than U.S. personnel are accustomed to. Support for construction of the trench on Bemowo Piskie Training Area required approval from the Polish government, and requests for engineer equipment and carpentry facilities down to the tactical level were routed through allied commands.

2CR assumed risks by using personnel who were not trained in construction to construct the most unique trench range in Europe. Further risks were assumed by conducting a live-fire exercise outside of Polish range norms. Heavy vertical-construction missions such as those of Objective Ford are normally tasked to echelon-above-brigade units because they are outfitted and trained for them. With a subject matter expert and the proper care to outfit and train its sappers, 2CR accomplished this task. Polish range regulations are designed for the way in which the Polish military conducts training; 2CR techniques for assaulting the trench differ greatly from Polish techniques. Common U.S. Army techniques for assaulting the trench and using fire support needed to be coordinated with Polish range control. 2CR subsequently assumed full responsibility for conducting the live-fire exercise, and only with this assumption of risk was an outstanding live-fire training event conducted.

2CR achieved deterrence at a strategic level by using Eastern doctrine in its construction practices, publicizing the multinational effort, and executing a realistic live-fire exercise. From 30 September to 3 October 2017, eFP Poland conducted the first live fire on Objective Ford and Public Broadcasting Service's *NewsHour* publicized the event. Colonel Ellis clearly stated that the purpose of the range was to train NATO troops against a near-peer threat.[1] 2CR sent a strategic message of deterrence by training to defeat NATO adversaries. Potential aggression is deterred by improved capability, and realistic training improves capability. Each time NATO uses Objective Ford, whether eliminating supporting vehicles or navigating the zigzag turns inside the trench, its soldiers become more familiar with an Eastern trench.

During the live-fire exercise, 2CR practiced its full spectrum of warfighting capabilities to defeat the simulated defense; then, the infantry practiced clearing nearly 900 meters of trench line with Eastern-style bunkers. The commitment of 2CR to the defense of NATO borders was captured by Public Broadcasting Service's *NewsHour,* and the strategic message of readiness was broadcast to the world.[2]

Endnote:

[1]Ryan Chilcote, "After Russia's Ukraine Incursion, NATO Troops Drill for War on a Cold-War Scale," *NewsHour*, Public Broadcasting Service, 11 December 2017, <https://www.pbs.org/newshour/show/after-russias-ukraine-incursion-nato-troops-drill-for-war-on-a-cold-war-scale>, accessed on 26 July 2018.

[2]Ibid.

Captain Donaldson served as project manager with the 2d Cavalry Regiment and as the breach observer-controller for the live-fire project. He holds a bachelor's degree from the U.S. Military Academy–West Point, New York, and a master of science degree from Missouri University of Science and Technology at Rolla. He is a certified project management professional.

The Modern Battering Ram: MICLIC in Kuwait

By Private First Class Victoria R. Herrera

In the winter of 2018, the 40th Brigade Engineer Battalion, 2d Brigade, 1st Armored Division, used its Assault Breacher Vehicles (ABVs) to launch Mine-Clearing Line Charge (MICLIC) rockets. Engineer Soldiers rarely get to train with MICLICs; however, a few combat engineers from Company B, 2d Platoon (War Dogs), were part of an exercise that qualified them on the MICLIC system for use in future operations.

The MICLIC is a reduction asset for breaching operations. It allows Soldiers to clear minefields in order for mission-essential vehicles and personnel to maneuver through an area. To enable a successful MICLIC deployment, there cannot be any deficiencies in manpower or equipment. Poor maintenance or lack of system knowledge may cause unnecessary hazards and casualties.

Soldiers assigned to Companies A and B detonated a MICLIC for the first time on Udari Range Complex, Kuwait, on 8 February 2018. First Lieutenant Derek R. Wilson served as the officer in charge of the MICLIC range, and Sergeants Dustin L. Calderwood and Eugene M. Perez taught safety classes prior to deploying the MICLIC. The focus of these classes was on driver and commander stations, preventive maintenance checks and services, and precombat checks and inspections. Functions of the MICLIC tub, Modification Mark II rocket launcher, and operation fuse and misfire procedures were covered during the safety briefing. The purpose of preventive maintenance checks and services is to ensure that the system and equipment are poised to increase readiness and avoid a failure that could potentially render the system inoperable. Precombat inspections and precombat checks help leaders ensure that the MICLIC system is combat-ready prior to its use. The instructor's intent was to provide the Soldiers with the knowledge they needed in order to accomplish future missions and operations with the MICLIC.

"The MICLIC is a reduction asset for breaching operations. It allows Soldiers to clear minefields in order for mission-essential vehicles and personnel to maneuver through an area."

The opportunity to train the Soldiers on the MICLIC was a source of pride for the range instructors. "It's a great accomplishment—knowing that my Soldiers are qualified and have a better understanding of the ABV vehicle and the responsibility that comes with it," stated Sergeant Perez. "By doing that, it enables this company to continually provide ABV support for future missions," he said.

Private First Class Herrera serves as a combat engineer Bradley operator for the commander and a representative for the unit public affairs program and Digital Training Management System in Company B, 40th Brigade Engineer Battalion, Fort Bliss, Texas. She graduated from Combat Engineer One-Station Unit Training with Company D, 31st Engineer Battalion, Fort Leonard Wood, Missouri.

What to Expect When You're Expecting to Work With USACE

By Captain Spencer L. Diamond and Captain Daniel B. Powell

An assignment to the U.S. Army Corps of Engineers (USACE) offers an excellent experience and represents the most available broadening program for engineers, with opportunities at every grade. The transition to USACE, while exciting, requires many adjustments. Many Soldiers have little exposure to, or experience working with, USACE before receiving an assignment; this creates opportunities for transitional friction. The purpose of this article is to facilitate a better understanding of working within USACE.

In-processing With the Corps

Upon notification of assignment to USACE, you should introduce yourself to the commander as normal. Most of your future communication will be with the deputy commander and your sponsor. You may not be assigned to the district headquarters, which makes early and open communication key to expectation management. There will be no replacement or reception unit to help you in-process. Your sponsor should provide you with a packet or checklist and the point of contact for all in-processing tasks. There is a personnel office for in-processing and personnel actions. However, the points of contact at some district offices are at different locations. You should contact your sponsor 2 weeks ahead of arrival and ask him or her to initiate your network account request so that you have network access upon arrival. Also, if working in a metropolitan area, ask your sponsor about public transportation benefits. Serious house hunting should be delayed until after your duty location is pinpointed.

Living in the Corps

USACE is a project-funded service organization. The source of the entire district budget, including funds for payroll, office supplies, and the building lease, is the income generated by the projects that are managed by the district. USACE-managed work and services for local, state, or federal entities are split between military construction and civil works. Military construction pertains to any branch of the Department of Defense and includes construction, renovation, repair, and facility maintenance. Anything not categorized as military construction is considered civil works; this includes waterway management, emergency management, dams, bridges, canals, locks, hydrology, recreational areas, and Superfund remediation.

The organization of USACE districts is vastly different from that of traditional military units. The district commander chairs a corporate board; the governing board members are the chiefs of the district divisions. As a Soldier, you will likely have a civilian for an immediate supervisor; however, the civilian will not rate you. Rather, the district deputy commander will likely be your rater and the district commander your senior rater. The complex and vertically aligned organizational structure requires that you coordinate efforts outside of your chain of command and with people over whom you have no authority. You must communicate clearly across this wide range of people, ensuring that all information makes it to your subordinates and coworkers.

Of the 37,000 USACE employees, approximately 700 are Regular Army Soldiers. It is commonly understood that our

contribution to USACE is not as technical experts but as leaders. Most civilians are understanding and patient as we take the time necessary to get up to speed. A surprising number of people have worked in USACE for as long as some of us have been alive. Personnel actions are largely reactive, which often results in weeks or months of underlap in positions. The reasons for this can be as predictable as retirements or as unexpected as promotions to other positions. The process of hiring someone is almost always initiated after the departing employee leaves his or her position, which often results in a capabilities gap. However, expectations are managed by having others cover to ensure success.

Soldiers generally have a great reputation for being responsible workers and leaders. Therefore, it is likely that you will have little direct supervision. While the freedom of independence is exciting, you may find that it is challenging to stay motivated and difficult to stay fit. This autonomy can extend to your Family as well. A spouse may experience challenges in developing social interactions, especially if he or she is a stay-at-home parent. Coffee groups and Family readiness groups are not likely to exist. Finding a local support structure early on goes a long way to building Family readiness. Local and state events are abundant, and breaking out of the Army's social shell provides many opportunities to experience new types of people who are not part of the typical military demographic.

An assignment to USACE may mean that you will be living completely on your own for the first time. Many USACE offices are located far from sizeable military installations. Much of the normal Army support structure for Families is not available. There may be no Army child development center; and school and daycare costs, which may be dictated by the local economy, can vary widely. Look into Tricare Prime Remote® (a managed medical care option available in remote areas of the United States), as opposed to the nearest military clinic or hospital, to receive medical services near your residence. You will be required to commute to work at your own expense unless you are able to use public transportation. If assigned to an urban/metropolitan area, you may receive financial assistance such as a cost of living allowance and even public transportation benefits. USACE supplements public transportation costs but will not pay for parking passes. Contact your sponsor regarding public transportation benefits 1 month before reporting so that the passes are ready when you arrive.

Working in the Corps

USACE has a flexible work schedule policy; employees may work anytime between 0630 and 1700, with established core times of 0900 to 1500. Policies vary by location, but most districts have their employees assume responsibility for their own work schedules, physical fitness, deployment readiness, and welfare. Your pay will still come from the Army; USACE reimburses the Army.

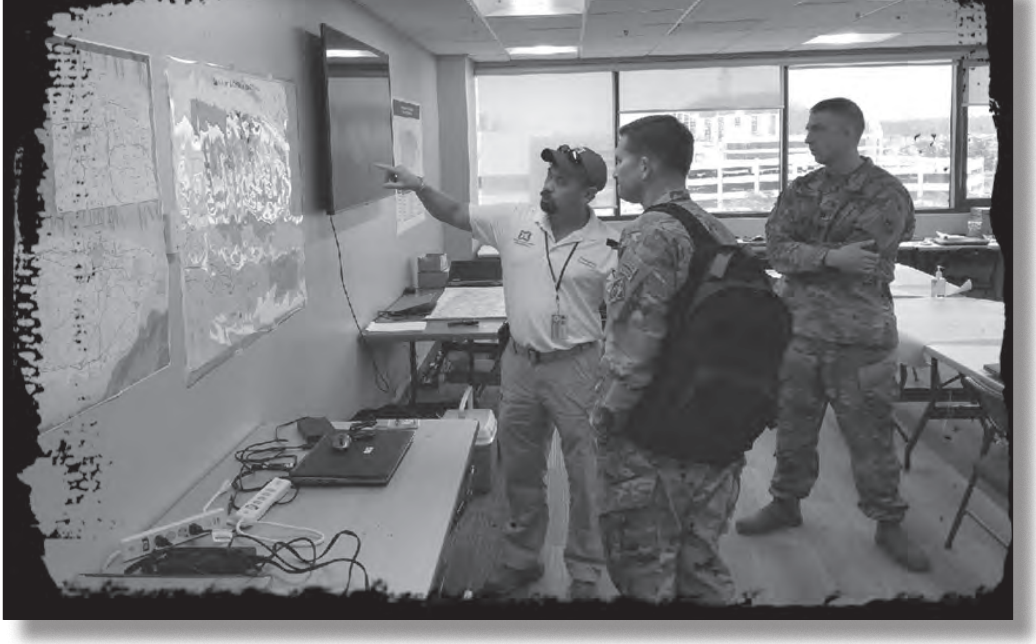
USACE uses its own vocabulary and acronyms, and each branch or division within the district uses its own dialect. Acclimating to new diction is not a new challenge, but is something to keep in mind. Most of us will likely become project engineers in the construction branch of a district. Project engineers administer contracts as contacting officer representatives. Contracting officer representatives (COR) ensure that contractors comply with contract requirements, process monthly invoices, analyze submittals for compliance, prepare formal correspondence, and interface with the customer and contractor on behalf of the contracting officer. Project engineers are generally responsible for multiple small projects (under $500,000), one large project (over $10 million), or a combination thereof, depending on office workload and other factors.

Major Brian L. Corbin, deputy commander of the Philadelphia District, addresses the crowd during a ribbon-cutting ceremony for the Absecon Inlet construction project, Atlantic City, New Jersey.

Another common assignment is as resident engineer. A district may have multiple resident offices throughout its area of operations. Each of those offices has a resident engineer, who is responsible for making sure that the project engineers and other field staff successfully administer assigned contracts. Serving as a resident engineer is much like running a small company or detachment command. Resident engineers sign for office property, approve and verify time sheets, approve leave, and manage the office workload. Some may be assigned

as a resident engineer immediately upon arrival, and others may spend time as a project engineer before moving on to become a resident engineer.

Some Soldiers may work as project managers. Project managers are responsible for a project from its conception through its close-out and may have extensive portfolios consisting of more than 50 individual contracts in various stages of progress. Project managers coordinate assets from across the district to ensure that each contract is planned, resourced, and executed to the satisfaction of the customer. Generally, one would be assigned to this position only after adequate exposure to the district, as it requires extensive knowledge of USACE contract administration and project management.



Mr. Tom S. Lavender, project manager for the Philadelphia District, and Captain Brian N. Clason brief Major General Donald E. Jackson on recovery efforts after Hurricane Maria.

Special-projects positions are not uncommon in USACE. Other USACE positions that Soldiers have filled include design engineers, various section chiefs, and design managers.

Disaster relief support is unpredictable. Stay abreast of the weather within your district and its area of operations. Many deployment notifications occur with little or no notice. Most personnel who deploy in support of disaster relief do so on 30-day assignments. However, there have been assignments as long as 90–180 days. Most who deploy to support disaster relief do so as a quality assurance representative, project engineer, or battle captain.

Training in the Corps

Most USACE divisions have Soldier-specific development programs that require Soldiers to pursue and earn either project management professional (PMP) accreditation or professional engineer licensure, as applicable. PMP accreditation can be pursued in a couple different ways. The first option involves self-study; you study on your own time and at your own expense and then apply for reimbursement after passing the test. For the second option, USACE has a list of courses that includes a weeklong PMP preparation course offered throughout the year. This course, which fills up fast, is a temporary duty assignment paid for by USACE. Because only degreed engineers can earn a professional engineer license, that training is not facilitated like PMP training; however, USACE will reimburse you for training courses and testing fees upon successful licensure. Some districts may also have professional engineer study groups available. Coordinate with your leadership as early as possible to be included in the next fiscal year training.

Soldiers are also required to attend an annual District Officer Introductory Course during their first USACE tour. Taking this weeklong course is a great way to learn more about USACE and to network with other Army personnel assigned throughout the Corps.

As a project engineer or resident engineer, you will be required to become COR-certified. There are three main classes required for COR credentialing: Fiscal Law, Ethics, and COR With a Mission Focus. Fiscal Law, which is the class most applicable to a project manager or project engineer/resident engineer, takes the longest time to complete. The Ethics, COR With a Mission Focus, and a few other annual training classes require a day or less to complete.

Conclusion

An assignment with USACE represents an excellent opportunity. USACE is a diverse organization that will expose you to a cornucopia of fields and experiences. The environment is much different from that to which Soldiers are accustomed—mostly in a positive manner. Flexible work schedules open the door for significant Family time and a wide range of exposure. Civilians are excellent coworkers and welcome our leadership and enthusiasm. Come with a good attitude, and you will have a rewarding broadening experience.

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Captain Powell is the budget management chief for the Philadelphia District, Philadelphia, Pennsylvania. He holds a bachelor's degree in civil engineering technology from Southern Polytechnic State University, Marietta, Georgia, and a master's degree in civil engineering from Missouri University of Science and Technology at Rolla. He is a licensed professional engineer.

The Prestigious Sapper Tab–

Earning and Maintaining the Right to Wear It

By Master Sergeant Matthew B. Zwolinski

The sapper and the sapper tab represent the elite engineer in the U.S. Army—a leader among leaders, peers, and subordinates. Sappers transcend their counterparts to support the maneuver commander in all aspects of mobility, countermobility, and survivability. From preparation to performance, these engineers must accomplish many feats to earn and wear the coveted sapper tab. The dedication and effort that sappers put forth certify them in their profession, designate them as experts in their units, and allow them to lead from the front. To protect the right to wear the tab, sappers must prove themselves to their peers and leaders on a daily basis. However, others forge their way into this elite group by wearing an unearned sapper tab or falsifying documents. It is the responsibility of Soldiers to defend the prestige of the sapper tab.

The sapper tab was established by the Chief of Staff of the Army on 28 June 2004. The tab is authorized for award to U.S. military and civilian personnel and foreign military personnel who meet the prescribed eligibility criteria. The basic eligibility criteria for sapper tab award include successful completion of all requirements for graduation and a graduation certificate from the Sapper Leader Course conducted by the U.S. Army Engineer School (USAES), Fort Leonard Wood, Missouri. The sapper tab may be awarded retroactively to anyone who met these criteria on or after 14 June 1985, which is when the first validation class was conducted. Requests for retroactive awards can be submitted to the Commandant, USAES, Maneuver Support Center of Excellence, Fort Leonard Wood.

Earning the Sapper Tab

Soldiers must compete to get accepted into the Sapper Leader Course. They must meet two important prerequisites—passing the sapper physical fitness test and completing the 12-mile road march. They must also meet height, weight, and tape standards in accordance with Army Regulation (AR) 600-9, *The Army Body Composition Program*.[1] An inspection and inventory of equipment are conducted to check for all required packing list items, and paperwork is screened for accuracy and to confirm that a proper physical has been conducted. Once candidates have met all entry requirements, they are approved to participate in the Sapper Leader Course.

The course includes rigorous training on small-unit tactics, endurance, and combat engineer battle drills while in a physically demanding, stressful, and austere environment. The preparation and train-up conducted prior to attending the course will be exposed based on student performance and proficiency in basic and advanced skills. The training objective is physical and mental toughness acquired through tough individual events and team-building activities focused on leadership skills, technical proficiency, and self-confidence.

The course is divided into two phases—general subjects and patrolling. The scope of the first phase includes training on rappelling, helocasting, demolition calculations, construction, placement, and priming. The methods include classroom instruction, practical exercises, squad events, and

written examinations. The curriculum for the first phase includes—

- Physical fitness.
- Conventional and expedient demolitions.
- Air operations.
- Mountaineering.
- Water operations.
- Land navigation.
- Communications.
- Medical techniques.
- Foreign weapons.
- Identification of threats and ordnance.

To ensure full effort, the general subjects phase is allocated 1,000 available points. However, the breakdown of points for each event in the phase is not disclosed to the students. To pass the general subjects phase and meet graduation criteria, each student must earn a minimum of 700 points. An example of how students exhibit their proficiency in basic skills is evident in the land navigation event. Participants must locate a minimum of four of six points across the unforgiving terrain of Fort Leonard Wood during 3 hours of day and 3 hours of night. This land navigation challenge and three written examinations can be retested one time.

Examples of the sapper tab

Once students complete the general subjects phase, they advance to the patrolling phase the following day. During the patrolling phase, students receive more classroom instruction, conduct more practical exercises, and participate in platoon level field training exercises (FTXs) to demonstrate their leadership performance. This phase focuses on continued—

- Physical stamina.
- Troop-leading procedures.
- Fundamentals of patrolling.
- Combat orders.
- Survival skills.
- Raiding.
- Reconnaissance.
- Ambushing.
- Breaching.
- Military operations in urban terrain.

One of the major events in the patrolling phase is the FTX. Students rotate among assigned leadership positions as squad leaders, platoon sergeants, and/or platoon leaders. Up to seven FTXs are executed throughout this phase during a barrage of engineer and infantry missions. In these leadership positions, students are evaluated on tactics, techniques, procedures, performance, and accomplishment of the mission. All sapper students are required to achieve a 50 percent "GO" rate in assigned graded positions to meet graduation criteria.

The valuable training that students receive from attending the Sapper Leader Course improves leadership skills, advances troop-leading ability, improves technical and tactical proficiency, restores navigational skills, broadens demolitions expertise, and increases self- and equipment competency. Students must participate in all training to meet graduation requirements. Graduation also requires achieving a minimum of 70 percent on all written examinations including air operations, demolitions, and patrolling examinations.

The scoring of students can include merits and demerits issued throughout the duration of the course. Examples include receiving a merit for executing tasks above and beyond expectations or receiving a demerit for failing to follow instructions. In addition, peer-to-peer student evaluations are done at squad and platoon levels to assess the strengths and weaknesses of the participants. Students can be administratively dropped from the course if they do not take these evaluations seriously.

Another area that may affect the eligibility of a student to graduate is absence from training for more than 24 hours due to sick call. Any student receiving quarters or a profile is medically dropped from the course. In short, students and their units must be dedicated and must undergo months of preparation to meet all the requirements for successful graduation from the Sapper Leader Course.

An unsuccessful student has one chance to recycle through each phase of the course. However, students who fail a second time are dismissed.

Wearing the Sapper Tab

According to Department of the Army (DA) Pamphlet (Pam) 670-1, *Guide to the Wear and Appearance of Army Uniforms and Insignia*, a maximum of three combat and special skill badges and tabs may be worn on the combat uniform or similar utility uniform. The maximum of three tabs does not include tabs that are part of the unit shoulder sleeve insignia (such as airborne or mountain tabs).[2]

When a Soldier earns the right to wear the sapper tab, he or she proudly wears it as public evidence of the effort and sacrifice made during the 28-day course. All who have earned the right to wear this prestigious symbol of accomplishment have endured one of the most challenging and rigorous schools the Army has to offer.

Previous Army regulation once specified an order of precedence for the wear of multiple tabs; however that order of precedence no longer exists. A debate about precedence continues to be a discussion among units, on social media, and in published material. For example, the September 2017 issue of *Army Magazine* contains a picture of a first sergeant wearing the sapper tab over his ranger tab.[3] A subsequent letter to the editor was published in the December 2017 issue of *Army Magazine* to "correct" the first sergeant for improperly wearing the tabs.[4] The letter states that the ranger tab has a higher order of precedence and, therefore, should have been worn above the sapper tab. However, regarding any authorized uniform, the order of precedence for combat and special-skill badges, and tabs, is established only by group. There is no precedence for combat or special-skill badges or tabs within the same group.[5] For example, personnel who are authorized to wear the parachutist and air assault badges may determine the order of wear of those two badges. Where Army Regulation (AR) 670-1, *Wear and Appearance of Army Uniforms and Insigna*[6] mentions order of precedence, placement guidance, and general wear policy for special skill badges and tabs, it refers to DA Pam 670-1.[7] As confirmation, guidance from the office of the U.S. Army Deputy Chief of Staff (G-1) states that there is no order of precedence for special-skill tabs. Most Soldiers who are authorized to wear more than one permanent tab wear them in order of tab size, but there is no Army regulatory guidance for this. Therefore, the first sergeant pictured in the September 2017 issue of *Army Magazine* did not violate any regulations by wearing the tabs that he had earned as he saw fit.

Verifying the Sapper Tab

Unfortunately, there are many past and present Soldiers who have chosen to abuse honor and integrity to purposely gain recognition, promotion, position, and/or status based on the sapper tab. Therefore, the chief of operations of the Sapper Leader Course performs "tab checks" as a result of a formal inquiry regarding a Soldier. Over the last 5 years, roughly 220 Soldiers have been formally tab checked and questioned about the authenticity of their sapper tab. Of those, more than 170 Soldiers have been identified as fraudulently wearing this symbol of excellence and expertise. Requests for tab checks must be made by e-mailing the sapper training company (STC) at <usarmy.leonardwood.engineerschl.mbx.1st169thsapperldrcrs@mail.mil> to ensure a proper document trail. Tab checks will not be initiated by STC, and STC will remain impartial throughout the verification process. In order to initiate an inquiry, the originating unit must provide justification. If available, additional information such as the Soldier's full name, social security number, enlisted or officer records brief, and other supporting documentation should be included in the request to support the investigation.

After a review of the justification and Soldier's information, the STC commander must approve the inquiry in order for a full tab check or investigation to occur. If the inquiry is approved, the sapper graduation database is searched for attendance and/or proof of graduation. In addition, an Army Training Requirements and Resource System query is made to pull the Soldier's training record and a memorandum for record is produced to reflect the information found. The STC commander reviews and forwards the inquiry and any supporting documents to USAES for validation and action. After the inquiring unit receives the completed and validated packet, it may contact STC to request additional information or subpoenas for expert witnesses. The appointed unit investigating officer should attach appointment orders to the request. This is a formal process, which is necessary to ensure confidentiality and to ensure that inquiries are handled in a professional and expeditious manner. It is unethical to capitalize on "stolen valor" to gain recognition or to profit by committing a fraudulent act. To help eliminate integrity violations and deter dishonest actions by Soldiers, it is important to stay informed and vigilant and to understand the process of conducting a sapper tab check. Each individual command determines the consequences of wearing an unearned tab.

Revoking the Sapper Tab

The sapper tab is authorized for permanent wear on Army uniforms; however, it may be revoked for numerous reasons. Commanders who are allowed to award the three authorized tabs, including the other specified special-skill badges, are also authorized to revoke such awards. When the original awarding authority has departed the command, the revocation request will be referred to the same authority for appropriate action. Revocations will normally be announced in permanent orders. The sapper tab may also be revoked by the Commandant, USAES, or the Awards and Decorations Branch, Human Resources Command, based on the recommendation of the field commander (colonel and above) of the individual in question. The recommendation to revoke the sapper tab can be based on an exhibited pattern of behavior, expertise, or duty performance that is inconsistent with the expectations of the Army, which include a degree of confidence, commitment,

(continued on page 33)

By Captain Justin M. Verde

Most people love trick plays—the Philadelphia Eagles© stealing Super Bowl LII©; Penn and Teller© pulling a card out of an audience member's pocket, a queen sacrifice in chess, William Shakespeare's moving forest in *Macbeth*.[1] However, militaries—successful ones—historically *really* love trick plays—Ulysses' Trojan horse, General George S. Patton's inflatable Army, Colonel Robert Baden-Powell's defense at the Siege of Mafeking;[2] and the list goes on. In fact, trick plays, or deceptions as one might call them, are so popular that there is a joint publication (JP) that addresses them, JP 3-13.4 *Military Deception*.[3] There is something undeniably exhilarating about bending rules and tricking opponents into doing what you want them to do. As the shapers of the battlefield, engineers should be particularly adept at this.

If these deceptive plays are so exciting, why do we tend to avoid them? To start, there are very real risks associated with them. When we set out to deceive, we are betting that we are smarter than the enemy and that often has negative consequences. In a typically narrow timeline, we are reallocating our limited assets away from what they are typically designed to do. General Patton's inflatable Army, for example, took a tremendously successful leader and a number of troops out of a pivotal operation under the assumption that the demonstration would work. However, the risk is not always met with reward. This is perfectly described in the cult classic film *Monty Python and the Holy Grail,*[4] in which, after a failed initial frontal assault, King Arthur recreates a "Trojan Rabbit" in an attempt to deceive the enemy. Arthur is met with disappointment when his England-based French adversaries launch it back to him among a slew of other direct attacks, namely verbal insults. The suggestion of deploying a reserve "Trojan Badger" was ineffective because King Arthur's strategy evolved from tactical deception to standard operating procedures.

Similar to the concept of *The Six Degrees of Separation*[5] concept in social circles, there is undoubtedly an nth degree of separation between any engineer task and the destruction of an enemy. If you ask an engineer what the Regiment does, the answer will be something like "use engineer

"There is something undeniably exhilarating about bending rules and tricking opponents into doing what you want them to do. As the shapers of the battlefield, engineers should be particularly adept at this."

and other organic or augmenting assets to conduct combat (mobility, countermobility, and survivability), general, and geospatial engineering . . ." Unfortunately, while detailed and all-encompassing, this synopsis of the full breadth of the Engineer Regiment, its vast array of assets and capabilities, work rates, and employment techniques overwhelm the audience with more information than is necessary. That is not to say that the information is pointless; but rather, that the briefing of it should be condensed to meet the commander's intent and relevancy. A better way to describe

our mission might be to say that we help achieve victory over the enemy in interesting and unique ways. While this leaves a large portion of Engineer Regiment capabilities unaddressed, it does complete two crucial tasks: It shows the maneuver commander that we can provide options for what he or she cares about, and it begins dialogue about how we can do that through detailed analysis of the breadth of our capabilities. This is the most crucial step of maneuver support, and it cannot be overstated. Before we can show anyone what we can do as engineers (conventional or otherwise), we must get them to listen to us.

As we transition to a more conventionally focused training regime, defense and countermobility are going to play a larger role than in recent years. This means that the engineers are going to be busy doing what we love to do—blowing things up and preparing to destroy the enemy, both well-outlined in doctrine. In the defense, we typically see this accomplished through the "big three": tank ditches, concertina wire, and fighting positions. Occasionally, we get ambitious and bring out the lesser-used abatis, minefields, Antipersonnel Obstacle Breaching System, M131 Modular Pack Mine System, and Volcano Mine Dispensers. However, the real phenomenon behind the Engineer Regiment is that when we are fighting a conventional peer threat, we will not be bound by environmental laws, rules of engagement (not to be confused with William M. Riesman's *The Laws of War*[6]), or Field Manual (FM) 3-34, *Engineer Operations*[7], all for which the enemy will be well-versed. Instead, we are going to need to get creative. Wars are not won by doing what the enemy expects us to do.

Training military deception (MILDEC) is not straightforward, but JP 3-13.4 does an admirable job of methodizing MILDEC planning, as opposed to describing its techniques. In nontechnical language, it directs commanders how to think about MILDEC instead of listing MILDEC procedures, stating bluntly, "MILDEC procedures are specific (unique or changing) with regard to each operation."[8] The publication describes what principles and means a MILDEC should use, along with the four basic deception techniques:

- **Feints.** A feint is an offensive action involving contact with the adversary, conducted for the purpose of deceiving the adversary as to the location and/or time of the actual main offensive action.
- **Demonstrations.** A demonstration is a show of force in which a decision is not sought and no contact with the adversary is intended. The intent of a demonstration is to cause the adversary to select a course of action that is favorable to U.S. goals.
- **Ruses.** A ruse is a cunning trick designed to deceive the adversary to obtain friendly advantage. It is characterized by deliberately exposing false or confusing information for collection and interpretation by the adversary.
- **Displays.** Displays are the simulation, disguise, and/or portrayal of friendly objects, units, or capabilities in the projection of the MILDEC story. Such capabilities may not exist, but are made to appear so (simulations).[9]

Creativity goes beyond deception though. It involves using standard men, weapons, and equipment in nonstandard ways. Typically, junior Soldiers, both enlisted and commissioned officers, flourish with this. With little doctrinal experience and a healthy amount of fear to meet mission requirements, Soldiers who are new to the Army provide fresh insight into overcoming difficult challenges. That is not a bad thing (most of the time); but at some point in the planning-to-execution transition, there is a loss of that creativity such that we, as leaders, avoid thinking outside of conventional doctrine. Why not use a mine-clearing line charge to hit a tank? Trees limit observations and fields of fire, so why not push the tree line back and create standoff? Why not build fake fighting positions? No time to emplace a minefield? Why not put a dummy minefield in? The Army likes the idea of unconventional thinking enough that it even made a doctrinal symbol for it (Figure 1). With no combined arms training strategies guiding leaders in the subject, it is difficult for leaders to include training tasks.

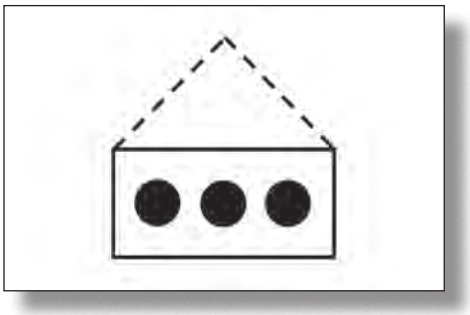

Figure 1. Dummy minefield shown with feint, decoy, and dummy indicator

A leader can assist in training Soldiers to use MILDEC by including it in planning procedures and fostering a climate for the expectation of creativity. Commanders should dictate or prescribe MILDEC, as it is usually not implied. When in doubt, subordinate leaders usually maintain doctrinal solutions that have served them well in the past. This is reasonable. People tend to stick with things with which they are comfortable, especially when their jobs or careers are on the line. A commander should include MILDEC in planning scenarios, mandating that subordinate leaders learn about what is foreign to them and become familiar with it, thus increasing their "normal" to include "abnormal" ideas. After this, the commander must provide an environment in which creativity can flourish. He or she must convince Soldiers that creative solutions are not only acceptable but also encouraged. For this to happen, commanders must do the following:

- Provide subordinates with room to lead, through delegation.
- Actively disallow overcommitment to standard doctrine by forcing a creative solution.
- Pivotally allow for failure.

Engineers are the problem solvers of the Army. As the shapers of the battlefield, we are expected to have the

answer when a maneuver commander is presented with complex obstacles and problems. Fortunately, doctrine is notably ambiguous in this regard in order to allow subordinate leaders to creatively overcome these obstacles. It is our responsibility to incorporate this aspect of doctrine into our planning and execution processes. The Engineer Regiment and all of its associated capabilities are crucial to a successful operation. We must be able to build trust in our non-engineer counterparts in order to fully use our vast resources. This trust is built through explaining our relevancy to the maneuver commander and employing our equipment in ways that have never been seen.

Endnotes:

[1]William Shakespeare, *Macbeth,* Millennium Publications, Garden City, New York, 2014.

[2]"The Relief of Mafeking," *History Today*, 5 May 2000, <https://www.historytoday.com/richard-cavendish/relief-mafeking>, accessed on 11 July 2018.

[3]JP 3-13.4, *Military Deception*, 14 February 2017.

[4]Mel Brooks, *Monty Python and the Holy Grail,* Columbia Tri-Star Home Video, 2002.

[5]John Guare, *Six Degrees of Separation,* Dramatists Play Service, New York, 1992.

[6]William M. Reisman, *The Laws of War: A Comprehensive Collection of Primary Documents on International Laws Governing Armed Conflict*, Vintage Books, New York, 1994.

[7]FM 3-34, *Engineer Operations,* 2 April 2014,

[8]JP 3-13.4, *Military Deception*, 14 February 2017.

[9]Ibid.

Captain Verde is the planner for the 37th Brigade Engineer Battalion, 2d Brigade Combat Team, 82d Airborne Division. He holds a bachelor of science degree in physics from the U.S. Military Academy–West Point, New York.

Go to:

<https://home.army.mil/wood/indexphp/contact/publications/engr_mag>

(*"Sapper Tab,"* continued from page 30)

competency, and discipline. The sapper tab may be revoked for dismissal, dishonorable discharge, conviction by courts-martial for desertion in time of war, and failure to maintain prescribed standards of personal fitness and readiness to accomplish missions commensurate with position and rank and upon a relief or release for cause. An award, once revoked, will not be reinstated except when fully justified by the commander of the Awards and Decorations Branch, U.S. Army Human Resources Command.

Closing

The sapper tab is desired by many, but attainable only by a select few. The training and preparation necessary for the Sapper Leader Course are key and vital aspects that many Soldiers and units do not take seriously prior to attendance at the course. As a sapper community, we must continue to develop and maintain the building blocks required to ensure persistent exposure of the course within the military and through all channels of the media. It is important to assist in the recruitment and growth of the sapper community by continuing to honor and respect all who have been involved in establishing its legacy. In doing so, sappers will continue to be one of the most effective and elite groups of leaders on the battlefield, which in turn, will diminish and eliminate the fraudulent wearing of the tab. In order to preserve the accomplishments of sappers, the displaying and bearing of this symbol, which represents a high degree of skill, proficiency, and excellence, must remain authentic. Our Engineer Regiment and the Army depend on it. Sappers Lead the Way!

Endnotes:

[1]AR 600-9, *The Army Body Composition Program,* 28 June 2013.

[2]DA Pam 670-1, *Guide to the Wear and Appearance of Army Uniforms and Insignia,* 25 May 2017.

[3]Kenneth Herron, "Final Shot," *Army Magazine*, September 2017.

[4]Steven R. Slocum, "Tabs Appear Out of Order," *Army Magazine*, December 2017.

[5]DA Pam 670-1.

[6]AR 670-1, *Wear and Appearance of Army Uniforms and Insignia,* 31 March 2014.

[7]DA Pam 670-1.

Master Sergeant Zwolinski is a former chief instructor of the Sapper Leader Course, Fort Leonard Wood. He is a graduate of the U.S. Army Engineer Advanced Leader Course, Senior Leader Course, Precommand Course, Ranger School, Sapper Leader Course, Airborne School, Jumpmaster School, Pathfinder School, Mountain Warfare School, Urban Mobility Breacher Course, British Search Course, Basic Instructor Course, Battle Staff Course, Equal Opportunity Leaders Course, Combative Level 1 Course, and Combat Life Saver Course. He is currently attending the U.S. Army Sergeants Major Academy.

Engineer Doctrine Update

U.S. Army Maneuver Support Center of Excellence
Capabilities Development and Integration Directorate
Concepts, Organizations, and Doctrine Development Division

Publications Currently Under Revision

Publication Number	Title	Description	Tentative Publication Date
FM 3-34	*Engineer Operations*	This update focuses on engineer support to large-scale ground combat operations and will nest with, and incorporate topics from, Field Manual (FM) 3-0, *Operations*.	2d quarter, fiscal year (FY) 2019
TM 3-34.56	*Waste Management for Deployed Forces*	This update will incorporate current regulations and best practices and techniques for conducting waste management activities while deployed.	2d quarter, FY 19
Training Tools Under Development			
ATP 3-34.81	*Living Doctrine for Engineer Reconnaissance*	This product will incorporate audio, video, and pictures to enhance understanding and training of Army Techniques Publication (ATP) 3-34.81.	1st quarter, FY 19
ATP 3-90.4	*Living Doctrine for Combined Arms Mobility*	This publication will incorporate audio, video, and pictures into each chapter in order to enhance understanding of ATP 3-90.4 (with additional support from the U.S. Marine Corps for this multi-Service publication).	1st quarter, FY 19

How can you provide feedback to doctrinal publication reviews?

As Soldiers and civilians, you have the opportunity to provide feedback to our doctrinal publications as well as those staffed across the Army. For existing publications, please e-mail us directly with your feedback. For doctrinal publications that are under assessment or revision, the staffing process includes a 45-day period for comments, which are accepted regardless of rank or position. However, there are requirements associated with the *level* of comment. Below are the descriptions associated with *critical*, *major*, *substantive*, and *administrative* comments. We have added additional notes annotating the rank equivalent associated with the level of comment.

C—**Critical.** Contentious issue that will cause nonconcurrence with publication; requires general officer level backing.

M—**Major.** Incorrect material that may cause nonconcurrence with publication; requires colonel level or above backing.

S—**Substantive.** Factually incorrect material.

A—**Administrative.** Grammar, punctuation, and style.

Regardless of level of comment, we welcome the feedback to ensure that the information we are capturing for the Regiment is current, relevant, and useful for the force.

ENGINEER DOCTRINE UPDATE

U.S. Army Maneuver Support Center of Excellence
Capabilities Development and Integration Directorate
Concepts, Organizations, and Doctrine Development Division

New Engineer Publication Highlights

New Living Doctrine media and products are being developed to increase doctrinal knowledge and ease of use. ATP 3-34.81, *Living Doctrine for Engineer Reconnaissance Publication,* is in the final review stage. See the following Common Access Card site for an example of living doctrine: <https://rdl.train.army.mil/catalog/search?current=true&search_terms=living%20doctrine>.

ATP 3-34.45/Marine Corp reference publication 3-40D.17, *Electric Power Generation and Distribution,* was published to the Army Publication Directorate on 6 July 2018. Updates to this multi-Service manual include the following:

- This ATP is a compilation of tactics, techniques, and procedures found in doctrine, lessons learned, and other reference material that, for the first time, provides an integrated systematic approach to electric power generation, distribution, and management. It codifies lessons learned over the past 16 years and serves commanders and their staffs as a comprehensive guide for planning, producing, distributing, and managing electrical power in support of military operations.
- The chapters cover the role of electrical power in support of military operations, an overview of tactical electrical power systems, the supply of medium voltage, utility power, and the planning and construction of power systems.
- The appendixes provide information on each of the Service electrical power capabilities of the U.S. Army, Marine Corps, Navy, and Air Force, including worldwide power voltages and plug and outlet configurations.

Joint Publication (JP) 3-15.1, *Counter-Improvised Explosive Devices Operations,* was published to the Joint Education Directorate on 17 July 2018. The doctrinal guidance is being expanded to counter emerging threats that go beyond the scope of this JP. Accordingly, relevant material in this JP will be consolidated into existing joint doctrine and this publication will be removed from the joint doctrine hierarchy no later than 12 months from the signature date. Updates to this manual include the following:

- Describes the improvised explosive devices network and threat.
- Covers planning for counter-improvised explosive device operations discusses, staff responsibilities, and describes a counter-improvised explosive device task force.

Please contact us if you have any questions or recommendations concerning engineer doctrine:

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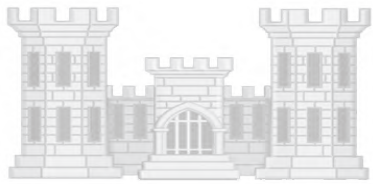

THE EVOLUTION OF ENGINEER QUALIFICATION TABLES

By Captain Dominic A. Senteno

This article discusses the current structure of engineer qualification tables (EQTs). The Engineer Branch is very diverse, with disciplines ranging from combat and general engineering to electrical power generation to geospatial engineering. There are engineer units that specialize in horizontal or vertical construction, bridging, or route clearance, each unit having its own tasks that require qualification to be deployable. Individual engineer Soldiers have requirements to maintain personally assigned weapon systems and crew-served weapons, so they revert to squad and platoon gunnery tables to ensure that those standards are met. The challenge for engineers is to clearly articulate the engineer-specific training events necessary to become elevated to *trained* in their overall readiness status on mission-essential tasks. The EQTs were designed to provide battalion and brigade maneuver commanders with quality oversight to validate engineer training.

However, the EQTs fail to address the full spectrum of engineer tasks or give a set standard for each table. Without a common published standard, engineer units across the Army cannot know if newly arrived Soldiers who have completed the EQTs at previous assignments are capable of completing the EQTs at their new duty stations. Qualification tables should provide predictable and reproducible outcomes. My recommendation is to establish EQTs that are similar in design to gunnery tables—with the same level of detail—for each of the tasks that engineer units must complete, up to platoon level.

The EQTs were last published on 3 September 2009 in Field Manual 3-20.21, *Heavy Brigade Combat Team Gunnery,* which allows unit commanders to add or delete tasks based on "capabilities, mission analysis, and modularity build."[1] Once the focus of the training has been decided, the commander then selects on which squad and individual tasks to train to support the culminating platoon training event. After selecting the training tasks, engineer commanders rely on the Combined Arms Training System to provide guidance on tasks, conditions, and standards. This differs from the tank and Bradley fighting vehicle gunnery tables for the Armor and Infantry Branches.

Although the EQTs progress from individual and team levels up to platoon level tasks in the same manner as the gunnery tables, they do not match the detail of the gunnery tables. For example, the gunnery tables for maneuver elements contain their own tasks, conditions, and standards within each table. These include the ammunition allocation needed for each table, breaking down in detail which tasks must be accomplished to complete each of the tables to standard. The gunnery tables also state the minimum standard for qualification and provide a scoring sheet. This does not imply that engineer commanders, with the support of their noncommissioned officers, do not establish minimum standards and scoring sheets before the start of training. However, the fact that there are not set standards across the Engineer Branch shows a lack of continuity and common understanding of the EQT tasks that a commander elects to train. This makes predictable and reproducible results difficult to attain.

The biggest drawback to the current EQTs is that they do not include tasks for engineer units that do not conduct route clearance or sapper training. However, most maneuver commanders use the completion of EQTs I–XII as the annual training guidance for all engineer elements. The majority of the tasks highlighted in the EQTs focus on demolitions and clearance of obstacles. The EQTs completely ignore key tasks such as the construction of structures and infrastructure and the use of engineer equipment such as the bulldozer.

"Qualification tables should provide predictable and reproducible outcomes."

For engineers to provide maneuver commanders with verifiable training oversight, enable them to validate engineer training, and provide the Engineer Branch with predictable and reproducible standards, it is our duty to publish a manual that provides clear guidance on the tasks to be trained. Initially, it would be advantageous to develop a consensus of separate qualification tables for all engineer equipment and techniques, with templated scenarios of what must be learned to be considered *trained*. Ideally, this would be followed by providing standard definitions and scoring criteria from the individual level to platoon level for each table; whether the criteria are set by time, distance, check points, or overall effects is up for discussion.

To summarize, the way ahead for EQTs involves—

- Establishing tables for all engineer equipment and tasks from earthmoving to breaching to bridging.
- Setting standards for evaluations.
- Designing tables similar to gunnery tables.

MICLIC Table Structure	
Table	**Title**
I	Crew Critical Skills
II	Crew Practice
III	Crew Qualification
IV	Squad Proficiency
V	Squad Practice
VI	Squad Qualification
VII	Platoon Proficiency
VIII	Platoon Practice
IX	Platoon Qualification

MICLIC Table VIII, Platoon Practice, Proficiency Course	
Task:	Employ and reduce an obstacle using a MICLIC.
Conditions:	Given the following: • A fully operational combat vehicle • A fully operational MICLIC trailer • Full or scaled obstacle • Inert MICLIC and live rocket
Standards:	The crew must obtain a minimum score of 70 percent and successfully launch a MICLIC.

Sample Score Sheet for MICLIC Table VIII, Platoon Practice, Proficiency Course			
Tactical Task	**Tactical Score**	**Technical Task**	**Technical Score**
Conduct troop-leading procedures	T / P / U	PMCS on the MICLIC	/ 3
Conduct tactical movement	T / P / U	Conduct initial pressure check	/ 5
Conduct reconnaissance	T / P / U	Conduct assembly and preparation of MICLIC	/ 4
Create a lane with a MICLIC	T / P / U	Conduct connections and continuity checks	/ 6
Establish patrol base	T / P / U	Conduct MICLIC operations	/ 3
		Conduct disassembly of MICLIC	/ 2
Total (day)	# / # / #	Total (day)	/ 33
Total (night)	# / # / #	Total (night)	/ 33
Total	# / # / #	Total	/ 66
Total number of T or P rated tasks/total tasks	#/#		
Multiply by 100		Multiply by 100	
Total tactical score	%	Total technical score	%
(tactical score ___ + technical score ___) / 2 = overall score _____ %			

Legend:

MICLIC - M58 Mine-Clearing Line Charge
T - Trained
P - Practiced
PMCS - preventive maintenance checks and services
U - Untrained
#/## - The total number of T/P/U tasks
% - percent

Figure 1. Mine Clearing Line Charge table structure and platoon proficiency practice with example score sheet

The development of tables like the one in Figure 1 would provide clarity and guidance similar to that provided by maneuver gunnery tables and would allow our profession to deliver predictable and reproducible outcomes across all engineer elements. The establishment of tables for earth-moving and bridging elements, as well as sapper and route clearance companies, is necessary for the growth of our profession and organization.

Endnote:

[1]Field Manual 3-20.21, *Heavy Brigade Combat Team Gunnery,* 3 September 2009.

Captain Senteno serves as the assistant professor of military science and the executive officer for the Reserve Officer Training Corps, 8th Brigade, U.S. Army Cadet Command, California Polytechnic State University, San Luis Obispo. His previous assignment was with the 58th Combat Engineer Company, 2d Squadron, 11th Armored Cavalry Regiment, Fort Irwin, California. He is a graduate of the Maneuver Captains Career Course, the Urban Mobility Breachers Course, the Engineer Explosives Ordnance Clearance Agent Course, the U.S. Army Airborne School, the U.S. Army Air Assault School, and the Sapper Leader Course. He holds a bachelor's degree in mathematical sciences from the U.S. Military Academy–West Point, New York.

561st Engineer Construction Company Provides Partner Nation Construction Efforts During *Pacific Partnership 2018*

By First Lieutenant Jessica E. McAllister

On 2 July 2018, the 561st Engineer Construction Company, 84th Engineer Battalion, 130th Engineer Brigade, 8th Theater Sustainment Command, Schofield Barracks, Hawaii, welcomed back 15 Soldiers after 4 months aboard the U.S. Naval Ship Mercy hospital vessel supporting the Pacific Partnership 2018 (PP18) mission in the Indo-Pacific region.

The 13th iteration of the Pacific Partnership (PP) mission began in early 2018. PP is the largest annual multilateral humanitarian assistance and disaster relief and preparedness mission conducted in the Indo-Pacific region. More than 800 Service members and civilians from the United States, the United Kingdom, Australia, Japan, Sri Lanka, Peru, and South Korea supported the mission with medical, dental, civil engineering, and veterinary skills. The projects, engagements, and exchanges carried out during PP18 improved capacity, enhanced regional partnerships, and increased multilateral cooperation for humanitarian assistance and disaster relief preparedness.

During PP18, Soldiers from the 561st worked beyond the normal duties of their specialties as plumbers, electricians, carpenters, and masons. They helped construct and renovate schools, community halls, and medical centers in Indonesia, Sri Lanka, and Vietnam. 561st Soldiers were part of the U.S. Naval Ship Mercy sail-in echelon, utilizing water taxis to shuttle the Soldiers and other members of the construction teams from the vessel to the project sites on-ground. The teams often consisted of Hawaii Army National Guard Soldiers, U.S. Navy Seabees, U.S. Airmen, Indonesian army soldiers, Sri Lankan sailors, and Peruvian sailors.

Construction in Indonesia

The U.S. Naval Ship Mercy visited Indonesia for the first time in 2018. The PP18 mission in Indonesia included two engineer civil action programs (ENCAPs): the School District 83 Elementary School and a community hall. Fifteen Soldiers from the 561st Engineer Construction Company worked alongside Soldiers from the Hawaii Army National Guard and Naval Mobile Construction Battalion 4 Seabees, who had arrived a month earlier to begin construction.

The project scope for the elementary school in School District 83 included the construction of a 112-square-meter, two-classroom school building using concrete reinforced with steel. The team used locally procured materials from nearby vendors and, with the help of translators, worked alongside Indonesian army soldiers. The successful completion of the project resulted in improvements to the existing facilities, allowing for smaller class sizes for 360 children and providing additional jobs for teachers.

The Padang Village community hall project included the construction of a community hall building. The plans called for a building of 56 square meters, constructed with concrete reinforced with steel. The successful completion of the community hall provided enduring infrastructure, directly contributing to the economic and social development of the community. The building serves as a logistical hub for the community of more than 3,000 personnel and as a storm shelter for the local village during natural disasters.

Soldiers install light fixtures.

Construction and Renovation in Sri Lanka

The sail-in echelon aided in the construction of three ENCAPs in Sri Lanka: the Kappal Thurei Medical Center, Andankulam Midwife Clinic, and Vyravar Kovilady Preschool. PP18 participants interacted closely with the Sri Lankan navy and used the country's naval base when transporting to and from the ship.

The scope of the Kappal Thurei Medical Center project included a 56-square-meter emergency room building constructed of concrete reinforced with steel. Plans for the emergency room building included plumbing and three toilets. The successful completion of the project provided much-needed improvements to the existing medical facilities. The clinic provides services for the population of approximately 6,000 residents. Approximately 70 patients are seen daily at the facility. Due to a lack of space in the previous medical center, the doctor was unable to provide emergency services; the new emergency room allows doctors to stabilize critical patients prior to transport to the hospital, located 7 miles away.

Soldiers from the U.S. Army, U.S. Navy, and U.S. Air Force level the ground to build a sidewalk for the emergency room in Sri Lanka.

The scope of the project for the Andankulam Midwife Clinic included the installation of 112 feet of chain link security fencing with gates through the existing porch, newly constructed concrete stairs, and structural and cosmetic improvements. The Andankulam clinic provides services to more than 600 families in need of nutritional education, family health services, and vaccines. The clinic is staffed by one midwife, who

provides prenatal care to an average of 60 pregnant women per month. This project was critical to improving the comfort and living standards of the community.

The scope of the Vyravar Kovilady Preschool renovation included the construction of a three-stall squat toilet block, septic tank, and soakage pit. The sail-in echelon also improved structural weaknesses and cosmetic faults. The preschool serves approximately 30 students (ages 2–5) and a staff of three teachers. The school previously had one toilet, which was shared among the students and faculty. This project was critical in improving the comfort and quality of life for the students and teachers.

Renovation in Vietnam

The largest involvement of the PP in Vietnam occurred during 2018. Naval Mobile Construction Battalion 5 arrived in Vietnam with the advance fly-in echelon to begin construction. The U.S. Naval Ship Mercy engineering team participated in the construction of two ENCAPs in Vietnam: the renovation of the Ninh Xuan #2 Primary School and the Dien Dong Medical Clinic.

The Ninh Xuan #2 Primary School ENCAP involved the renovation of two school buildings and included installing aluminum windows and doors and replacing light fixtures, ceiling fans, three toilets, three sinks, and one water tank. The successful project supports 1,100 local schoolchildren in the Khanh Hoa District and helps provide primary education classes to 140 students throughout the school year.

The Dien Dong Medical Clinic ENCAP involved a renovation of the existing clinic, including the replacement of sinks and toilets and cosmetic improvements. The successfully completed project supports more than 3,800 local Vietnamese villagers in the Khanh Hoa District. An average of 25 patients is seen at the clinic per day. The renovation provided five functioning restrooms, increasing the comfort and quality of care for patients.

Conclusion

The United States has a strong legacy of cooperation and defense ties with countries across the Indo-Pacific region, dating back to a devastating tsunami in Southeast Asia in 2004. PP continues to emphasize direct care, responsiveness, preparedness, and civil-military exchanges in the region.

The sharing of technical expertise and processes proved invaluable to the 561st Soldiers and their joint counterparts. The Soldiers of the 561st learned new techniques and skills from their counterparts. Four Soldiers earned the Navy Enlisted Aviation Warfare Specialist badge during the mission. The world-class construction efforts of the 561st and its partners directly improved the lives of more than 11,000 residents and serve as a lasting reminder of the capabilities and effects that these partnerships craft for thousands more.

First Lieutenant McAllister is a vertical-construction platoon leader for the 561st Engineer Construction Company, Schofield Barracks, Hawaii. She holds a bachelor's degree in systems engineering from the U.S. Military Academy–West Point, New York. She is a graduate of the Engineer Basic Officer Leadership Course.

BALIKATAN EXERCISE 2018

By First Lieutenant Abigail J. Toth

From April to May of 2018, Soldiers from the 523d Engineer Support Company, 84th Engineer Battalion, 130th Engineer Brigade, 8th Theater Sustainment Command, Schofield Barracks, Hawaii, deployed to Cabanatuan, Republic of the Philippines, in support of the 34th annual Balikatan Exercise. Among the ranks of this vertical-construction platoon were trained electricians, plumbers, and carpenters.

The Balikatan Exercise is an annual, multifaceted, multilateral exercise that supports the Indo-Pacific Security Cooperation Initiative. The 2018 exercise combined a staff exercise, live-fire exercise, and humanitarian civic-assistance component to enhance the operational readiness of U.S. Army Soldiers and the armed forces of the Philippines (AFP) while increasing interoperability.

Task Organization

The 523d was task-organized under the Joint Civil Military Operations Task Force, which was responsible for conducting broad-spectrum civil and military operations. These operations included five engineer civil action programs (ENCAPs), cooperative health engagements, civil affairs operations, and community relations activities.

The 523d vertical-construction platoon controlled ENCAP Site 5, which was co-located with Cabu Elementary School, while members of the U.S. Marines, Navy, and Air Force controlled the other four sites. The ENCAP Site 5 mission was to enhance the operational readiness of U.S. forces, AFP forces, and other international partners through joint engineer construction, demonstrating U.S. and AFP commitment to the welfare and social development of local communities and, thus, assisting in preserving the alliance between the partners.

Project Scope

The project scope for the 523d was simple, yet unique: construct a two-classroom building designed by the Philippines Department of Education. While on-site, the engineers also used the ENCAP site as a logistics hub for civil and military operations in the region. The existing school suffered from overcrowding and was forced to operate on a split schedule in order to accommodate more than 900 students. This limited the time available for educating students and placed a huge burden on the teachers. Therefore, the intended effects of the project were to increase the capacity for students, reduce class sizes, and return the school to normal operating hours.

Construction

Within 24 hours of arriving on-ground, the 523d and the 548th Engineer Construction Battalion, its Filipino engineer counterpart, staked the layout at

523d Soldiers and host nation counterparts manually hoist a metal truss for the roof system.

the new construction site and started digging foundations. Over the next month and a half, engineers hand-placed 53 cubic meters of concrete, laid more than 1,500 concrete blocks, hoisted five metal trusses, and installed the roof system. Inside, they installed the electrical wiring, painted, and hung chalkboards. In total, the project required more than 20,000 Soldier hours, saved more than $500,000 through the utilization of troop construction, and was finished 5 days ahead of schedule.

The task force responsible for construction at ENCAP Site 5 included 27 U.S. Army Soldiers, six U.S. Marines, 30 AFP soldiers, and 11 Japanese soldiers. These 74 engineers were organized into multinational teams of different specialties to increase collaboration and enhance interoperability. The task force worked 12-hour days and sometimes initiated night shifts to avoid potential heat casualties.

Lessons Learned

While the construction project was finished ahead of schedule, the operational environment and variables posed challenges. The lessons learned highlighted the importance of—

- **Communication.** The foundation for success is communication. The English, Tagalog, and Japanese languages were spoken by the joint service teams. A

Project officer First Lieutenant Toth (left) meets with Major General Hermingildo Francisico C. Aquino of the AFP and Lieutenant General Lawrence D. Nicholson, commander of the III Marine Expeditionary Force, during the classroom dedication ceremony.

523d Soldiers and host nation counterparts constructed a two-classroom schoolhouse to serve the local community.

common platform for communication was necessary to transmit and exchange ideas, methods, and plans. Communication by illustrations and numbers was essential for success. Words lost meaning during translation, whereas construction plans and sketches provided a clear and shared vision. Captain Roy R. Bauding, 548th Commander, stated, "Many of my troops have a lot of experience in construction, but they could hardly express themselves to relay their ideas and suggestions." Innovative communication in joint and multinational exercises is vital to success.

- **Resource and project management.** U.S. forces gained unique knowledge about resources and project management. The 523d was responsible for coordinating the delivery, inventory, and use of $56,000 worth of materials. Experience dealing with 160 different line items taught leaders about contracts and the importance of holding host nation contractors to exact specifications. Additionally, most of the power tools and advanced equipment normally used by U.S. and Japanese soldiers were not available. However, Filipinos are accustomed to using ingenuity to complete jobs without ideal resources. Therefore, soldiers learned about resource management from the AFP, while leaders learned about project management from Captain Bauding. Due to an unpredicted local election, the project needed to be completed 5 days ahead of the original schedule. Rather than simply increasing work hours, the leadership developed a new plan that redefined phases of the construction. Captain Bauding's experience in working with constricted timelines and limited resources allowed his Soldiers to adapt to an uncommon construction flow. The method was not revolutionary; however, it forced the leaders of the 523d to think outside of the box. Resources and time are critical constraints, but abstract management and innovation will win every time.
- **The engineer professional.** As professionals, Soldiers of the Engineer Regiment were entrusted to complete the construction with little oversight. ENCAP Site 5 operated autonomously. The 523d tactically controlled all personnel who entered the school grounds and often housed visitors and important dignitaries. As Army and engineer professionals, the 523d Soldiers accepted the mission to build a product that upheld the engineer obligation to society, the client, and the profession.

Conclusion

The Tagalog word *Balikatan* translates to "shoulder to shoulder." The Balikatan Exercise is a cornerstone of the relationship between the U.S. military and the Philippines. The troop construction and its direct effects will leave a lasting legacy on the residents and on diplomatic relationships. The challenges and rewards of working with host nation forces illustrate that engineer civil-action programs across the Indo-Pacific region are imperative. The 523d was assigned a unique mission, with real-world effects, and was successful in highlighting world-class engineering to the host nation counterparts. Using troop construction, more than $500,000 was saved and the project was finished 5 days ahead of schedule. The 523d left behind an effective product that will enhance the quality of life for the community.

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PREPARING FOR A FIREFIGHT:

Organizing, Equipping, and Training a Wildland Firefighting Task Force

Captain Matthew T. Nichols, First Lieutenant Charlene L. Coutteau, and First Lieutenant Mark L. Rubio

Imagine that you are deployed to a battlefield on fire, with just 6 days' notice. You are unaccustomed to the terrain; the smoke billows, concealing groups of Soldiers from your view. You are combating a dynamic, unfamiliar threat that spreads very rapidly over any terrain. The weapons and tools with which you have previously trained have no effect on this threat. The radios that you have in your company cannot be used to communicate with anyone else on the battlefield, including medical evacuation (MEDEVAC) personnel, coalition partners, or tactical superior leadership. The "enemy" that you are fighting can use your clothing as well as the organizational clothing and individual equipment that you are carrying against you. This is not war; this is wildland firefighting. It is a mission unlike any other that you have trained for or are equipped to accomplish. Nevertheless, your Soldiers are fit and they learn quickly. That is all you need to succeed.

Soldiers practice building a handline to prevent a fire from spreading.

The Umpqua North Complex wildfire near Glide, Oregon, began as the result of a series of lightning strikes during the third week of August 2017. Low precipitation, high winds, and highly unstable atmospheric conditions during the summer months created ideal conditions for the fire to spread across more than 43,000 acres of Oregon forest. On 1 September 2017, the Department of Defense answered

a request from the National Interagency Fire Center (NIFC) for military aid to help contain the Umpqua North Complex wildfire under defense support of civil authorities orders.

On 7 September 2017, 250 Soldiers from the 23d Brigade Engineer Battalion (BEB), 1-2 Stryker Brigade Combat Team, deployed to the Umpqua National Forest. The 23d BEB rapidly reorganized into a task force of three strike teams (companies) and 10 crews (platoons). NIFC advisors came from a multitude of federal agencies to train and advise the task force. The advisors arrived 2 days before the 23d BEB departed Joint Base Lewis–McChord, Washington. Integration and predeployment activities were efficient but condensed to allow for further training upon arrival at the base camp. The NIFC rushed hand tools, radios, and fire-resistant personal protective equipment to JBLM and the base camp in Oregon to equip the Soldiers for their mission.

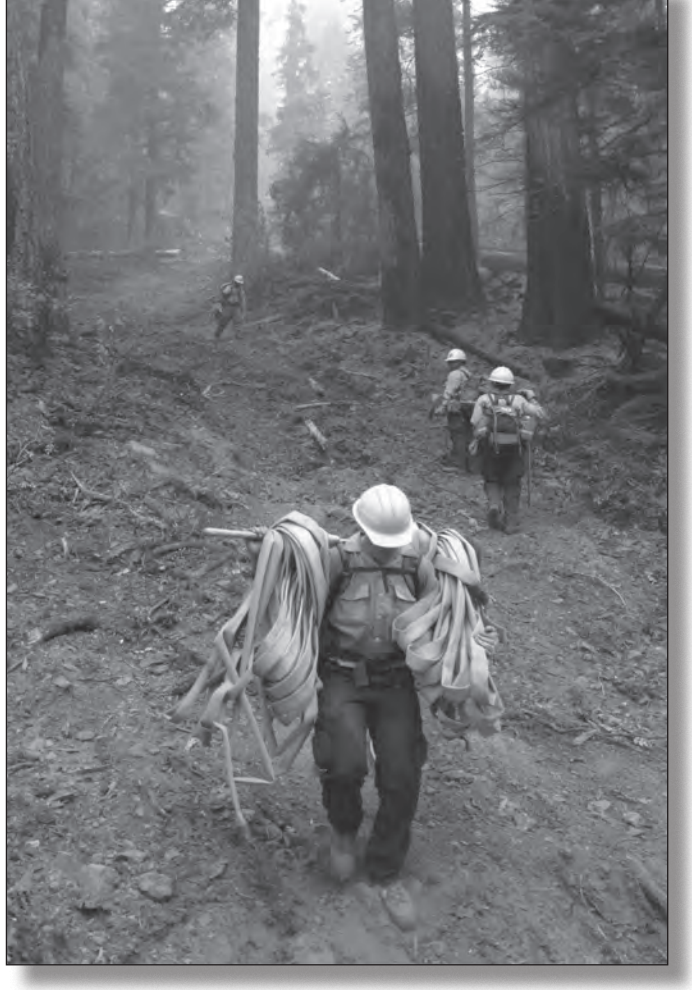
Wildland Firefighting Tools

Due to the remote locations of wildfires, it is often not feasible to move fire engines and pumps to the fire line to provide water for fire suppression. Instead, wildland firefighters rely on a multitude of construction equipment and hand tools to separate burning debris from unburnt debris, with a buffer space of mineral, soil, rock, or other fire-resistant terrain (such as a road, river, or rock face). Each tool assists wildland firefighters with suppressing the fire or halting its spread until it burns itself out. Some common firefighting tools include bulldozers, chainsaws, water hoses, Pulaskis, shovels, McLeods, and bladder bags.

The Pulaski is one of the most versatile wildland firefighting tools. The combination axe head/adze allows for the digging and chopping of limbs, roots, and logs. Due to its utility, most crewmen carry the Pulaski as their tool of choice. The adze on the back side of the axe head differentiates the Pulaski from other axes, such as those used in logging and included as basic-issue items for many military vehicles.

McLeods are a combination of a hoe and a rake. Although they have a cutting edge, they are mostly used for their raking side. The raking side allows for the cleanup of the handline so that it is level. A handline is a strip of land cleared of all vegetation to prevent fire from spreading. McLeods are usually positioned at the end of the handline-digging crew.

Pulaski McLeod



Soldiers hauling hose down a dozer line

Digging a handline (the most common mission) requires Pulaskis, McLeods, shovels, and chainsaws. The crew uses the hand tools to scrape down to mineral soil or rock and create a buffer between the fire and unburnt debris. The crew digs the handline along the perimeter of the fire, which can be hundreds of yards or even miles in length. Crews can expect to dig handlines for extended periods of time.

Other tasks conducted by firefighting crews include mopping, gridding, and chipping, which help prevent the fire from spreading. Mopping and gridding consist of patrolling through burnt areas, usually along the perimeter next to an unburnt area, and ensuring that the fire is out and the ground is cold, leaving no chance for the fire to reignite and spread. Completion of this task relies heavily on the use of shovels and bladder bags. The shovel is used to move soil onto the hot spot to deny it access to oxygen. The bladder bag is used to put out smoldering roots and debris (hot spots) with water so that they do not reignite nearby unburnt debris.

Common Interagency Communications

Firefighters who work to extinguish a fire come from a variety of agencies, including the U.S. Forest Service; the Bureau of Land Management, U.S. Department of the Interior; the U.S. National Park Service; and a multitude of state and local organizations. Wildfires cause crews to spread out along long distances in remote areas where cell phone service is not reliable. Fire behavior can change rapidly based on changes in wind, temperature,

A Soldier conducts a controlled burn to reduce the amount of quick-burn fuel on the forest floor.

humidity, and cloud cover. As such, crews must receive regular weather updates. This creates a challenge for keeping firefighters from different agencies connected across miles of forest.

Handheld radios are important for providing crews with the means to reach support, receive weather updates, and call for MEDEVAC. The type of radio primarily used in wildland firefighting is the Bendix King© (BK) very high frequency radio. The NIFC and many other federal agencies use these radios as their main communication devices. State and local agency personnel can also sign for radio sets from the incident command to access the radio communications network. This network has a number of frequencies arrayed to support command and tactical traffic. The command network consists of a number of repeaters and a few frequencies. The incident command post has a communications team that hikes or flies frequency repeaters to mountaintops and ridges to ensure long-distance radio communications on a handful of command frequencies. This ensures that fire divisions can reach the incident command post, MEDEVAC helicopters/ambulances, and crews in remote areas.

BK handheld radio

The incident command also designates most of its available frequencies as "tactical" networks, which are not repeated across distances. These frequencies are assigned to task forces, divisions, and others to provide line-of-sight communications to crews in closer proximity to each other. Most radio traffic within a division is sent over these frequencies in order to keep command frequencies free of routine traffic.

Wildfire in the Umpqua National Forest

Prior to deployment to the Umpqua National Forest, Soldiers learned the basics of analyzing weather conditions, predicting fire activity, and employing fire shelters. This training in fire behavior and survival techniques provided Soldiers with the basic competencies needed for safely conducting wildland firefighting operations.

On 7 September 2017, the bulk of Task Force Spearhead moved to the Umpqua North Complex base camp and began hands-on training, utilizing firefighting tools to learn a variety of fire suppression techniques. During this initial training, Soldiers learned how to construct a handline. To do this, crews organized themselves in lines according to tool type. Cutting tools such as the Pulaski were placed at the front of the line to loosen and remove roots and tree limbs. Shovel and McLeod teams followed closely behind the Pulaski teams and swept out all remaining grass and foliage. Teamwork and communication were essential in handline construction to ensure that the depressions were wide enough to prevent fire from jumping the line. While digging handlines, Soldiers also practiced what they had learned prior to deployment by moving along fire escape routes and employing fire shelters.

Another skill set that Soldiers acquired during initial training involved gridding and mopping. Gridding occurs when a crew sweeps through burned-out areas known as "the black" in order to identify hot spots. While gridding, the crew moves in a staggered line along a section of burned-out area. As they move forward, crew members reach down into the ash and use their hands to identify the hot spots. When a hot spot is discovered, the crew stops in place to maintain the continuity of the formation. Crew members closest to the hot spot move forward with their tools and dig deeper into the hot spot. Mopping involves exposing the heat in the hot spot to the surface. The crew members turn and mix the cooler soil outside the hot spot into the warm soil closest to the center of the hot spot. The cool soil snuffs out the hot spot and prevents the fire from flaring back up. Although this may seem monotonous, it is one of the most important tasks required for clearing an area.

Finally, crews learned many preventive and repair skills needed to mitigate conditions for future burning. Some of these skills included constructing water bars, initiating controlled burns, and conducting chipping and clearing operations. Water bars are trenches that are placed on sloped terrain; the skills used to construct water bars are the same ones employed in constructing handlines. Water bars

prevent the erosion of soil that has loosened after a wildfire. The construction of water bars is an important repair technique used to prevent runoff and mudslides from damaging roads and polluting bodies of water. In a similar way, controlled burns help prevent conditions from worsening. In order to properly conduct a controlled burn, several crew members light drip torches filled with fuel. They walk along a piece of terrain, staggering their movement, with flames trailing behind. This staggered formation is necessary because it ensures that the crew member farthest from the road has a clear escape route. The drip torch burns up all the fast-burning fuel such as low shrubs, grass, and leaves. Burning all the vegetation that is low to the ground prevents future fires from spreading quickly. The final repair tasks that crews employed were chipping and clearing. Firefighting crews and chainsaw teams remove loose brush and logs along the roadside and feed them into the chipper. By clearing brush, trimming trees, and removing stumps, crews prevent rotting conditions and mitigate the encroachment of bees and snakes in recreational areas. Chipping prevents hazardous forest conditions and increases the aesthetic value of the forest for recreation.

Soldiers feed branches into a wood chipper to clear an impassible road.

Best Practices

We offer some best practices to future engineer Soldiers who may deploy on a wildland firefighting mission. Our advice for companies assigned this mission is to maintain a high level of physical fitness. The rigors of manual labor in rough terrain tested and motivated our Soldiers. In addition, as most organizational clothing and individual equipment is not flame-resistant, the amount of gear necessary can be reduced. Rapid changes in elevation bring rapid changes in temperature, so snivel gear, an extra pair of boots, and a variety of socks should be included on the packing list.

Finally, bring a camera. You are about to deploy to an area with some of the most beautiful and scenic treasures our Nation has to offer. Stop to smell the ash and fir trees, and snap a photograph. This is a once-in-a-lifetime experience that you will remember fondly—and one that will authorize you bragging rights when you return to home station.

Soldiers grid and mop to prevent a fire from reigniting.

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First Lieutenant Coutteau is the route clearance platoon leader for Company B, 23d BEB. She is a graduate of the Engineer Basic Officer Leadership Course and the U.S. Army Airborne School. First Lieutenant Coutteau holds bachelor of science degrees in German and defense and strategic studies from the U.S. Military Academy.

First Lieutenant Rubio is a platoon leader for Company B, 23d BEB. He is a graduate of the Engineer Basic Officer Leadership Course. First Lieutenant Rubio holds a bachelor's degree in environmental engineering from the U.S. Military Academy–West Point, New York.

Amphibious Combat Engineering

An Australian Engineer's Perspective

By Captain Liam J. Clarke

In 2015, the Australian Army designated the 2d Battalion, Royal Australian Regiment (2RAR), as the core of an amphibious force. Over the next 3 years, 2RAR trained and grew in size until the Amphibious Ready Group consisted of a reinforced battalion strength organization with combined arms enablers aboard three amphibious platforms. Beginning in 2015, a combat engineer troop (designated 21 Troop) was raised within the 2RAR support company to provide specialist amphibious combat engineer support to the battalion. In Australian Commonwealth nomenclature, an engineer or cavalry troop is equivalent to a U.S. Army platoon and a squadron to a U.S. Army company. This arrangement was unique in the Australian Army, as traditionally, a combat engineer regiment provides engineer support. The establishment of an organic combat engineer troop within the battalion provided an unparalleled opportunity to develop amphibious engineering tactics, techniques, and procedures.

While the Australian amphibious force is relatively new and relatively small, the experiences gained in amphibious combat engineering are relevant to U.S. Army engineers, particularly those in the Pacific Region. History has shown that amphibious operations are central to any conflict in this theater; for example, consider the island-hopping campaign in the Southwest Pacific and Pacific Ocean theaters during World War II. These campaigns were conducted with approximately equal numbers of U.S. Marine Corps (USMC) and U.S. Army divisions. In the European theater, major amphibious operations (Torch, Overlord, and Husky) were U.S. Army affairs. Prospects for conflict in the region (in areas such as the South China Sea and Korean Peninsula) suggest that U.S. Army engineers would be well-served to consider a shipboard amphibious engineering capability.

Amphibious operations are those in which a force maneuvers directly from the sea to achieve objectives ashore. This is distinct from sealift operations, in which a force is transported by ship and then disembarks in a secure assembly area before engaging in operations. Amphibious operations are the domain of the USMC, which typically secures points of entry for Army follow-on forces to flow through by sea or airlift. Part of the invasion of Afghanistan in November 2001 was achieved by the 15th Marine Expeditionary Unit projecting into southern Afghanistan before seizing Kandahar Airfield, which became a significant theater air point of disembarkation. The potential for future conflicts in the Pacific may result in a requirement for the Army to augment USMC amphibious operations or conduct them independently. The potential for a situation to rapidly escalate may also result in an Army force that sailed for sealift being retasked to execute an amphibious operation.

Central to modern amphibious theory is the concept of ship-to-objective maneuver (STOM), in which the amphibious force uses a combination of surface and air assets to deploy forces ashore in the most advantageous position to achieve its objectives. This differs significantly from what most people envision as amphibious warfare—namely, the D-day amphibious assault depicted in the opening scenes of *Saving Private Ryan*.[1] STOM negates the requirements to seize and hold an expanding beachhead where combat power is massed prior to breakout and confront prepared enemy

defenses immediately after landing. Ideally, the minimum forces required for the mission should be projected ashore where the enemy is not located and the objective is struck as rapidly as possible.

STOM is enabled by thorough reconnaissance using all available means. This is critical to ensure that the vulnerable troops making landfall do so away from the enemy location. To be successful, the intelligence gathered should be leveraged by the supporting engineer commander. Equipment and specialized training differentiate sappers from infantrymen. Without the tools of the trade, combat engineers become riflemen. In conventional, land-based operations, the heavy, bulky equipment is carried in troop vehicles; this enables the troop to bring everything everywhere—and to be able to do anything anywhere. This approach is not compatible with STOM, where time is of the essence to get the force ashore before the enemy can respond. With the limiting factor of the capacity of ship-to-shore connectors resolved, operational tempo may be achieved by minimizing the force to be landed.

A sapper with search equipment prepares to board an MRH-90 helicopter.

Taking advantage of the intelligence information gathered before the operation allows the engineers to organize the force and equipment. The planning required for engineer equipment should be shared down to the lowest level to ensure that the mission can be completed with maximum efficiency. This extends to the prioritization of personnel and the equipment they need for projection from ship to shore since it is unlikely that an amphibious force will be able to project itself in a single lift. The risk of subsequent waves being significantly delayed or not arriving should be considered during planning. Thus, each engineer element must plan to execute the mission with only the stores and equipment on hand, rather than relying on subsequent waves of troops arriving.

It is not uncommon for engineers to land ashore without their vehicles. They may be without the vehicles for a short period or for the duration of the mission. Sappers may need to pack their stores and equipment from the insertion site to the objective while keeping up with their supported force; this highlights the importance of proper task organization of equipment. The selection of innovative equipment and the novel use of stores aid the amphibious engineer in achieving the mission. With the luxury of access to integral vehicles during conventional land-based operations, sappers may become complacent, bringing along the same equipment for every mission instead of looking at the situation with a critical eye. For example, 21 Troop replaced hand axes, hammers, and wrecking bars with a smaller, lighter combination tool carried by the individual. This tool was not as effective as the individually designed tools; however, the degraded performance was offset by versatility and portability.

Stores can also be adapted outside of their primary or conventional use. If a mission requires a position to be seized and defended (such as with a *coup de main* operation), there may not be time to prepare defensive positions before the arrival of an attacking force. It is equally unlikely that light plant equipment would be deployed to speed up the process during such an operation. Instead, fighting positions for primary weapon systems can be expediently prepared using shaped and bulk explosive charges. Similarly, small quantities of explosives could be used to prepare an abatis style obstacle held as a reserved demolition to cover the withdrawal of an amphibious force following a raid. This option would negate the requirement to carry chainsaws, which are problematic due to the flammability of their fuel supplies.

These examples are not meant to suggest that small-engine equipment does not have its place; provided it is maintained and supplied with fuel, small-engine equipment will continue to operate after explosive stores have been expended. This emphasizes the importance of including the relative advantages and disadvantages of potential equipment types in mission planning. Options are limited by the stores that are initially loaded onto the ships; this requires a focus on innovation and adaptability before the force begins to embark. Versatile stores and equipment should be prioritized over specialized items, even at the cost of reduced performance. Additionally, the quantity of limited

supplies such as demolitions and fuel must be monitored as they are consumed during the course of the mission. Timely and accurate reporting of these critical stores is essential to enable the planning process and demonstrate the need for engineers to be actively engaged with their supporting logisticians.

Once the amphibious engineer is ashore, discrete engineering tasks can be executed as they would be during conventional operations. For example, the tactics to breach, proof, and mark a lane through an obstacle do not change because the mission was launched from an amphibious platform. The techniques and procedures for discrete tasks may need modifications to suit the restricted stores and equipment availability. For example, during an assault breach, clear lanes which would normally be marked with star pickets were instead marked with lightweight poles made from sections of electrical conduit, allowing the marking kit to be carried by a dismounted single sapper. A significant difference between conventional and amphibious combat engineering is the lack of inherent flexibility that engineers would normally have with access to their full suite of equipment once ashore. Supported commanders must be made aware of this limitation of their assigned engineers; the reduced scope to be retasked during the mission itself will likely be at odds with what an Army maneuver commander is accustomed to from his or her conventional experience.

This is not to say that engineers lack usefulness once their primary task is completed or their limited stores are expended. The stated secondary role of the Royal Australian Engineers is to fight as infantry. Assuming proper training, engineers provide supported commanders with operational flexibility. A maneuver commander who sees an attached engineer troop as simply an additional rifle platoon is wasting a specialized asset and depriving himself or herself of the force-multiplying effects that sappers bring to the combined arms fight. Similarly, a commander who views engineers as a burdensome liability once their task is completed fails to recognize the opportunity to increase the combat power provided by engineers in a new role. For engineers to effectively demonstrate this versatility, the engineer commander must ensure that the troops are sufficiently trained and that suitable advice has been provided to the supported commander.

It is unlikely that engineers will embark on shipping as a formed body; instead, they will likely be dispersed across platforms to ensure that the loss of a ship does not deprive the task force of an entire capability. Junior engineer commanders may find themselves directly reporting to, advising, and contributing to the planning activities of more senior commanders than usual. For 21 Troop, it was common for a corporal to be reporting directly to an infantry major while a lieutenant worked at the battalion level. In the Royal Australian Engineers, a corporal (as opposed to a sergeant in a U.S. squad) leads a combat engineer section of eight men and a major (rather than a captain) commands Australian company/squadron size organizations. Instilling the requisite tactical knowledge and confidence in junior commanders to work at higher levels of command is important to ensure that engineers are incorporated into the plan under normal circumstances. In an operational environment where seats on the mission are scarce, it is even more critical that engineer commanders accurately champion their capabilities.

Markers guide assaulting troops into a cleared line that has been breached through an obstacle.

Sappers place lightweight lane entry markers during a breach.

Exercise Talisman Sabre 15 was conducted in the Northern Territory, Australia, where 2RAR provided two company size combat teams as part of a combined USMC and Australian task force to execute a point-of-entry seizure operation. During this, 2RAR's first major amphibious exercise, 21 Troop formed the depth element of a company attack.

From this position, 21 Troop was able to provide an additional assault platoon, support by fire, and breaching parties to reduce obstacles depending on how the attack developed. The troop was integrated into the operation during the planning stages to ensure that it enabled the commander with a degree of flexibility that no other element could have provided. As it transpired, the troop was required to clear the objective of booby-traps—an enemy course of action not identified during planning. This was countered with search equipment and lightweight hook and line kits, which had been derived from larger, in-service variants. This simple example, albeit in a training environment, highlights the wide-ranging impact that engineers can have on an amphibious operation when they have versatile equipment and are in the right place at the right time.

Life aboard an amphibious platform presents challenges to an embarked force unaccustomed to that environment. To the uninitiated, the tight quarters may make it seem like people are in each other's pockets; however, the first attempt to pass information dispels the notion that proximity yields speed. Mobile telephones and radios do not work within the steel bowels of a ship, and the crew rapidly tires of passing personal messages over the public address system if the practice is even indulged at all. While not specific to engineers, holding routine meetings between commanders and subordinates ensures that information is communicated regularly. Informing cabinmates of movements and expected times also assists in the passage of information. Verbal time and date stamping ensures that old news is not circulated when situations change.

Amphibious operations present unique challenges to combat engineers; and while it may be easy to dismiss overcoming these challenges as the role of the USMC, it is possible that the U.S. Army may need to execute amphibious operations in the near future. Unit training plans do not necessarily need to be comprehensively redeveloped because of this potential, but it is worth considering how Army engineer units could adapt to the amphibious environment if required. This may take the form of professional development discussions amongst unit leadership, tactical exercises without troops, or trials of new or existing equipment in alternate roles—or even cross-training with USMC combat engineers. Consideration should be given to the likely platforms to be embarked (regarding deck space), possible operational duration, and the type of operation (humanitarian assistance through conventional warfighting). At most, this preparation could provide an invaluable baseline prior to conducting amphibious operations with short notice and, at the least, could provide Army units with stimulating and demanding training outside of the norm.

Endnote:

[1]*Saving Private Ryan,* DVD, directed by Steven Spielberg, performed by Tom Hanks and Matt Damon, Dreamworks Video, United States, 1998.

Captain Clarke, a Royal Australian engineer, is posted to the Australian Army Headquarters, Canberra, Australia. He has deployed with the Resolute Support Mission in Kabul as an engineer planner. In 2015, he was the troop commander of 21 Troop, posted to 2d Battalion, The Royal Australian Regiment.

All photographs provided by Warrant Officer Class Two Thomas Jesser. Warrant Officer Class Two Jesser was the first Troop Sergeant of 21 Troop, from 2015–2016. Following his promotion to Warrant Officer Class Two, he is now a company sergeant major at the Australian Army's First Recruit Training Battalion.

7TH DIVE DETACHMENT CONTRIBUTES TO SEARCH FOR MISSING SERVICE MEMBERS

By First Lieutenant Connor R. Wernecke

From 1964 to 1975, more than 2.5 million U.S. Army, Marine Corps, Navy, and Air Force Service members deployed to Vietnam in support of U.S. operations there.[1] On 23 May 2018, 12 Soldiers from the 7th Engineer Dive Detachment, 84th Engineer Battalion, 130th Engineer Brigade, 8th Theater Sustainment Command, Joint Base Pearl Harbor–Hickam, Hawaii, made the same journey but with a different purpose. Working as members of an underwater recovery team led by the Defense Prisoner of War/Missing in Action Accounting Agency (DPAA), their mission in Vietnam was to search for, and attempt recovery of, still-missing Service members from the Vietnam War.

More than 1,500 U.S. personnel remain unaccounted for in Southeast Asia—a number that DPAA constantly works to reduce. In keeping with our Nation's pledge to make every effort to bring home those still missing from past conflicts, 7th Dive Detachment Soldiers had the privilege to participate in the very meaningful mission.

The divers worked at a site located off the coast of the Nghe An Province of Vietnam, in the Gulf of Tonkin. Following various DPAA recovery missions to this particular site in previous years, the agency's scientific recovery experts have gradually narrowed the most likely location of missing U.S. personnel. However, the mapping of the underwater site is an ongoing and complicated process. The sea floor is invisible and constantly changing due to coastal storms, variable sea conditions, and dragnet fishing in the area.

A Soldier lowers a dredge basket down to a diver during an underwater recovery operation.

The depth at which the divers worked was shallow enough that the primary factor limiting the divers' bottom time was not (as it typically is) the accumulation of nitrogen gas in their bodily tissues due to the increased ambient pressure underwater. A diver's body absorbs more nitrogen at deeper depths in order to reach equilibrium with the pressure from the surrounding water. This absorbed gas must be released gradually as the diver returns to the surface,

so bottom time is limited by the rate of nitrogen absorption at a given depth. At depths shallower than 30 feet, nitrogen absorption is relatively slow; therefore, divers can remain at those depths for extended periods. However, regardless of the depth or bottom time, closely managing the divers' rate of ascent back to the surface is vitally important in preventing diving injuries. If a diver ascends too quickly, nitrogen that was absorbed at depth will expand in response to the decreasing ambient pressure of shallower depths. Expanding nitrogen gas bubbles can block blood flow or interfere with the diver's nervous system, leading to serious injury.

Working at depths of only 20 to 25 feet, divers' physical endurance was the primary limiting factor. The team master diver limited working dives to 180 minutes to mitigate the effects of fatigue and dehydration.

Divers used a system of 86 1-square-foot grids, emplacing them according to direction from the team's scientific recovery expert. Once in place, the divers used a 6-inch dredge hose to dredge one grid at a time. The system created suction known as the Venturi effect (which is the creation of a partial vacuum when the flow of a fluid is restricted, thereby increasing its speed of flow) at the diver's working end of the hose.[2] Water was pumped through a fire hose and into a device that restricted the water flow, increasing the speed of the pumped water through the device and creating a partial vacuum in the 6-inch suction hose that was also connected to the pump. The entire contraption was clamped to a large mesh basket that collected the material excavated by the divers.

Once a grid was complete, the diver unclamped the pump and its accompanying hoses. A crane hook was lowered from overhead and used to lift the basket out of the water. The entire process was slow and methodical, as the divers worked in conditions of zero visibility and frequently during high surf. It was particularly challenging to remove full baskets of sea floor material from the water and emplace empty baskets with the crane, as the operator required close communication between the diver, the diving supervisor, the crane operator, and the team linguist. Nevertheless, the team completed this difficult task multiple times per day for the duration of the mission.

While the work environment was challenging and the work repetitive, the Soldiers of the 7th never lost their focus on the mission. The team's scientific recovery expert and aircraft equipment specialist must conduct a detailed forensic review of any potential evidence before any conclusions can be drawn.

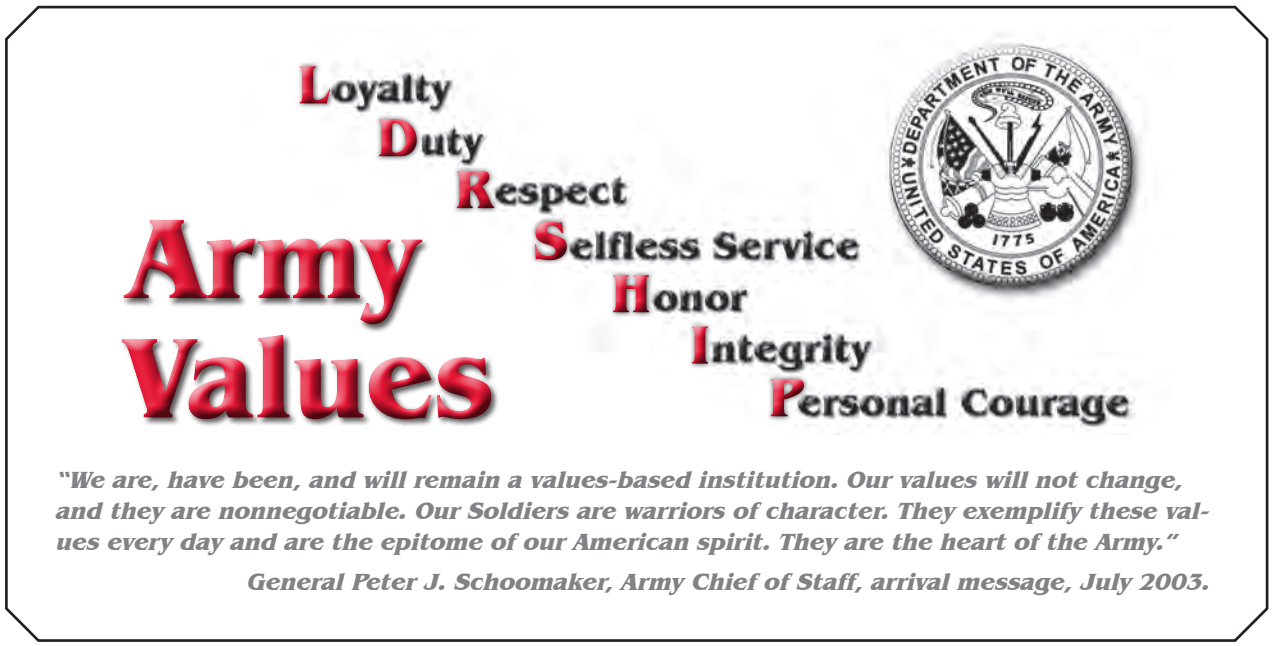
Regardless of the conclusions, the 7th Engineer Dive Detachment was honored to have the opportunity to participate in such a solemn mission. The experience gave the participating Soldiers a new perspective on the promise within the Soldier's Creed to "never leave a fallen comrade."

Endnotes:

[1]"Vietnam War Statistics," History-World.org Web site, <history-world.org/vietnam_war_statistics.htm>, accessed on 13 August 2018.

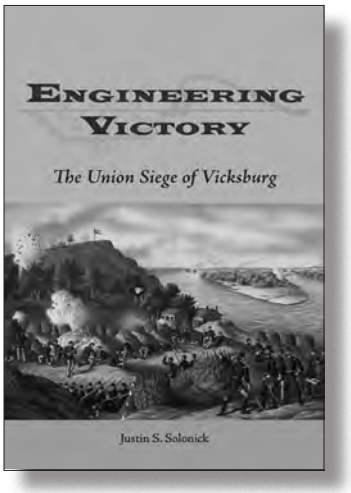
[2]"What is the Venturi Effect?" Reference.com Web site, <https://www.reference.com/science/venturi-effect-202884285e3ab0ee>, accessed on 13 August 2018.

First Lieutenant Wernecke serves as the executive officer of the 7th Engineer Dive Detachment. He holds a bachelor's degree in engineering psychology from the U.S. Military Academy–West Point, New York. He is a graduate of the U.S. Army Air Assault School, the U.S. Army Sapper Leader Course, the Engineer Basic Officer Leadership Course, and the U.S. Navy Joint Diving Officer Course.



Book Review

Book reviews are a feature in each issue of *Engineer*. Authors of book reviews summarize the contents of books of interest and point out the key lessons to be learned from them. Readers who wish to submit book reviews may forward them to <usarmy .leonardwood.mscoe.mbx.engineer@mail.mil>.



Engineering Victory: The Union Siege of Vicksburg, by Justin S. Solonick, Southern Illinois University Press, 2015, ISBN 0-8093-3391-0.

Reviewed by Mr. David S. (Scott) Franklin

There are abundant books and articles on the campaigns and battles of the Civil War; however, one military action that has received scant attention is the Union Siege of Vicksburg, which took place in Vicksburg, Mississippi, from 22 May 1863 to 4 July 1863. Justin S. Solonick's work *Engineering Victory: The Union Siege of Vicksburg* should serve as a commencement of dialogue with historians about the importance of the Vicksburg Campaign to the success of the Union Army in the Civil War and provide greater focus on engineer operations on both sides during the bloody conflict. According to Solonick, "This largest siege in United States military history has gone largely ignored by historians." Historians are more enamored with the campaigns of the East, spotlighting the Army of the Potomac, than with the Army of Northern Virginia. Suffering even greater disregard is the conduct and operations of Army engineers, both North and South, during the Civil War—and during the Siege of Vicksburg in particular. Solonick cites two major reasons for the Union victory—the West Point engineering theory and Western improvisation and ingenuity.

Solonick's book begins with an examination and explanation of the techniques of military engineering that were in practice in the Army during the Civil War. These techniques were taught at the U.S. Military Academy–West Point, New York, with particular attention being paid to siegecraft. Although, the present-day Soldier may be unfamiliar with the terms and techniques of 19th century engineering doctrine, Solonick defines and explains the terms and ideas in such a way that makes them very accessible and understandable for the novice. For more enhanced clarity, Solonick provides contemporary sketches and drawings from the two major engineer manuals in use at that time—Dennis Hart Mahan's *A Complete Treatise on Field Fortification*[1] and James Chatham Duane's *Manual for Engineer Troops*.[2] By outlining and explaining the curriculum at the U.S. Military Academy, Solonick lays the groundwork for part of his thesis. Solonick attributes partial credit for the Union success at Vicksburg to the fact that even though there was a dearth of engineer Soldiers at Vicksburg, many of "those officers in the Union Army fronting the rebel defenses . . . who had received exposure to the engineering curriculum at West Point were more than adequately prepared to implement a scientific siege and reduce the Gibraltar of the Confederacy." He contends that, due to the fact that the U.S. Military Academy was established as a school of engineering, all graduates, irrespective of their assigned branches, received and were familiar with basic engineer courses and techniques, including Major General Ulysses S. Grant, commander of the Army of Tennessee and a 1843 graduate of the U.S. Military Academy. Thus, the officers were able to adequately guide and direct the Soldiers under their command in the proper laying of a siege at Vicksburg.

The second part of Solonick's thesis supports the idea that Western improvisation and ingenuity contributed to the ability of the Union Army to achieve success at Vicksburg. Solonick often refers to the lack of engineer Soldiers at Vicksburg. However, Vicksburg was not the only campaign in which the Army was in need of engineer Soldiers. At the start of the Civil War, the entire Army had only four companies of engineer Soldiers, commonly referred to as the Battalion of Engineers. The situation was such that the Army began recruiting volunteer engineer regiments, and along with the Battalion of Engineers, served with the Army of the Potomac. In fact, the argument could be made that these Western Soldiers would have been the type to have formed the backbone of the corps of sappers and miners less than 100 years earlier, during the Revolutionary War,

for that corps was formed by "able-bodied men, intelligent, sober, and engaged for the war."[3] Solonick cites several examples of the ingenuity of these Western Soldiers, but leans heavily on two specific examples. The first example resulted in an improvised sap roller in which bales of cotton were stacked onto a flat cart that was pushed ahead of the approach trench as it was being dug. The Confederates fired a lighted projectile into the "experiment" and burned it to the ground. The second example involved the construction of an observation tower, the purpose of which remains somewhat a mystery. Although these items illustrate the ingenuity of the Western Soldiers, the items were not effective. Therefore, citing them as examples of why the Union Army was victorious at Vicksburg is a stretch. A more plausible explanation is that hardworking Western Soldiers under the direction of a few trained engineers and West Point–educated officers were able to sway the outcome in favor of the Union. Another ancillary conclusion that could be drawn from these examples is that the Soldiers had the freedom to try these improvisations, which went against contemporary doctrine.

This book is great for anyone interested in Civil War history or engineer operations. It sheds some light on a topic that is often overlooked. This work also provides an extremely useful, illustrative example of how a well-trained, well-informed cadre of leaders can have a positive influence on their Soldiers and affect the outcome of an operation.

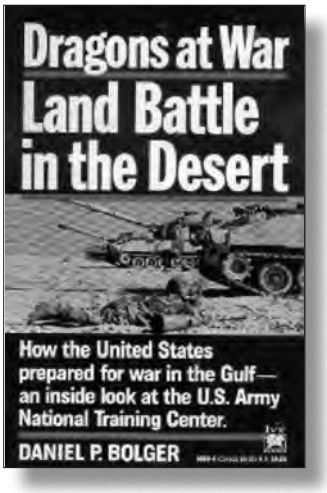
Endnotes:

[1]Dennis Hart Mahan, *A Complete Treatise on Field Fortification*, Praeger, 1969.

[2]James Chatham Duane, *Manual for Engineer Troops*, Nabu Press, 2013.

[3]Raphael Prosper Thian, *Legislative History of the General Staff of the Army of the United States (Its Organization, Duties, Pay, and Allowances), From 1775 to 1901*, U.S. Government Publishing Office, Washington, D.C., 1901, p. 492.

Mr. Franklin is the collection curator at the U.S. Army Engineer Museum, Fort Leonard Wood, Missouri. He holds a bachelor's degree in history from Columbia College, Missouri.



Dragons at War: Land Battle in the Desert, by Daniel P. Bolger, Ballantine Books, 1986, ISBN 0-8041-0899-4.

Reviewed by Mr. James E. Mc Carthy

In *Dragons at War: Land Battle in the Desert*, Lieutenant General Daniel P. Bolger (Retired) describes the troubles, travails, and triumphs of the 2-34 Infantry Battalion on an early National Training Center (NTC) rotation with a descriptive narrative, rich in tactical lessons. *Dragons at War* captures the pace of an unrelenting rotational unit experience in what is today termed a decisive-action training environment. In terms that an average reader can understand, Bolger describes the 1982 contemporary operating environment, relevant doctrine, major weapons systems and, most importantly, tactical and leader lessons that any NTC veteran will surely recognize. Location names such as Drinkwater Lake have evolved since the early days of NTC, but the themes and lessons remain the same. Although one might argue that the work is dated, the lessons are remarkably relevant for units that are preparing for NTC today.

Dragons at War describes in some detail the rotational design of its time. Surprisingly, the rotations were battalion task force-centric, as opposed to the brigade combat team-centric rotations of today. The 2-34 Infantry Battalion—one of only two battalion task forces in the brigade—deployed as a part of First Brigade, 24th Infantry Division (Mechanized). The 14-day rotation was broken into two periods of force-on-force scenarios, with a 4-day period of live-fire exercises between them. The 2-34 Infantry Battalion task force was allocated a normal (for the era) share of attachments, and Bolger describes the task force efforts to receive and integrate the attachments for the rotation. The 2-34 Infantry Battalion task force notably received only one platoon of engineers in direct support, although there was another platoon in general support. As a result, the infantry companies spent much time at home station, learning to breach obstacles and mark lanes without engineer support. Bolger also describes the all-too-familiar battles of the "draw yard" that every rotational unit encounters—the chaos and navigational difficulties of the initial movement to a laager in the Central Corridor under the shadow of Tiefort Mountain and the struggle of the task force to find and fix the opposing forces in the initial movement to contact. Bolger organizes the book around each mission set, describing the tactical task in terms that an average reader can understand. There is an incredible amount of detail, including times, in the descriptions. A cynical reader might wonder how focused the author was on looking forward to

a publication date rather than concentrating on precombat inspections.

The book contains many lessons for engineers. Although Bolger focuses on Company B, he takes time to reflect on the various enablers that were attached to the 2-34 Infantry Battalion. He is scathing in his evaluation of the direct-support engineer platoon, labeling it "a known horror story." Nevertheless, to his credit, Bolger does more than throw stones. He explains that the engineers were a victim of a battalion logistics system that had grown lazy while supporting training at the local training areas of Fort Stewart, Georgia. In addition, there were not yet any doctrinal provisions for pushing logistical packages of essential Class I (food)/III (petroleum)/V (ammunition) materials that enabled the task force to maintain momentum or execute a rapid change of mission. Bolger further describes the lack of comprehension that key leaders displayed in understanding the time required to haul the Class IV (fortification and barrier materials)/V (mines) packages 30 kilometers from the brigade trains forward to the far end of a task force movement to the contact lane while transitioning to a deliberate defense.

Dragons at War argues that it is the responsibility of the receiving unit to ensure that attachments are integrated into the unit and to inspect the specialty support tasks that it performs. The 2-34 Infantry Battalion task force struggled with attached units until the task force commander tasked the Headquarters and Headquarters Company commander with the responsibility for all of them, particularly during the vulnerable periods of movement and tactical emplacement. Of course, the task force then paid a price in the form of a less-efficient tactical operations center.

Although perhaps a bit heavy-handed, Bolger's criticism of engineer support is best captured in his description of Team Bravo and the command group moving forward to breach a minefield on the initial movement to contact and passing the direct-support engineer platoon idling near a tanker truck as it executed an ill-timed refuel on the move. "The engineer image at Irwin would be frozen forever in the colonel's mind: a little row of vehicles at a diesel pumper while Bravo's infantry picked through the big minefield," he states.

The author is equally scathing in his assessment of his own performance. He describes that, after many days of nonstop operations, his entire company slept through the task force stand-to and relates that the task force commander berated him on the task force command net, imploring him to catch up. However, Bolger also includes several valuable lessons for engineer attachments beyond the truism that first impressions are lasting. For example: Engineers must know where their bill of materials is and how long it will take for the material to come forward and be emplaced; engineers must be actively involved in the task force orders process; engineers must site critical systems in the same way that infantry leaders site crew-served weapons; and engineer leaders must position themselves near obstacles to ensure that the task force commander's intent, such as closing a lane in a minefield, is achieved when an action is joined. These engineer lessons are timeless.

Several recent Modern War Institute at West Point articles decry the lack of defensive-planning ability. One article indicates that terrain management and engagement area development are particularly difficult tasks to accomplish.[1] Another article elaborates, "This has led to a generation of noncommissioned officers and officers who excel in counterinsurgency and stability operations but have very limited experience with digging individual fighting positions, emplacing wire obstacles, felling trees into an abatis, and [performing] many other tasks associated with conducting engagement area development against a determined and capable adversary."[2]

In today's operating environment, NTC is fully engaged in a shift back to major combat operations and decisive action. Gone are the situational training exercise lanes and preparations for deployments to Iraq or Afghanistan, and back are the pre-11 September 2001 force-on-force scenarios. No longer is the focus on defeating improvised explosive devise networks and securing the populace, but rather on destroying a modern near-peer enemy maneuver force. For engineer leaders, *Dragons at War* contains several truths—some of which are unpleasant. Hard, realistic training is a requirement for combat forces preparing to confront a near-peer. Bolger cautions that it is "so easy to be lazy, especially in training." Bolger's work is much more compelling to read than the abundant lessons learned publications on NTC rotations. Accordingly, it is well worth the time of any military professional to rediscover *Dragons at War*, especially for Soldiers who are preparing for an NTC rotation.

Endnotes:

[1]Jared Hirschkorn, "Getting Defensive: Observations from the National Training Center", Modern War Institute at West Point, 2018, <https://mwi.usma.edu/getting-defensive-observations-national-training-center/>, accessed on 1 August 2018.

[2]Brandon Morgan, "Make Defensive Operations Great Again", Modern War Institute at West Point, 10 July 2018, <https://mwi.usma.edu/make-defensive-operations-great/>, accessed on 1 August 2018.

Mr. Mc Carthy is a retired infantry officer and avid history buff. He presently serves as the U.S. Army Forces Command engineer analyst at the Maneuver Support Center of Excellence, Fort Leonard Wood, Missouri.

Survey Team Establishes New Geodetic Control

By Mr. Mark W. Huber and Mr. George H. Ohanian

The Army Geospatial Center (AGC), U.S. Army Corps of Engineers (USACE), sent survey team members to the U.S. Army Engineer School (USAES), Fort Leonard Wood, Missouri, the week of 4–8 June 2018. Their mission was to establish coordinates on several new survey monuments installed by Military Occupational Specialty 12T, Technical Engineer Instructors, at Brown Hall for inclusion into the National Spatial Reference System (NSRS).

USAES, AGC, and Combat Terrain Information Systems (CTIS), which is chartered under the Program Executive Office, Intelligence Electronic Warfare & Sensors, formed a survey team and spent several days surveying six new control points as well as observing two existing NSRS control points with North American Vertical Datum of 1988 elevations. CTIS provides modern combat engineer and survey capabilities that streamline terrain management, reconnaissance, and surveying. AGC submitted the coordinates for the new monuments, which consist of USACE brass survey disks mounted in concrete (Figure 1).

Figure 1. Standard control monument—a USACE brass survey disk mounted in concrete

Figure 2. A Soldier sets up a GPS receiver point.

All surveying was performed using Trimble R8® surveying equipment owned by USAES and new equipment that CTIS is in the process of fielding. CTIS has commercial off-the-shelf-capable systems coupled with embedded Selective Availability Antispoofing Modules-capable Global Positioning System (GPS) survey receivers, shown in Figure 2. The Army's modern GPS system allows the capability to survey in electronically degraded environments that could influence the accuracy of GPS signals. In 3 days, the team collected GPS observations, which it then submitted to the National Geodetic Survey (NGS) Online Positioning User

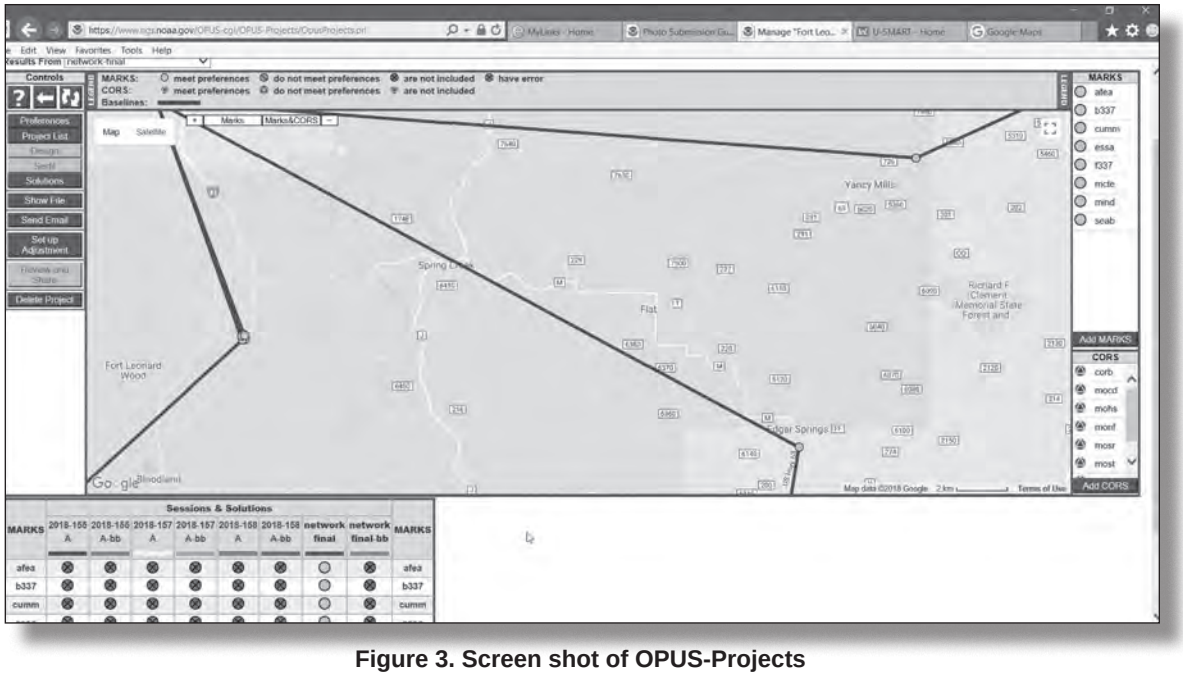


Figure 3. Screen shot of OPUS-Projects

Service–Projects (OPUS-Projects) application (Figure 3). The OPUS-Projects application used the GPS observations to produce baselines between the surveyed points and other NGS points from continuously operating reference stations. These baselines were put through a series of network adjustments to improve the accuracy of the surveyed points.

Final coordinates for these new points, which provide the instructors at Brown Hall more accurate (within a few millimeters) survey control, will be included in the NSRS network. The increased accuracy will help the students at Brown Hall achieve consistent results with any type of surveying equipment and surveying techniques used in training and practical exercises. Furthermore, these points will support future techniques in which positioning will play a critical role in autonomous unmanned operations, sensor placement, and optimization of all types of excavation and construction.

As part of this effort, AGC provided OPUS-Projects manager training to USAES instructors. This authorizes the instructors to utilize the Web-based GPS processing tool produced by NGS. After completing the training, USAES instructors immediately began to demonstrate the OPUS-Projects tool to their students. The OPUS-Projects application provides the user with an online tool to process GPS observations from multiple GPS receivers and produce accurate adjusted coordinates relative to each other and the NSRS network. One of the big advantages of the tool is that it does not require the installation of software on local machines. It also allows users to work from any computer with a connection to the Internet.

Instructor Staff Sergeant Erik Stenslien stated, "These new control points on Fort Leonard Wood are the first to be established and submitted into the NSRS since 1946. This new link to the NSRS will be incorporated in the new survey course that is being updated for 2019. Without these points, we would still be surveying on outdated, poorly constructed benchmarks [Figure 4]. These marks have been sorely needed since I came through Advanced Individual Training here in 2009. In addition, these new markers will help to

Figure 4. Preexisting outdated and poorly constructed survey control markers

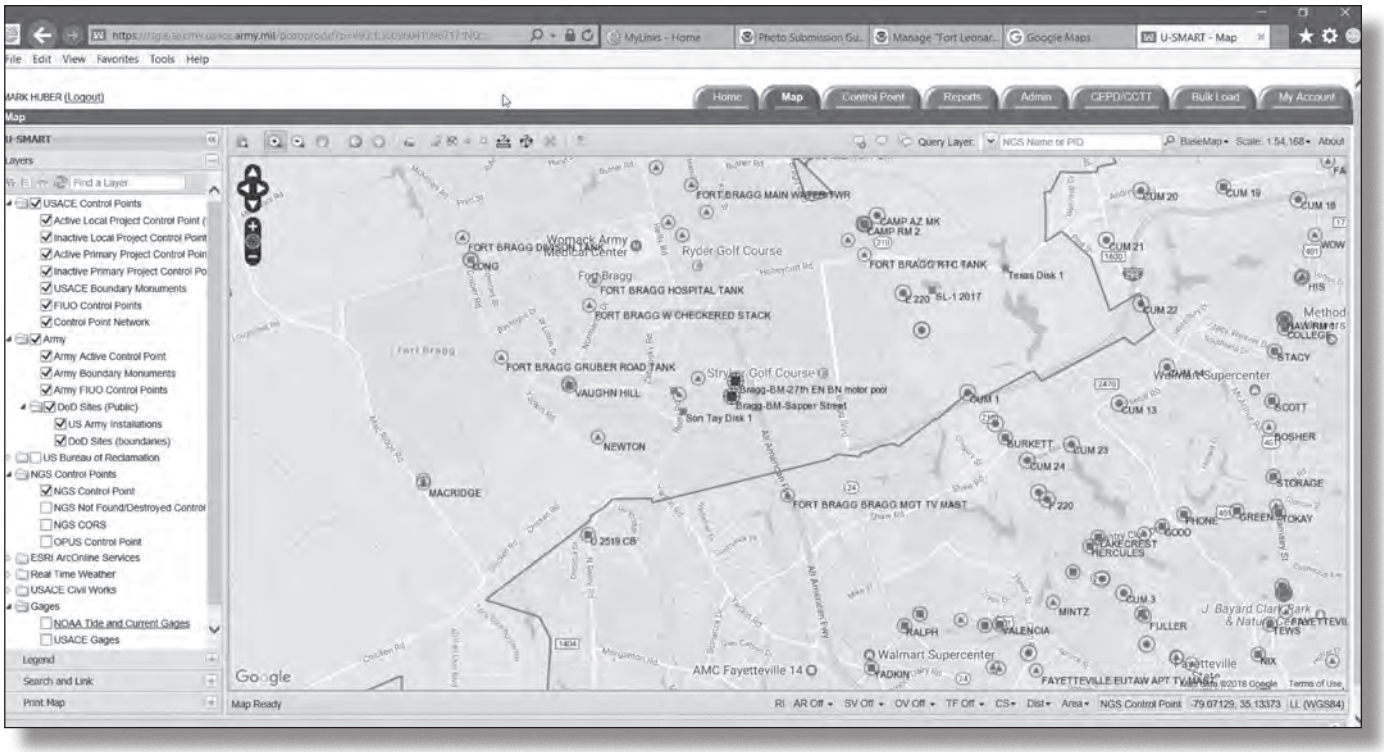


Figure 5. Screen shot of U-SMART

standardize our instruction with modern methods and show our future surveyors what a proper survey control point is."

Staff Sergeant Stenslien is also eager to begin showing his students the USACE Survey Monument Archival and Retrieval Tool (U-SMART), shown in Figure 5. U-SMART manages the USACE project control. Staff Sergeant Stenslien describes the addition of U-SMART to the curriculum, stating, "Working through USACE using the U-SMART system for recovery and description of control points will also be added to the new course. This will replace [Department of the Army] Form 1959,[1] which was last updated in 2001 and is no longer an active publication."

The partnership between USAES, AGC, and CTIS demonstrates how an important and difficult mission can be accomplished with teamwork and cooperation. Collaboration between civilian and military surveying communities modernizes processes at no additional cost to the Army. The team is currently preparing to perform similar tasks at the 164th Regiment Regional Training Institute of North Dakota, located in Bismarck, in August 2018.

Having precise survey control at Fort Leonard Wood and the 164th Regiment Regional Training Institute will also posture those facilities for autonomous construction equipment that leverages GPS and works hand in hand with GPS-enabled survey equipment as we improve the overall training the Army provides to its surveyors.

Endnote:

[1]Department of the Army Form 1959, *Description or Recovery of Horizontal Control Station*, July 2001 (now obsolete).

Mr. Huber is a cartographic technician in the Systems Acquisition Branch, AGC, USACE. He has 30 years of experience with GPS and has conducted geodetic surveying campaigns around the world. He also serves as a subject matter expert for the Survey Engineering and Mapping Technical Center of Expertise and as an instructor in several USACE surveying and mapping-related courses.

Mr. Ohanian is the product director at CTIS and serves as the chief of the Systems Acquisition Branch, AGC, USACE. He holds a bachelor's degree from the University of Maryland and a graduate degree from George Washington University, Washington, D.C. He is Defense Acquisition Workforce Improvement Act Level IV-certified in project management.

"A man's feet should be planted in his country, but his eyes should survey the world."

—George Santayana

ENGINEER WRITER'S GUIDE

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Include photographs and/or graphics that illustrate information in the article. Graphics must be accompanied by captions or descriptions; photographs should also be identified with the date, location, unit/personnel, and activity, as applicable. Do not embed photographs in Microsoft® PowerPoint or Word or include photographs or illustrations in the text; instead, send each of them as a separate file. If illustrations are created in PowerPoint, avoid the excessive use of color and shading. Save digital images at a resolution no lower than 200 dpi.

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